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Funding the Future: Are the Facts Correct?

*T.F. Shaxson**

ABSTRACT

In the tropics and sub-tropics, despite many years of effort and expense to resolve them, land degradation and decline in yields are continuing problems, and much money has been ineffective (Doolette and Smyle, 1990, p.35). A present problem is that financial aid-agencies are increasingly reluctant to continue to fund such programs whose outcomes may not be sustainable and which seem likely to show poor benefit:cost ratios. In-field situations in Lesotho, Brazil, India and Nepal are described which indicate that faulty assumptions or misapprehensions - about farmers' perceptions, about the causes of degradation of soil and water-supplies, about cause-and-effect relationships between erosion and yields, and about the dynamics of landscape-formation – could have led to inappropriate emphases in the formulation and funding of programs for improvements in land and livelihoods. Identification, re-assessment and abandoning of invalid but ingrained assumptions can lead to raising benefits per unit of cost, to lowering of costs per unit of benefit, to enhancing farmers' interest in implementing effective and lasting solutions to problems in plant production, to increased resilience of farming systems in the face of vagaries of climate and the market, to improving the possibilities for attracting funding assistance, and to increasing food security and decreasing rural poverty in the coming century.

FUNDING THE FUTURE

Difficulties

In many tropical and subtropical countries, while rural populations continue to rise, the productivity of their lands is commonly said to be falling due to soil erosion, and more and more people are falling into poverty. This is part of a set of problems, which pose a challenge for the 2lst century (Govt. of U.K, 1997). But there is a paradox. On the one side some governments engage in apparently open-ended spending on wars. On the other side development-funding agencies appear to be constantly preoccupied with the minutiae of budgets, and sometimes give the impression of being 'fatigued' at being asked to finance yet more projects and programs aimed at halting the decline but which would seem, on past evidence, to have little chance of any greater or sustained success than before.

Where funds are provided initially for various aspects of rural development, including land development and soil conservation, they may often be as development-agency grants for short-term 'pilot projects', to allow the identification of what 'interventions' might work in some particular geographical x cultural situation. However, the following stage of negotiations with lending agencies, such as commercial banks, for getting loans for longer-term funding of technically successful components of such a pilot project over wider geographical areas, may be difficult, protracted and not always fruitful, due to doubts about the scale or duration of benefits relative to the expected costs.

Reasons for such hesitancy to fund further projects are commonly related to

(a) unwillingness to fund actions whose outcomes may not last, and

(b) the unattractive, and possibly falling, rates of return which lenders fear they are likely to derive from investments in agriculture-related development in these poverty-stricken countries, where land improvement and conservation of water and soil is increasingly urgent but still fails to be achieved. How can the difference between the costs and the benefits be increased so as to be more attractive to financiers?

Two possibilities

One way has been the use of wishful thinking about benefit:cost ratios at the stage of preparing project budgets may inflate unrealistically the supposed number or size of expected benefits, and/or reduce unrealistically the supposed costs of producing them. However, this brings the difficulty that, while it may apparently better justify the investment, it also may increasingly divorce the economics from the realities in the field and diminish rather than increase sustainability of benefits. For instance, allocation of significant sums of money for making soil conservation structures has often been based on unsubstantiated positive assumptions about projected yield increases supposedly attributable to the structures. When eventually these are not realized, the benefit:cost ratio may even prove be negative:

"The ex-ante benefit/cost literature on soil conservation generally appears to have been overly optimistic about benefits and costs, has often failed to adequately address the subsidy component of conservation promotion schemes, seldom accounts for maintenance requirements and most importantly seems to be at odds with evidence on adoption rates. More careful attention to the dynamics of the adoption of soil conservation techniques is clearly needed". (Magrath,1990, p.91).

Field experiences show that in this way money was thus wasted, overall output from the fields may have been reduced in proportion to the land area taken up by the structures, any goodwill on the part of affected farmers was reduced, adoption of recommendations was unpopular, and downstream problems of flooding and sedimentation continued.

An alternative way is to further deepen the inquiry into reasons for success or failure of soil conservation projects

*Greensbridge, Winterborne Kingston, Dorset DT11 9BJ, England; f.shaxson@cwcom.net.

(Hudson, 1991) (and probably relevant also to other projects and programs in other aspects of agricultural development) by asking ourselves if even some of the premises on which projects have been predicated might themselves have been inaccurate.

ARE THE FACTS CORRECT ?

The examples below, from a range of situations in the author's experience, suggest the hypothesis that some aspects of failure and/or low benefit:cost ratios of different projects in the past could have been due to uncritical use of faulty assumptions at the concept stage, before projects were even designed, and that this is a potential pitfall to be recognized and avoided in future.

If underlying premises or assumptions were mistaken, a project's design and implementation would then tend to initiate and perpetuate actions which might be technically inadequate or inappropriate, and/or which might fail to catch and maintain the interest and commitment of the rural people whom it is supposed to benefit. A participatory approach in which 'bottom-up' and 'top-down' aspects of putting a project together meet in a 'zone of convergence' will do much to avoid some of these distortions (Virgo, 1999).

EXAMPLES

A different perception of reality

On a flat field of easily-cultivated loamy soil I saw, on several occasions, a farmer plowing with six work-oxen harnessed to a single-furrow plow by means of simple bluegum-pole yokes. I assumed that each ox was so uncomfortable that he was unwilling to exert maximum effort, making it necessary for the farmer to hitch six together to get enough draft-power to do the job. So I began considering a small project to develop and popularize more-appropriate harnesses, maybe equivalent to horse-collars, for the greater comfort and tractive power of each ox, so that two could do the job now done by six, and four would be released for two other farmers to plough likewise at the same critical pre-rains season. I greeted the farmer at his plowing one day and explained my idea. He laughed in disbelief that an outsider could be so wrong: "If I only hitch two to the plough (which is all it needs), then I have four of my oxen with nothing to do but cause mischief up in the village. To avoid such problems I would have to pay someone to watch them. It is much cheaper for me to hitch them all to the plough where I can keep an eye on them all the time!"

While this is a small and amusing incident, it has huge implications: How many multi-million-dollar projects in the past have been built on outsiders' preconceptions and assumptions which, like mine, were in fact not in accord with either the technical or the farmers' own realities? Projects or programs founded on equivalent misperceptions would not address farmers' chief concerns, nor would they be sustained autonomously in future, because the farmers would not have interest. So, much money might be spent for little or no lasting result, giving low, if any, return on the investment. Therefore it is important to identify and verify one's own - usually hidden - assumptions from the very outset of conceptualizing and framing programs and projects.

Erosion and ecological dynamics

Many projects in the past have treated soil erosion as if it were an invisible monster stalking the land, carving gullies and stripping topsoil, and which therefore had to be stopped/fought as a menace to the land and to agriculture, with enormous expenditures worldwide on various types of physical conservation works. But over the past century many projects aimed in this way at soil and water conservation have not resulted in the lasting positive benefits that had been envisioned at their beginnings. (Hinchcliffe et al., 1999).

In reality accelerated erosion and runoff represent an active phase of change in relationships between various components of an agroecosystem – between its topography, climate, geology, hydrology, soils and plant and animal organisms - from one level of relative stability to another, following the disrupting effects of a change in management. So attempts at dealing with runoff and erosion by hindering their movement fail to address the more basic 'upstream' causes of the problems, which are often found to be a decline in effective soil cover and/or a loss of soil porosity. Making the common assumption that soil erosion itself is usually the prime cause of land degradation channels and constrains all subsequent thinking about how best to resolve problems of land degradation.

By the earlier thinking, rural people have been blamed as the causes of erosion by deforestation, overgrazing and over-cultivation. Restrictive and punitive laws have been enacted by governments to prevent such actions at macro-level, but with little effect . Better success might be achieved if more attention were to be been given, at micro-level, to recovering three key features which each of the three supposed causes have damaged in common, by: (a) reinstating long-lasting and conservation-effective vegetal cover over the soil; (b) restoring soil's organic-matter content and activity; and (c) reinstating the soil's porosity, all of which are in fact interrelating actions (Shaxson, 1997). Dramatic proof of this assertion is provided by the exponential growth of crop-residue-based zero-tillage in Brazil over the past decade. The techniques developed for both large mechanized farms and for small farms with only animal traction concentrate specifically on achieving and maintaining these three key features of well-managed soils of almost any type: cover, organic content and porosity. Because of reduction of costs and stabilized or increasing yields, the economics of zero tillage have attracted the interest of farmers not only on the soils of the temperate southern states but also those of the subtropical subhumid Cerrado region and of the hotter tropics of the Amazon basin. The spread, through farmer-to-farmer networks and without subsidies, has been from around 200,000 hectares in 1980 to about 1 million hectares in 1990, then continuing exponentially to over 8 million hectares in 1997 and over 9 million in 1998 (FEBRAPDP, 1997; Pereira and Landers, unpublished data,1999).

Clearer knowledge of the components and ecological dynamics of landscapes paved the way for conservation-effective crop- and pasture-production practices to improve health, porosity and productivity of the soils under zero-tillage, to increase sustainability of the farming systems, and hence to increase the margins of benefits over costs.

Altering the focus

Cover-based reduced-tillage systems and zero-tillage, as exemplified in Brazil, have not only provided economic but also environmental benefits. Among the benefits is the fact that most of the rainfall infiltrates into the soil, whereas before large proportions were lost as runoff.

On degraded soils, poor yields from crops, pastures, and forests are often more closely related to insufficiency of plant-available soil water at intervals during the growth cycle than to loss of soil by erosion (FAO,1995). To the extent that contoured planting-ridges, bunds and terraces provided increased detention-time for the water to soak in, they had an effect. This, however, did not address the problem that the runoff in the first place had been exacerbated by loss of voids which form the soil's macro- and micro-porosity which include old root holes, the burrows made by earthworms and other soil organisms, and the spaces between soil particles and aggregates, into and through which rainfall can infiltrate, be held and percolate into the soil.

When the focus is altered from soil to water, and from solid particles to the spaces between them, the approaches to improving yields are no longer restricted to combating soil erosion.

Attention first to minimizing disruptive effects of high-energy rainfall in the vertical dimension by soil-cover and strong soil structure should precede installing physical structures against the effects of runoff in the lateral dimension. (e.g. Shaxson et al.,1989). In Brazil, those adopting zero-till technologies have found in many cases that physical conservation structures, beneath the dense cover of crop residues, are now almost superfluous because almost no runoff occurs even in very large storms.

Under conservation-effective systems such as zero tillage, crop yields may benefit directly from more available soil water from rainfall at little or no extra cost to the farmer. Deriving from the better infiltration of rainfall, improved river-flow regimes can improve domestic water supplies and chances for dry-season irrigation. For instance, in southern Brazil a farmer and his wife on an 8ha smallholding near Toledo were able to raise their living standard from poverty to profitability once the river bordering their holding became perennial again after many years, due to improved land management through conservation tillage methods in the catchment upstream. This encouraged them to build fishponds for commercial production and to install irrigation for high-value soft fruit crops, and both enterprises have been satisfyingly profitable. Other examples of benefits from increased water availability are quoted by Hinchcliffe et al. (1999). Increased availability of rain, expressed both as soil water and as streamflow, can offer opportunities for increased financial viability if the benefits, both direct and indirect, rise faster than the costs.

An historical clue

Near Palampur, in the Shiwalik Hills of North India which lie in front of the Himalayan ranges, low yields of crops, pastures and woodlands were assumed by many to be due somehow to soil erosion. However, the connection between yields and the very visible gully erosion and torrent-type riverflow which is typical of the Shiwaliks was not clear, nor were the mechanisms of possible beneficial effects on yields of physical works such as gully-plugs, checkdams and river-training gabions. But a chance remark by a small farmer gave the clue to making a particular project's approach more comprehensive. He said that when he was a boy, the stream on whose bank we were standing had run throughout the year, and had been narrow enough to jump across. But over the years it had become more prone to damaging flash-flooding, more frequently cutting its banks away and reducing the usable area of his small farm. It now ceased to flow ever earlier in the dry season, resulting in severe shortage of water for even domestic use at the hottest time of year.

This historical clue sparked our understanding that the porosity of the catchment surfaces - cropland, pastureland and 'forest' land (usually severely-degraded native vegetation) - throughout the project area has been declining over the years. It switched main emphasis from soil erosion control to enhancing rainwater infiltration, something to be achieved most effectively by improved management of these areas through the decisions of the villagers who have control of their use. It also highlighted the linkage between lack of water in the rivers at critical times of year, observed high volumes of short-duration runoff, and physiological drought in the soil root-environments of plants used for crops and for fodder. Because everyone in this area is afflicted by the problem of extreme scarcity of water in the hot dry weather, the increased emphasis on improving water capture and use has generated much enthusiasm among the villagers (Kloss and Preuss, 1996).

In this case, knowing something of the history of a stream led to a change in project emphasis that attracted rural people's interest and efforts in rainwater capture and management. The results in terms of rainwater retention on areas for fodder, wood and grazing, together with water-capture (from roofs), have allowed raised yields of feed for animals, development of vegetable production, more-reliable water supplies for domestic uses, and concomitant increased benefits to rural families' livelihoods.

A geological clue

Over the last decade or so, poverty-stricken rice farmers in the Nepal Terai zone closest to the Churia Hills (an easternmost extremity of the Shiwalik formation in North India, as above) have suffered severely from the cutting and depositional actions of short but sediment-laden rivers whose headwaters are in the forests clothing this low range of hills. The rivers change their courses frequently, in some places cutting away earthen embankments and the fields behind, in others depositing sheets of boulders, gravel and sand on the rice-fields. One of the tasks of a rural development project in the area was to try to solve this problem. The severe erosion giving rise to such high sediment-loads in the rivers during and after each rainstorm was assumed to be related to overgrazing and tree-chopping in these hill lands for which rural people, both from the vicinity and from far away, are commonly blamed. Yet it was difficult to relate the huge volume of eroded materials carried by the rivers to the relatively low intensity of these human activities as observed both on the ground and from the air. An indication of a need for stern action against the people was implied by a photo in a project document of a small area of severely-overgrazed and devastated forest land, which suggested an (unreal) representativeness of the whole area.

Four disparate facts eventually came together over a few days during a visit: (a) we were told in conversation that comparison by Government staff of air-photos of the area at different dates over the last three or four decades had showed a sudden and apparently unexplained change in the rivers' appearance, from relatively placid streams to intermittent debris-choked torrents, about 9 years before; (b) in the vicinity of the Churia Hills a number of buildings had been demolished, and others had suffered severe cracking of the walls, during a severe earthquake which had occurred a year or more before the aerial photography had recorded the river-changes; (c) our foot-traverse into the hills along more than one river-channel showed that even beneath dense forest vegetation there were deep vertical-sided gullies cut into the loosely-compacted bouldery and sandy sediments of these steeplands; (d) stereoscopic study of the most recent airphotos showed that in some places the rocky ridge-line of the Churia Range, still clothed in relatively dense forest, looked like the cracking on the top of a well-baked round cake, apparently bursting upwards from the center.

These four observations pointed to a geological/tectonic cause of the problem, rather than one to be blamed solely on the people's mismanagement of land. An explanation which fits the facts, in this tectonically-active zone at the foot of the Himalayas (Bruijnzeel and Bremmer, 1989, p.15) is that the earthquake resulted from an upward shift of some underlying strata as the Indian Plate grinds into the Tibetan Plate, pushing the Churia Hills themselves higher by perhaps a meter or more, thereby increasing the rivers' gradients and provoking active downcutting at present, tending towards a new equilibrium in the future between the rivers and their catchments.

Here, some understanding of the geological dynamics of the situation could remove undue blame being accorded to rural people for the problem, thus perhaps avoiding investment in inappropriate forest-control actions which would have proved ineffective in the face of the real land condition, and which could have broken down any goodwill between Forestry Department staff and the rural people thought to be causing the mess. The insight did not suggest a solution to the rice-farmers' problems of deposition and damage downstream, but it did indicate that large expenditure on massive physical gully-control structures in the hills would probably be a poor investment because of only short-term effects of holding back erosion debris before the structures were themselves filled and overwhelmed by further sediment emanating from the active fluvial downcutting.

WIDER IMPLICATIONS

The examples given above, and others' experiences also, indicate that greater benefits per unit of funding may be achieved if the interpretations of facts underlying a project's design are actually realistic. In some cases, these increased benefits may be achieved because unnecessary costs were avoided, and much of the funding allocated for 'erosion control' could be transferred to more profitable activities within a project. In other cases, even within the same project, benefits may be increased even at the same level of costs, because e.g. technical efficiency in the capture and use of scarce soil water has improved, greater efficiency in use of expensive fertilizers has been achieved, and/or because e.g. people's latent skills and enthusiasms have been tapped, such that they are keen to continue into the future work which had been initiated under a pilot project, which they consider to produce recurrent worthwhile results. Improvements such as these would prolong the stream of benefits beyond the critical end-point of any pilot phase.

Listening, observation and lateral thinking are useful attributes to exercise at every and any stage in the sequence of a program's life, from the concept, through design and implementation. Altered emphases, mental inversions, and re-interpretation of available evidence can all contribute to insights which may conform better with realities faced by the rural poor.

Farmers in Brazil using zero-tillage acknowledge that it has given them greater resilience than before against price-shocks such as caused by recent drastic devaluation of the currency and adverse changes in market conditions. Such improvements, with other examples such as reported by Hinchcliffe et al.,(1999) also create greater resilience of the land in the face of climatic shocks, such as infrequent but intense erosive rainfall, which may increase in severity and/or frequency as global climate change occurs. Such resiliences minimize the likely direct and indirect costs required to clear up the negative effects of such events, whether in terms of value of agricultural loans written-off, or the quantum of emergency relief costs for repairing fields, homesteads, and infrastructure damaged by events such as Hurricane Mitch across Central America recently.

Getting the facts right at the beginning also provides better bases for benevolent policy-making, promoting catalysis more than castigation, facilitation more than force. Participating with people in solving their real problems effectively leads to greater likelihood of farmer-to-farmer spread of innovations and adaptations that they consider valuable. Thus a limited number of advisory staff may be deemed to be more cost-effective than before when comparing the speed and reach of positive changes that have spread autonomously.

If a soundly-based project enables farmers to produce acceptable benefits quickly and in ways which are effective in conserving water and soil, and where these are linked with attractive market opportunities, profits begin to be generated and entrepreneurship begins to develop, so that the need for ongoing financial support may be overcome by the farmers and their own commercial institutions (e.g. Cheatle and Shaxson, this Conference, in review). This is most likely to happen where and when prices paid to farmers for favored products from the developing countries are more nearly equal than at present to those in the wealthy industrialized countries of the world.

Improving the husbandry of land, in both its socio-economic and agro-ecologic aspects, produces positive consequences for the well-being of people and of their surroundings. However, projects and programs to help people achieve this successfully depend on ensuring that background facts are correct before appropriate assistance is suggested and formalized.

These ideas may contribute to approaching more quickly a number of important objectives, among them:

- Achieving conservation of water and soil as integral components of production systems;
- Developing safe intensification of production on a sustainable basis;
- Giving practical effect to both the World Conservation Strategy (IUCN et al., 1980) and the World Soil Charter (FAO,1982);
- Maintaining donors' and lending agencies' interest and willingness in funding for successful and self-supporting development;
- Increasing food security and eliminating rural poverty during the coming century.

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