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Multi-Level Participatory Planning For Water Resources Development In Sri Lanka

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EXECUTIVE SUMMARY

Participatory approaches have been shown to be effective for natural resource development planning. In most of these cases, however, the planning unit has been a village or small settlement area. This leads to the problem of how to 'scale up' a participatory approach when supra-community level planning is needed.

Supra-community level planning is necessary for water resources development. As water flows from place to place, the actions of one local community affect water availability for local communities downstream. Thus water resources development planning should be undertaken by multi-community groups so that the interests of all the communities within the water basin can be properly served.

This paper describes a multi-level approach to participatory water resources planning. In the multi-level approach, meetings are held with farmers in local communities to get an initial information base and to introduce the planning approach and concepts. Then participants from different local communities within a watershed meet at participatory planning sessions to exchange information about local conditions in different parts of the watershed. The participants use the enlarged information base to prepare water resources development plans for the whole watershed. This approach ensures that all local interests are reflected in the plans.

This approach was used in Sri Lanka to plan small tank (reservoir) rehabilitation activities. Preliminary studies found that farmers had little idea about the hydrology of parts of the watersheds outside their village areas. The multi-level approach gave farmers the knowledge to prepare workable proposals for improving water distribution within the sub-watershed. Without the multi-level approach, farmers could only suggest fixing their tanks, an activity that would have little development effect since it would not increase irrigation water. The sub-watershed level plans, however, included means for augmenting tank water supplies and thus increasing irrigated area.

The success of the approach was due partly to the constructive blend of scientists' knowledge of the watershed hydrology and the farmers' detailed knowledge of local hydrology, farming systems, and their own needs. A key point was that the farmers shared their local knowledge with farmers from other villages to produce useful watershed level knowledge and plans.

The paper concludes by outlining the institutional and policy support needed to make this approach more widespread in natural resource planning and management.

MULTI-LEVEL PARTICIPATORY PLANNING FOR WATER RESOURCES DEVELOPMENT IN SRI LANKA

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Participatory approaches have been shown to be effective in natural resource development planning (Chambers, 1994a; Shah, 1993; Devavaram, *et al.* 1991). In most examples of participatory planning, however, the planning unit has been a village or small settlement area. This close association with single communities leads to the problem of how to "scale up" a participatory approach to groups larger than the local community (Chambers, 1994b; Webber and Ison, 1995) when supra-community level planning is needed.

Supra-community level planning is generally necessary for water resources development. Water is a 'fugitive' resource; that is, it flows down slope under the force of gravity. The actions of one local community affect the availability of water for local communities downstream. The linkage of water resources systems within a water basin make it important that water resource development planning be undertaken by multi-community groups so that the interests of all the communities can be properly served.

This paper describes an approach to participatory multi-community water resources planning developed in Sri Lanka. The paper describes the steps and results of the planning process, and draws some general conclusions about the advantages of this approach and about the institutional and policy support needed to make it more widespread in natural resource planning and management.

Small Tank Irrigation in Sri Lanka

Irrigation in Sri Lanka

Sri Lanka has a history of over two thousand years of irrigation development (Brohier,1934). Today, Sri Lanka has more than 12,000 functioning irrigation schemes covering approximately 500,000 hectares. About 98% of these schemes irrigate less than 80 hectares each and are classed as "minor" irrigation schemes.

Sri Lanka is conventionally divided into two climatic regions: the Wet Zone in the south-west third of the island and the Dry Zone in the remaining two thirds. The country has two farming seasons. Maha season stretches from October to February when the north-east monsoon brings heavy rains to the whole island. Yala season runs from April to July when the south-west monsoon brings heavy rains to the Wet Zone and light rains to the Dry Zone.

In the Dry Zone, most of the minor irrigation systems are 'tank' systems; that is, they are based on small reservoirs. These tanks fill with the Maha rains. From the tanks, water is taken to the fields through earthen channels. Rainfall, although relatively high (over 1000 mm), is quite variable and soils in the Dry Zone are shallow and porous. As a consequence, many tanks fill on average only about three years in every five. Not surprisingly, many farmers depend on rainfed as well as on irrigated farming.

Water Resources Development in Tank Cascades

Sri Lanka is now implementing two coordinated rural development projects[1] in North Central Province in the Dry Zone. Both projects include water resources development components focused mainly on the repair and rehabilitation of small tanks. The International Irrigation Management Institute (IIMI) was asked to define an effective strategy for these components.

Rather than focus development efforts on individual small tanks, we chose to focus on watersheds, subwatersheds, and tank cascades. A tank cascade is a chain of tanks located one above another within a subwatershed (Sakthivadivel, *et al.* 1996). Tank cascades are characteristic of the Dry Zone (Madduma-Bandara, 1985). In tank cascades, drainage from one tank forms the major inflow to the next lower tank (Itakura and Abernethy, 1993).

Because of the hydrological interconnections, development of one tank can affect other tanks and other water users in the following ways:

- Increasing the capacities of tanks located in the upper sections of the cascade may reduce the inflows to the lower tanks.
- Increasing the capacity of a tank may lead to inundation of lands in the command area of the tank immediately upstream in the cascade.
- Tank hydrology has a strong influence on groundwater; wells below tanks have consistently more groundwater, even in the driest parts of the year, than do other tanks. Changes in water availability in tanks can affect the availability of groundwater for irrigation and other purposes.

These linkages imply that water resources development plans should focus on tank cascades rather than on individual tanks.

Because of the importance of irrigation in Sri Lanka, improving irrigation facilities has long been a popular means of rural development. In the Dry Zone, there have been numerous small tank rehabilitation projects and efforts. To date, this work has tended to focus on individual tanks, largely because:

1. The North Central Province Area Development Project, funded primarily by the Asian Development Bank, and the Participatory Rural Development Project, funded primarily by the International Fund for Agricultural Development.

- Tank management is largely carried out by village functionaries called *vel vidanes*. The government is also creating village based farmer organisations to manage tanks. There are no cascade-level management entities in the Dry Zone. Thus, even if a development project wished to work with cascades, there are no farmer groups with whom to collaborate.
- Working with individual tanks requires less data on hydrology and the work can be organised more easily.
- In popular imagery, the traditional Sri Lankan (Sinhalese) rural community includes three items - the village, the tank, and the Buddhist temple (Spencer, 1990). Thus many people associated a tank with a village but not with other tanks. This is particularly likely to be true of urban-based administrators and professionals who design development projects.

Most of the prior small tank rehabilitation projects have achieved poor results (Abeyratne,1990; Dayaratne, 1991). This failure has largely been due to poor understanding of tank and cascade hydrology. Because of the focus on individual tanks, tank rehabilitation has been done without ensuring that there would be additional water available to increase cropped area or cropping intensity.

Participatory Planning In Tank Cascades

The Approach

IIMI's task was to devise a method to prepare land and water development plans for the project that would ensure that beneficiaries' incomes would be increased. Our first concern was the identification of tank cascades where there is additional water that can be tapped. To achieve this we devised a method for selecting tank cascades using secondary physical and hydrometeorological data (Sakthivadivel, *et al.* 1996). Once promising cascades had been selected, we then needed to collect detailed data on the tanks in the cascade to confirm our initial cascade selection. Using this data, the next step was to work out development plans with the farmers that took the cascade hydrology into account. Development of the plans called for cascade level planning rather than tank level planning.

To collect tank data and to work out plans, we initially held group meetings with farmers in the villages in two cascades. This exercise showed that, although we asked them to consider the cascade as a whole, farmers' development proposals focused solely on improving their own tanks and distribution systems even though many farmers identified supply of water to the tank as the major problem. It was clear that the farmers were not thinking beyond the limits of the village jurisdiction.

Investments in irrigation water resources development can be justified only when they contribute to greater agricultural production. Where supply of water was the problem, farmers' proposals offered no way to increase cropping intensity or agricultural production. Since we had data on all the tanks within the cascades, we could see that some tanks in each cascade had an excess of water and others had a deficiency. Thus, distribution of water among the tanks in the cascade might improve the overall agricultural water supply situation. Since farmers were not able to see these possibilities, our initial planning process had a serious deficiency.

We decided that a cascade level participatory approach was needed to get effective farmer participation in cascade level planning. Our problem was that there are no cascade level settlement, management, or other social units to serve as the basis for undertaking participatory planning. Therefore, we devised a three stage process:

1) Village-level meetings. First, the IIMI field team would meet with farmers in each village to gather data on the village tanks, introduce the idea of cascade development, elicit and discuss proposals for investments in water resources development, and inform the farmers about the subsequent stages.

2) Multi-village meetings. Second, the IIMI field team would organise and lead a meeting of representatives from a cluster of 3-4 villages to discuss water resources development plans for each tank and to develop a cascade level plan.

3) Cascade-level meetings. Third, the IIMI team would organise a discussion among representatives from every village in the cascade to devise and agree on an overall plan for the cascade based on the proposals from the multi-village meetings.

Cascades can have up to 12 villages. We included the multi-village level meeting in this plan because we felt that jumping from a single village to a meeting among 12 villages would not be effective. We felt that the farmers needed additional time to learn from each other about the hydrology of the different parts of the cascade, and to begin to think in cascade level terms. Thirteen cascades were selected based on their potential for water resources development. The data collection and planning work at all levels was carried out by a three or four person team. Participatory mapping (Box 1) was used at all levels as the primary means of data analysis and planning.

Village Level Meetings

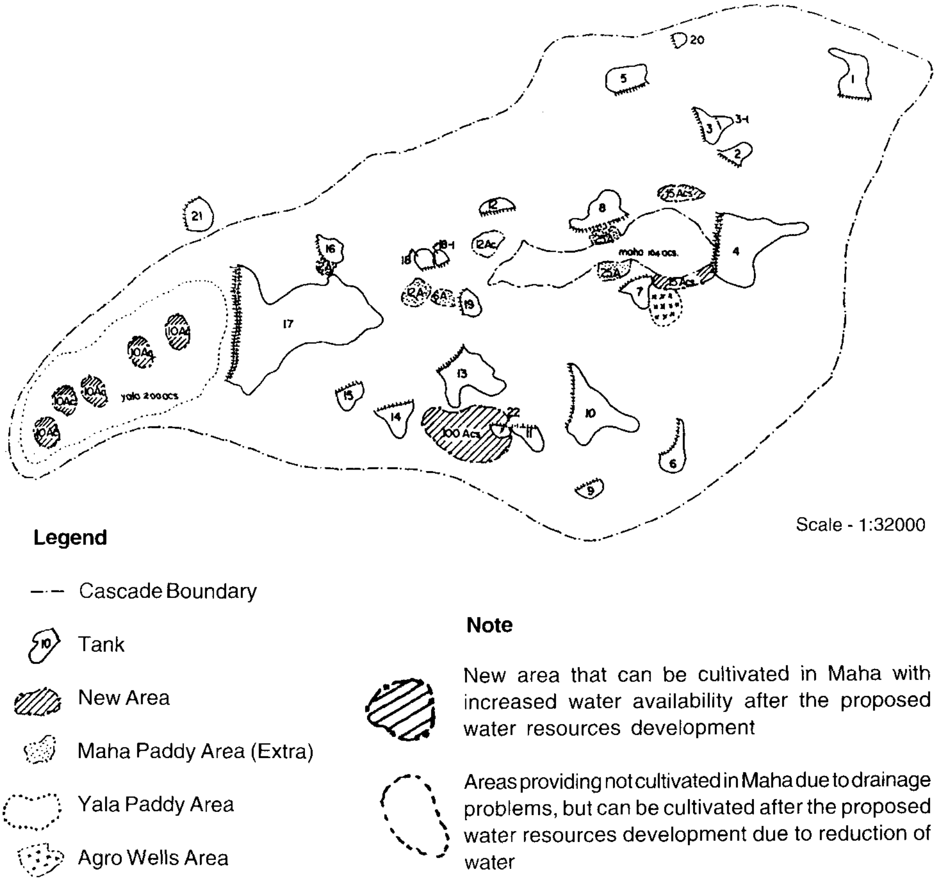
The first step of the planning process was to meet with farmers in each village in a cascade. In each village, the IIMI team met with the president and secretary of the farmer organisation, or with the v*el vidane* if there was no farmer organisation in the village, and two or more other farmers. At each meeting, the team explained the cascade planning process and used maps to introduce the concept of cascade level planning. Then the team asked farmers to consider how agricultural water resources could be improved in the cascade as a whole.

The IIMI team found that farmers knew very little about cascade tanks under the control of other villages; nor did they understand the hydrological relations of the tanks, streams, and wells of the cascade or the watershed as a whole. As a consequence, the farmers were not able to plan effectively for water resources development of the cascade as a whole.

Box 1. Participatory Mapping: A Key Analysis and Planning Technique

Since the farmers were not used to dealing with issues at the cascade level, we needed a tool to allow them to discuss those issues. The selected tool was a map of the cascade. For each cascade the standard government 1:50,000 maps were used as a basis for participatory mapping by farmers. Maps allowed participants from one village to visualise how the water flowed from tank to tank, and made the notion of a "tank cascade" concrete to the participants. The maps also enabled the farmers to discuss how their activities interrelated with those of participants from other villages.

For each cascade, we asked the farmers to develop six maps: a map of settlement details, road network and aspects of community organisations; a map of present cascade land and water resources, including land use in the catchment area, natural streams, drainage and inflow patterns, etc; a map of land use in tank command areas including cropping pattern and cropping intensity; a map of the proposals for water resources improvements in the cascade; a map of new land that could be developed for irrigated agriculture as a result of improving water resources in the cascade; and a map showing the management organisations that could be developed to manage water resources. Below is one example of a map prepared by farmers. It shows how their proposals for water resources development in the Maminiyawa cascade would increase the irrigated area.



Therefore, the proposals at the village level discussions were confined to improvement of the village tank(s) such as raising the bunds or improving the spillways. These proposals are summarised in the second column of Table 1. Some farmers did point out that without augmentation of water supply to their tanks, the proposed tank system improvements would not have a significant effect on agricultural production. Farmers clearly recognised a need for tank augmentation but did not see how it could be accomplished.

Multi-Village Meetings

A cascade normally contains from six to 12 villages. Depending on the number of villages, the team organised two or three multi-village meetings, each including the villages from a well-defined portion of the cascade. All villages in the cascade were included in the meetings. At least two farmers participated from each village; each meeting was attended by about 18 farmers. The IIMI team facilitated the meetings and contributed to the analysis and planning efforts by providing analytic concepts and information on general hydrologic principles. A key point was that the team did not interfere with the farmers' analysis and planning. Decisions about the data itself, its interpretation, and about the proposals to be included in the development plans were left strictly to the farmers. As a result, although the sessions were facilitated by the IIMI team, it was farmers' ideas and priorities that emerged.

Cascade Level Analyses

The IIMI team asked the farmers first to analyse the water resources in the cascade, the agricultural performance of the tank systems, their cultivation practices, and their institutional problems. To analyse cascade water resources effectively, farmers from different villages combined their knowledge of individual tanks to arrive at a clear picture of water resources at the sub-cascade and cascade level.

In addition to analysing the water resources, farmers analysed their cultivation practices to determine reasons for poor agricultural performance. These discussions were quite interesting to the farmers because farmers from different villages were involved. They found that while farmers from the same village usually had arrived at similar ideas through regular interaction, farmers from other villages often had quite different ideas. To summarise these discussions, the following were identified as reasons for poor performance of irrigated agriculture:

- Prolonged land preparation due to higher priority given to rainfed cultivation during the early part of Maha season.
- Scattered cultivation within the command area leading to increased water conveyance losses.
- High level of water wastage during Maha due to improper water management.
- Failure to plant crops requiring less water than rice to make better use of limited water supplies, particularly during Yala seasons.
- Farmers also identified the following institutional constraints:

- Farmer organisations have been established by the government for villages or for local administrative divisions rather than for tank commands. Thus, the farmer organisations do not generally take responsibility for tank system management. Water deliveries from tank sluices are made by individual farmers, either a *vel vidane* or someone else.
- There is no institutional mechanism for farmers to organise collective actions at the cascade level.
- Farmers are not satisfied with the extension programmes of the Department of Agriculture or with the input and other programmes of the Department of Agrarian Services.

Cascade Level Planning

Following these analyses, farmers were asked to develop plans for improving water resources management within the cascade as a whole. In many cascades, some tanks have excess water while others are always short of water, so farmers considered ways to distribute water better among the tanks. The ideas proposed included redistributing water from tanks that have an excess to those that have a deficiency; identifying natural streams from which additional water could be diverted to cascade tanks; diverting the excess water for use in an adjoining cascade; and tapping excess water from adjoining cascades. For the last point, farmers observed that since they own lands in adjoining cascades it would be possible to implement this plan without creating community conflicts.

Farmers also identified possibilities for improving cultivation and water management practices to increase cropping intensity, including planting crops that would require less water than rice. To reduce damage to catchment (upper watershed) areas, farmers also made suggestions to motivate farmers to undertake stabilised rainfed cultivation instead of the prevalent shifting cultivation. Possibilities discussed included the allocation of selected catchment areas to grow fruit or timber trees.

The discussion of water management at the cascade level and the development of proposals to link tank systems managed by separate villages through canals, raised the need for establishment of supra-village water management entities. The basic idea considered was a federation of village level farmer organisations at the cascade level. Farmers suggested that such a federation could help in the management of agricultural production for the entire cascade.

During the process, some conflicts arose. For example, one village might propose a diversion of spill water from their tank to irrigate additional land in their area. Farmers from a downstream tank would then object on the grounds that they need the water. In virtually all cases, the farmers were able to resolve these conflicts through discussion. Once the proposals are investigated more thoroughly, however, some conflicts are likely to re-emerge. Moreover, it is possible that the findings of more detailed investigations may lead to new conflicts where water resources have been overestimated.

Cascade Level Meetings

The next step in the process was a cascade level meeting to discuss and reconcile the water resources development proposals made at the multi-village meetings. One representative from each village was invited, the farmer organisation president or the *vel vidane*. In most cases, the invitee also brought along one or two other farmers. All the participants had taken part in the multi-village meetings.

In preparation for the cascade discussion, the IIMI team consolidated the proposals from the multi-village meetings in the cascade and presented them on a single map. Conflicting and overlapping proposals were clearly marked. All proposals were then brought up, one by one, for discussion and decision.

All farmers present clearly understood the basic ideas about cascade development because of their participation in the multi-village participatory planning sessions. Because the multi-village meetings included only the villages in one portion of the cascade, however, there was a need to exchange information about the facts of hydrology and land use in the different parts of the cascade. Once this interchange of information was completed, the actual negotiation of the final plan among the farmers tended to be rapid and straightforward. The IIMI team limited its contributions to providing technical information when requested.

During the discussions, the IIMI team suggested that the farmers should consider the costs and benefits when deciding among alternatives. Thus, in most cases, when alternative proposals were brought up for discussion, the one that benefited the greatest number of tanks or the one that involved the simplest and cheapest construction was adopted. One result was that many of proposals made at multi-village meetings were dropped in favour of simpler and more encompassing proposals.

Results of Cascade Level Planning

Table 1 summarises the proposals resulting from this three-step procedure for the 13 cascades. A comparison of column 2 with column 3 indicates just how much the process changed the nature of the water resources development proposals. The proposals developed at the village level meetings are almost exclusively focused on repair and improvement of individual tank systems. The proposals developed in the cascade-level meetings include the improvement of individual tank systems, but, in addition, they add well-defined proposals to augment the tank water supply.

The tank system improvements proposed at the village meetings would have relatively little effect on agricultural production. Most farmers said that the biggest problem was shortage of water in the tanks rather than losses in the tanks or distribution systems. Augmentation, on the other hand, clearly offers the possibility of increasing cropping intensity or cropped area. The table also shows the estimated benefits from the final proposals.

Table 1. Proposed improvements and potential benefits from village- and cascade-level meetings					
Cascade	**Improvements proposed at village-level meetings**	**Additional improvements proposed at cascade-level meetings**	**Present average irrigated area within the cascade (acres)**	**Maximum possible increase in irrigated area from tank improvements (acres)***	**Potential increase in irrigated area from tank and cascade improvements (acres)**
1	Improvements to headworks or canal system for 8 tank systems	Augment 2 tanks in cascade; divert excess water from one tank to 3 outside cascade	812	-	-
2	Improvements to 11 tank systems	Divert excess water from a tank outside cascade to 4 inside cascade	255	430	635
3	Improvements to 19 tank systems	Divert excess water from first tank to 1 5 water short tanks	727	157	207
4	Improvements to 24 tank systems	Capture excess water from several tanks to other through several canals	861	300	625
5	Improvements to 17 tank systems	Divert excess water from several tanks to others through several canals	1225	80	305**
6	Improvements to 10 tank systems	Divert excess water from one tank to 3 water short tanks, including one outside cascade	558	-	40
7	Improvements to 19 tank systems	Augment water to 2 tanks; divert this water to water short tanks, including three outside cascade	1332	185	305
8	Improvements to 16 tank systems	Tap a natural stream to augment the cascade; divert excess water from a tank outside cascade	1067	235	435
9	Improvements to 9 tank systems	Explore possibility of tapping drain water from a major system outside the cascade	106	65	165
10	Improvements to 5 tank systems	Divert water from a natural stream outside cascade; distribute excess water of some tanks to others within cascade	119	125	525
11	Improvements to 13 tank systems	Tap a natural stream to augment water supplies; divert excess water from some tanks to others	735	345	645**
12	Improvements to 23 tank systems	Tap a natural stream to augment water supplies; distribute water among tanks in cascade	591	-	-
13	Improvements to 1 6 tank systems	None	915	1450	1450

* These numbers have been estimated by the authors not the farmers; they are maxima under favourable conditions. In most cases, the farmers themselves insisted that these tank improvements would not have these benefits without augmentation; **Includes areas outside the cascade that could be irrigated from tanks in the cascade.

Complementarity of Knowledge

There is a large literature on the value and extent of indigenous people's knowledge (cf. Scoones and Thompson, 1994) that suggests that such knowledge must be considered as important as, or more important than, 'scientific' knowledge when carrying out development work. The literature on PRA stresses that data analysis and planning should be done by local community members (Chambers, 1994a) and outsiders' primary contributions should be methods for data collection, analysis and planning. This literature tends to emphasise a contrast between local and scientific knowledge.

The work described here illustrates that farmers' and researchers' knowledge and contributions can be complementary. In this case, both were essential to achieving the results.

- Sri Lankan farmers have a good working knowledge of hydraulics and of the basic facts of hydrology; the great majority of the 12,000 or so irrigation systems in Sri Lanka were built by and continue to be operated by farmers. Farmers involved in the planning had good knowledge of water distribution and of their own village irrigation systems. Before the participatory planning work, however, farmers had little knowledge or understanding of watershed or cascade hydrology.
- The IIMI team had a good theoretical knowledge of the failures of previous small tank rehabilitation efforts and of cascade hydrology but, before this work, had little detailed knowledge of the hydrology of particular cascades, in part reflecting the paucity of government or other data on hydrology in Sri Lanka.

The results shown in Table 1 are a product of the combination of the general watershed framework introduced by IIMI and the detailed local knowledge held by the farmers. Both were essential to the results. There was considerable learning in this process. IIMI team members provided farmers with basic concepts of watershed hydrology. Equally importantly, the farmers from different villages taught each other the hydrological facts of their particular cascade.

Organising Cascade Level Discussions

As mentioned earlier, in this part of Sri Lanka there are no cascade level institutions for natural resources management. Before the participatory planning work, farmers seem not to have felt a need for such institutions (although see below). A key IIMI contribution therefore was the organising of multi-village and cascade level meetings. Without those meetings, the essential interchange of knowledge among farmers from different villages would not have taken place in an organised way.

The general level of awareness of hydraulics and hydrology among Sri Lankan farmers made them receptive to cascade level planning when it was introduced. However, without adequate cascade knowledge and information, on the one hand, and without cascade institutions, on the other, farmers could not carry out cascade level planning. Given the advantages of cascade level planning for the augmentation of tank water supplies, it would be surprising if there had been no attempts by farmers to get together for this purpose. In fact, we discovered that in the 1970s, farmers in two of the cascades had, with some government support, begun digging canals to connect tanks to distribute water better. When the government assistance ran out, the farmers stopped the work. There are several reasons for failure to complete the work, among them the high level of investment required, and a lack of government support for intervillage management bodies.

Lessons From The Multi-Level Planning Approach

Virtually all reported PRA activities are focused on rural villages or similar small communities. The experience described here provides an example of how the approach can be made effective at a supra-community level. This approach is very similar to that described by Thrupp *et al.* (1994) in Latin America. There is one key difference; in Sri Lanka, even the local level PRA work was focused on cascade level planning whereas in Latin America, local level planning was an end in itself. The general approach used by IIMI and described by Thrupp *et al.* is a viable way for "scaling up" participatory development planning to supra-community levels (cf. Chambers, 1994b).

Our Sri Lankan experience highlights some issues which should be considered when deciding to pursue multi-level planning for natural resource development.

Advantages for Water Resources Development Planning

In this work, the preparation of preliminary water development plans for 15 cascades (the 13 shown in Table 1 plus two where preliminary testing was undertaken) was carried out in four months. These 15 cascades cover an area of about 39,000 hectares and include 299 tanks. These plans could have been prepared in other ways but not with this degree of efficiency. The biggest problem was lack of detailed information on cascade hydrology. Some tanks are not even shown on the government maps!

It is more common to have such planning done by a team of experts. The team gathers data from farmers and from other sources and then prepares the plans themselves. They may also discuss the plans for each tank with the farmers from that tank. This process has two disadvantages:

- Since the focus is on individual tanks rather than on the cascade as a whole, it fails to solve the problems of water supply to tanks.
- These resulting plans are based on the hydrologic, engineering, and agricultural data available to the experts. Farmers, however, are aware of many additional variables, such as labour resources, and existing water rights, that the team of experts are likely to miss or are relevant to planning in particular circumstances only.

Multi-level participatory planning deals effectively with both these problems. The approach allows the farmers to provide better information on cascade hydrology than is available to these experts and allows them to deal with plans to redistribute water more effectively within the cascade. Also, farmers can take additional variables, such as labour, etc., into account when preparing plans. The results are thus likely to differ in significant ways from plans prepared by the team of experts and are likely to serve the farmers' interests more effectively.

Another advantage of multi-level participatory planning over more conventional approaches to water resource planning is that it provides the opportunity for preliminary discussion and resolution of conflicts over water. During the multi-village sessions, whenever one group of farmers felt that another group's proposal might affect their interests, the matter would be discussed immediately and a tentative resolution would be arrived at, subject to confirmation of the hydrological data.

Obstacles to Multi-Level Participatory Planning

Institutional Obstacles. One of the reasons for failure to consider cascade level planning in the past has been the lack of cascade level institutions. If the proposed cascade level plans, including tank augmentation, are carried out, there will be a need for cascade level management institutions. Farmers may need assistance in developing those institutions, particularly in countries where government policies discourage the development of new local institutions. In Sri Lanka, for example, the government has had conflicting and changing policies over governmental support or discouragement for rural or farmer organisations (Scudder,1995); farmers now are rarely willing to participate in supra-community (or even community level) organisations that interact with the government unless the government itself provides assistance.

While multi-level planning may help to resolve some supra-community problems, unless appropriate supra-community institutions exist, carrying out the plans may not be possible without additional help by the project for which the planning is carried out.

Resistance to the Approach. In carrying out this work, we have encountered resistance from government officials and others to the notion of cascade level water resources planning. This resistance stems from two concerns:

- Multi-level participatory planning has two features novel to those involved in tank rehabilitation work in Sri Lanka. One feature is reliance on farmer knowledge of local hydrology. Since farmers do not express their knowledge of hydrology in scientific terms, (we discovered whether tanks have excess water by getting the farmers to tell us how often and for how long the tanks spill), some technical persons distrust their knowledge. The other feature is bringing farmers from different villages together for planning. Organising multi-village meetings is simply not common practice or is considered too difficult to do.
- Cascade level planning implies that work should be done on all or most of the tanks within the selected cascades, thus constraining selection of tanks. Development funds are limited, however, and must be rationed over the area, so cascade planning implies that tanks in non-selected cascades will not be given funds. This can create problems as political authorities often want to distribute

scarce development resources so as to reap the maximum political benefit. Cascade planning may make this difficult.

The lesson is that although multi-level participatory planning is an effective way to carry out supra-community planning, making it a widespread practice in natural resource development may be difficult. For example, the activity reported here was carried out by IIMI through a subcontract with a consulting firm; the draft report prepared by the consulting firm labels the multi-level participatory planning process as "experimental" and advocates going ahead with the land and water resources component of the project by planning the rehabilitation of individual tanks in isolation.

Conclusion

Multi-level participatory planning is an effective means of carrying out natural resources development planning when supra-community levels are involved. Water resources development, in particular, is generally better done at supra-community levels. Multi-level participatory planning has some clear advantages over other water resources planning methods, including efficiency when secondary data is lacking, coverage of watershed areas rather than local communities, and ensuring that farmer interests are taken into account. This has social, technical and institutional implications, however, and implementing the approach may require development of new management systems and procedures. In addition, the effective use of the approach may necessitate changes in government policies and attitudes in order to facilitate farmer involvement in resource planning and development.

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