

PARTICIPATORY IRRIGATION MANAGEMENT IN INDONESIA: LESSONS FROM EXPERIENCE AND ISSUES FOR THE FUTURE

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A background paper for the National Workshop on Participatory Irrigation Management November 4-8, 1996 organized by the Directorate General of Water Resources Development, Ministry of Public Works, Government of Indonesia and the World Bank Institute, the World Bank Participatory Irrigation Management in Indonesia: Lessons from Experience and Issues for the Future

EXECUTIVE SUMMARY

Beginning in the 1980s there was an increased emphasis on improving participation and irrigation operation and maintenance in Indonesia. This paper looks at what has been learned about participatory irrigation management, focusing particularly on lessons from: 1) turnover of irrigation systems smaller than 500 hectares to water user associations, 2) establishment of irrigation service fees with WUA participation in fee collection and identification of O&M needs and 3) development of irrigation and agriculture by farmers in the On-Farm Water Management Development Project. The most important challenges lie in sustaining participation in irrigation management, in ways which improve irrigation performance and farmer welfare. Formal, bureaucratically organized WUA often quickly become inactive. Participatory programs have helped to improve water distribution and system maintenance, but these impacts have been inadequately emphasized. In ISF and turned-over systems, annual joint walkthroughs to review performance and plan future efforts could help provide an incentive and stimulus essential to sustaining participatory irrigation management.

A number of key lessons can be extracted from the experience of participatory programs:

- 1) Participation improves planning, helping to provide valuable local information, prevent problems and optimise use of local resources.
- 2) Local cost sharing increases benefits, both by mobilizing additional resources and by increasing accountability to farmers, which then helps improve the quality and appropriateness of construction.
- 3) Institutional reforms promoted by participatory programs, such as ISF and turnover, have often helped highlight problems and support changes, such as more equitable block-level water distribution.
- 4) Training programs have helped improve capacity to carry out participatory programs. Training should continue to help orient staff taking up new responsibilities. Monitoring information and WUA requests could aid in more efficiently targeting training at sites with priority problems and opportunities.
- 5) A legal framework has been established for WUA. This framework will be more useful if it allows WUA to take on more formal legal status according to their own needs.
- 6) Policies now support participation, with detailed regulations, guidelines and training materials available.
- 7) There has been a tendency to make participatory approaches excessively complicated. Simpler, more focused approaches to PIM are likely to be more effective.

Several issues affect the potential for further improving participation in irrigation management.

- 1) Agricultural diversification is needed to improve farmer incomes and welfare. If irrigated agriculture is more profitable for farmers then they will be more interested to participate in irrigation management.
- 2) Clearer water rights and farmer participation in basin water resources management can help prevent problems and facilitate a smoother, more equitable and more efficient process to improve water use efficiency and reallocate water among competing users.
- 3) The capacity and sustainability of WUA may be strengthened through joint activities beyond irrigation management, building on local opportunities.
- 4) More traditional, quasi-voluntary WUA management can work well in small systems, while contracting for specialized irrigation management may be more suitable in multi-village irrigation systems and more commercialized areas.
- 5) The financial capacity of WUA should be increased, enabling WUA to borrow and invest in irrigation development.
- 6) Accumulated experience provides a basis for re-engineering tasks in irrigation O&M to create better patterns of cooperation between government and farmers, which should include opportunities for WUA to take over a greater role in the management of larger irrigation systems.

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A. INTRODUCTION

Government assistance in irrigation construction has usually been followed by a continuing bureaucratic role in operation and maintenance, with farmers' responsibilities officially limited to their own fields and tertiary areas of a size usually not exceeding 150 hectares. Management of dams, primary and secondary canals, tertiary gates and the first fifty meters of tertiary canals has been considered the responsibility of government, except in small farmer-managed irrigation systems. Concern about how irrigation systems could be better operated and maintained led to Indonesia's 1987 Irrigation Operation and Maintenance Policy Statement, which included policies to:

1. gradually turn over irrigation systems smaller than 500 hectares to water user associations (WUA), and
2. institute irrigation service fees (ISF) in systems larger than 500 hectares.

There have been many other projects seeking to improve participation in irrigation management, usually emphasizing physical improvements and WUA formation. Some of these are briefly described in Appendix 1. This paper examines what has been learned, focusing particularly on the two efforts listed above and a particularly interesting example of a pilot program including agricultural development:

3. "Starter" On-Farm Water Management Development, which combined agricultural training, stimulant subsidies for materials and irrigation improvement implemented by farmers.

The underlying theme of this paper is that accumulated experience shows the need for a thorough rethinking of approaches to participatory irrigation management, synthesizing the best aspects of past programs into a more efficient and effective approach to PIM. Many valuable lessons have emerged from the implementation of participatory programs. The sustainability of participation, as currently developed, is highly questionable. Better implementation, improved coordination, perfecting current methods, stronger high level support and increased efforts may be useful, but by themselves are unlikely to bring about the changes needed to make participation sustainable and worthwhile for farmers. The challenge lies in re-engineering participation in irrigation operation and maintenance to make it much more efficient, better aligned with farmers' incentives and more effective in achieving the goals of improving irrigated agriculture and the welfare of farmers.

This paper outlines key lessons and raises issues and alternatives for the future in hopes they will stimulate discussion as part of the International Seminar on Participatory Irrigation Management to be held in Indonesia, November 4-8, 1996.

1. TURNOVER OF SMALL IRRIGATION SYSTEMS TO WUA

Participatory planning of physical improvements and registration of formal WUA are used to prepare for turnover of irrigation systems smaller than 500 hectares to water user associations. Irrigation inspectors are trained to facilitate local participation in the turnover process. Overall procedures for turnover were laid out in an ordinance from the Minister of Public Works No. 42/PRT/1989. Appendix 2 shows the key steps of inventory/socio-technical profiling, design and construction of improvements, WUA development and turnover. The government decides which systems will be turned over, rather than responding to local requests. Implementation is now primarily handled by functional (project) units of the Provincial Water Resources Services (PWRS), under the guidance of the Directorate General of Water Resources Development (DGWRD), Ministry of Public Works.

Pilot activities began in 1987 and program implementation in 1988. The first systems were officially turned over in 1990. By 1996, systems irrigating over 200,000 hectares had been turned over, or were fully prepared, awaiting only completion of administrative formalities. The remaining area served by irrigation systems smaller than 500 hectares is estimated to be over 700,000 hectares.²

Farmer incentives: Farmers gain government assistance for physical improvements. Assistance for building and repairing weirs, division structures, canal lining and other improvements has averaged from one to two hundred dollars per hectare. There is a shortage of information on the impacts of turnover on production and farmer welfare. A 1994 study of 50 randomly selected turnover and starter project sites in West Java and East Nusa Tenggara indicated that on average yields increased one quarter ton per hectare per season, from more reliable and more equitably distributed water supplies. Overall economic rates of return were high, but about one quarter of sites had poor returns, showing that positive impacts are not certain, but require good site selection and planning.³ Farmers gain government recognition of their role in management and clearer authority for management. WUA registration formally legitimizes local management institutions and may give greater authority in enforcing rules for water distribution and mobilization of resources.

Farmers lose government assistance in routine operation and maintenance. However many systems did not receive any such assistance. In many other systems such assistance constituted only minor funding for cutting grass and desilting, or occasional funding for minor repairs. In many small systems which were turned over, farmers were not even aware that the government considered their system to be a "government" system, perhaps based on a few structures built with government funding many years ago.

Government goals: Turnover of O&M responsibilities was intended to reduce demands on government resources, which could then be reallocated, particularly to help provide more adequate staff and budget for larger government irrigation systems. More generally, turnover was intended to create a better partnership and division of responsibility between government and farmers. It would let the government concentrate its management efforts in larger systems, which serve the majority of irrigated areas, while WUA would be responsible for smaller systems, which are much larger in number but cover only a minority of the irrigated area. Turnover, ISF and other O&M reforms were part of projects which allowed continuing access to international funding for construction and rehabilitation.

Staffing: Staff reduction and reallocation may be benefits from a broad government perspective, but look negative from the point of view of individual bureaucratic units. Government budget allocations for O&M, particularly central government funds, are based on the irrigated area served by government (jointly-managed) irrigation systems, so, other things being equal, turnover would reduce the budget, a loss from the point of view of irrigation officials. Similarly, staff reductions and transfers potentially could shrink section and subsection irrigation offices. In practice, some weir caretakers and canal guards have been moved to other systems, released, or hired by WUA, though little systematic information seems available on staff reallocation. Irrigation inspectors have usually been left in place to serve other jointly-managed systems in their jurisdiction, and in theory supposed to assist farmers in turned over systems.

Implementation issues: Carrying out turnover on a nationwide basis has been a major undertaking. It involved development of new procedures in pilot areas, systematization in policies, manuals and training curricula, and extensive training and institutional change to carry out the new program. This was particularly challenging for those aspects requiring new skills and attitudes, beyond civil engineering and construction project management. Many of the problems are those which affect any large, new program, including shortages of suitable staff, the need to train and retrain personnel, delays in availability of budgets, lack of synchronization between interrelated activities, and difficulties in adapting a national program to the great diversity of local conditions. Much has been done to overcome such problems, though much potential still exists for improving the quality of implementation.

Hardware and software: Turnover goals for physical improvements have been defined in terms of putting irrigation systems into improved condition before turnover. Decisions that all systems must have a formal WUA to accept turnover, and all should be eligible for construction assistance, have meant that almost all systems have improvements built before turnover. The pace of turnover has therefore been shaped by the cost and availability of funds for construction of physical improvements. There are grounds for concern that implementation of turnover is emphasizing physical construction works, without adequate emphasis on the institutional changes during and after turnover essential to sustain and improve performance in irrigation management.

Support after turnover: According to policy, turnover is not intended to mean that farmers are abandoned, but that government aid should be for matters beyond the capacity of farmers. Provincial budgets (APBD) for WUA guidance are very small and no funding is specifically itemized for guidance of WUA in turned over systems. There is not yet any program for annual joint inspection of turned over irrigation systems, to provide technical advice, promote preventive maintenance and ensure that potentially expensive and dangerous problems beyond farmer capacity are identified and dealt with in a timely way. Some weirs which have failed during floods have been repaired with natural disaster funds from general budgets. There is no insurance program or systematic approach to budgeting for such assistance costs, nor for farmer-cost sharing in major repairs or improvements. Adequate guidelines, resources and incentives are needed, if guidance and support are to be provided after turnover and the performance of turned over systems sustained.

2. IRRIGATION SERVICE FEE

Beginning with pilot projects in the late 1980s, a new approach to irrigation service fees was formulated to support irrigation operation and maintenance. Water users associations and WUA federations are involved in collecting fees and in identifying priority needs for improving O&M, as part of needs-based budgets for O&M to be paid for by ISF.

During the last few years the government has moved to rapidly expand the area covered by ISF. Through recent and ongoing projects, ISF has been or soon is to be introduced on an area of over 700,000 hectares. The program has been implemented primarily by district governments, working with provincial water resources service and the revenue service (DISPENDA), under the guidance of the Directorate General of Regional Autonomy (PUOD), of the Ministry of Home Affairs. The legal basis for ISF has been established through a series of decrees, regulations and instructions issued by the Minister of Home Affairs. As with turnover, implementation has been affected by a variety of factors. Over time procedures have been simplified, in hopes of making establishment of ISF easier and faster.

Incentives for farmers: The introduction of ISF is accompanied by establishment of institutions for greater accountability and farmer voice in irrigation management, through WUA, WUA federations, joint walkthroughs to identify priority needs for O&M and district ISF councils (BAMUS). If implemented according to official policies, ISF should make more resources available for operation and maintenance, and help produce better irrigation services to farmers.

Pilot projects made clear that better information and management changes instituted as part of the process of establishing ISF could lead to substantial improvements in irrigation services. Detailed mapping of who received water and where problems existed helped identify ways to improve the quality of irrigation services.

ISF fees of 15,000 rupiah per hectare or more constitute an additional burden for farmers who already pay many other taxes and contributions, mostly from small holdings of a half hectare or less. While ISF may constitute only a few percent of the value of rice production, rice production is already relatively unprofitable.

Farmers who already receive good supplies of irrigation water, such as those in head areas of irrigation systems, have little prospect of personal benefits from ISF. They are asked to pay, but will receive the same amount of water, or even less if better management redistributes supplies more equitably to areas currently experiencing shortages. However it appears that such farmers are willing to pay, if they believe that others are benefiting and

the fees are being used for services. Other pressures from WUA and local government may also be sufficient to make people pay, even though they feel they do not benefit directly.

Incentives for government: ISF involves district government in collection and management of ISF. ISF requires increased time and effort on the part of district government, particularly the revenue collection office (DISPENDA) in collection, administration of funds, implementation of BAMUS and other meetings and coordination with irrigation and other agencies.

Responsibilities for irrigation O&M are in the process of being shifted from sections of provincial water resources services to district public works offices, putting them under the authority of district heads (Bupati). The Irrigation Service Fee has been introduced during "campaigns" with strong support from government, particularly district heads. However, once the initial enthusiasm of the campaign is gone, it has often been unclear what sanctions would be applied to those who do not pay, a problem which potentially could result in the collapse of the system. Revenue offices are short of staff and have many other duties, which makes it difficult for them to concentrate on collecting ISF.

For irrigation officials, ISF offers the prospect of more resources for O&M. If done according to policy, ISF requires increased agency openness and accountability, listening to WUA, establishing a service contract and reporting on how ISF funds are used. While beneficial in the long run, this requires changes and short run difficulties for the agency, and requires more accountability to farmers and other government agencies.

ISF offers better information about problems, farmer priorities and solutions, which can help improve irrigation performance, but often highlights problems which were previously ignored. The impact on agencies depends on whether within their bureaucratic structure they have incentives for solving problems and improving performance, or whether revealing the extent of previous problems only creates difficulties.

Issues: Recent expansion of ISF seems to have emphasized collection of fees from farmers, without a corresponding emphasis on the "voice" institutions for farmer participation in identifying O&M priorities and accountability for services, and without much targeting and assessment of how ISF institutions contribution to improved irrigation performance. Collection rates appear to be declining. It was originally envisioned that ISF would eventually become the only source of funding for O&M. ISF currently provides less than 1% of the total national funding for O&M. Even where ISF has been collected, there have been significant delays and uncertainty about procedures for disbursing the funds. Funding for O&M has risen because of increasing allocations for the Efficient Operation and Maintenance (EOM) program, with ISF funds playing at most only a minor role.

Linking fees and O&M: The original principle was that ISF fees were to be used within the same irrigation system, so that farmers would directly see the impacts and benefit from their fees. It appears that in many Kabupaten, use of funds from ISF is not linked to a particular irrigation system, making ISF more like an irrigation tax, without specific accountability and incentives. Usage of ISF fees is supposed to be reported to BAMUS, after which WUA federation leaders in the BAMUS then report back to other WUA leaders and farmers. It appears that farmers often do not actually receive information about how ISF funds have been used. More direct mechanisms for publicizing information could help improve the flow of information, such as signs posted at sites where repairs are funded from ISF and annual summary reports sent to WUA leaders.

Alternatives: If fees are not to be used in the same system, then administratively it would be much simpler to collect ISF like any other tax rather than through WUA. ISF might be eliminated and land and property tax revenues used to fund O&M. However, without the incentives of voice, accountability and use of their funds to improve their own system it is highly questionable whether farmers will have sufficient motivation to support ISF. Even if farmers are forced to pay, experience in Indonesia and elsewhere raises serious questions about whether adequate budget would actually be provided for O&M, as well as about how effectively funds would be utilized, if there is no accountability to water users. Another alternative would be to allow takeover of part or all of management of larger systems by farmers, so that WUA collect and manage funds themselves, perhaps paying for services provided by the government for headworks operation and basin water resource management.

3. ON-FARM WATER MANAGEMENT DEVELOPMENT PROJECT

The "Starter" project was intended to achieve a more efficient and effective use of water through increased cropping intensity and crop diversification while supporting self-reliance in O&M of farmer-managed irrigation systems. While implementation was mainly limited to a pilot project level, it is discussed in this paper as an example of how agricultural development can be better integrated with irrigation development. This project was implemented from 1985 to 1992 by provincial agricultural services, with support from the Department of Agriculture and the Food and Agriculture Organization of the United Nations. Key elements of the project were field training, cost-sharing and training of agricultural officers.

Farmer field training: Practical training was divided into a series of five sessions spread over two years. The first training developed a water management plan, preparing for system improvement and subsequent O&M. The main topics were mapping, problem identification, solution finding, water management action plan and water user organization plan. The farmers set priorities and provided ideas for the design of system improvements. This training was followed by improvements to irrigation structures, carried out by farmers. Later training sessions covered evaluation of the results of the water management plan (including system improvement), strengthening WUA organization, cropping patterns and agricultural development plans. Evaluation and adjustment of the plans followed at the end of each growing season.

Improvement of irrigation facilities: A subsidy worth about U.S. \$1,000 was provided for construction materials. The project provided limited funding for technical design. Farmers had to attend a series of five training sessions held over a period of two years. Farmers were expected to contribute labor, cash and materials of at least equal value. In many cases the subsidy stimulated farmers to mobilize resources worth far more than the value of the subsidy. The fixed amount of subsidy per system greatly simplified implementation, created transparency and stimulated local contributions, since the amount of outside aid had been clearly specified from the start.

Construction of weirs, canal lining and retaining walls benefited farmers through increased water availability. Construction of division boxes helped improve water distribution. Improvement in water availability and distribution increased cropping intensity and yields per hectare. Production per hectare increased an estimated 20-30%, raising farmer incomes about Rp. 400,000 per hectare per year.

Staff training: Agricultural officers received training to prepare them to support and guide water user associations to implement the on-farm water management program. Skills were strengthened for data collection and analysis, problem solving, technical knowledge of on-farm water management, managing farmer training and organization and acting as mediators in FMIS development.

Incentives for government: Government staff gained training in a variety of aspects of irrigation and agricultural development. There were only very limited funds available for the many visits to the field required by the participatory approach used in the project. Often staff had to obtain additional travel budget from other sources, or dig into their own pockets.

Issues: An evaluation by Rachbini raised several issues.⁴ WUA development focused more on the formality of organization, while traditional institutions continued to play the major role in irrigation management. There was no structure or unit to continue activities after the project. Trained officers usually went back to their routine assignments, which dealt with topics other than on-farm water management.

A study in West Java and West Nusa Tenggara showed benefits from Starter project sites as large as those at turnover program sites, even though the Starter project improvements cost much less per hectare.⁵ However, Starter sites had more technical problems and seemed unlikely to last as long on average.

The Starter project training for farmers included some diagnostic activities, to clarify local problems. More could have been done to increase the role of farmers in assessing what kind of training they need. Information and support services were fully subsidized, with no mechanism to enable farmers to share in the costs of extension services.

Influence on other projects: The Starter project demonstrated the potential for mobilizing farmer participation. Some provinces, such as West Nusa Tenggara and East Java, used funds from other projects to apply the same approach on a wider scale. A technical assistance project funded by the Asian Development Bank (ADB), on Improvement of Farmer Managed Irrigation Systems (IFMIS), drew on methods from the Starter project, Turnover Program and other sources to further synthesize a methodology for assisting FMIS. A project based on this methodology is scheduled to begin soon.

Village Irrigation Project: The Starter project and other efforts to assist farmer-managed irrigation systems have largely been overshadowed by the Village Irrigation Development Project. Launched in response to drought and rice production shortfalls in the 1990s, this crash program emphasizes rapid construction of physical improvements, with construction organized by state-owned firms, using paid local labor. Provincial irrigation (functional) project units have managed the project, under the guidance of DGWRD. This project has funded works on irrigation systems covering over many hundreds of thousands of hectares and is intended to cover a total of 1.6 million hectares identified as served by village irrigation systems. In some cases implementation has drawn on experience of participatory projects, to incorporate more consultation in design and more use of local labor and materials during construction than might have occurred otherwise. In general the emphasis has been on a crash program to build physical infrastructure, without much attention to institutional or agricultural development.

B. CHALLENGES

1. SUSTAINING PARTICIPATION IN IRRIGATION MANAGEMENT

Registration of formal WUA has involved a great amount of work in terms of local meetings and processing of the documents to have WUA constitutions and by-laws registered with district offices. However it appears that in many, if not most, cases, once a project is completed, local irrigation management quickly reverts to the patterns which had been used before. This may be informal cooperation among neighbouring farmers, dealing with problems on an ad hoc basis. Often village government plays the major role in selecting the people who actually distribute water and maintain canals, as well as in providing the authority needed to enforce rules, collect money and mobilize labor.

WUAs in the Madiun irrigation system had facilitated participation in physical improvements, but one year afterwards WUA were no longer active and irrigation management was an individual or small group matter.⁶ WUAs established by the government in the HPSIS project had not survived.⁷ Irrigation was managed using previous organizations except in one site where there had been no previous irrigation. Factors contributing to the disappearance of formal WUA included the lack of mechanisms to assist WUA once community organizers left the system and the emphasis on organizing WUA to carry out government instructions. Similar patterns of formal water user organizations not being sustained have been prevalent in other countries.⁸

There is a need for rethinking current approaches to WUA development. While the structures and canals of irrigation systems may appear permanent, actually they are very subject to erosion, flood and other forces bringing change. The sustainability of irrigation systems ultimately lies in the sustainability of the organizations which manage them.⁹ Even without changing the current policy framework, it would be possible to develop a much more efficient and effective approach to sustaining participation in irrigation management. Walkthroughs have played a crucial role in implementing cooperation between farmers and agency staff in past PIM efforts. Annual joint walkthroughs to review O&M and plan for the future, in ISF areas and turned over systems, are likely to be essential if participation in irrigation management is to be sustained.

2. IMPROVING IRRIGATION PERFORMANCE AND FARMER WELFARE

Participation should be not just something done for its own sake, but a means for improving the performance of irrigation. There is a shortage of information about what difference participatory irrigation management has actually made in irrigation performance, crop yields and the lives of irrigated farmers. Programs have had a technical focus on physical works. Except for the Starter Project, participatory programs have paid little attention to optimizing and assessing performance in terms of agricultural impacts.

Monitoring of turnover implementation has focused on physical and financial progress of construction and fulfillment of formal requirements for WUA registration. Monitoring of ISF has concentrated on collection rates as the key indicator. By contrast, there has been much less attention to monitoring key steps for WUA consultation in turnover and ISF. Aside from a few studies, little systematic information is available on performance impacts in terms of equity in water delivery and changes in crop yields. Field visits do indicate improvements in block level water distribution, as discussed later, but these are not shown well in current monitoring and evaluation systems. Routine monitoring is supposed to categorize WUA as developed, developing or inactive. This emphasizes compliance with formal procedures for meetings, planning and record keeping, with little information on more direct performance indicators.

The ISF program seems to have led to substantial improvements in irrigation performance, particularly in identifying areas which received inadequate supplies of water and promoting discussion of how to solve problems. The boundaries of who is and is not receiving water have been more clearly demarcated, allowing better understanding of how to allocate supplies, particularly during periods of shortage. This includes, for example, taking account of those pumping from canals to irrigate land which is not within the gravity command of the irrigation system.

Follow-up training in the WUTP is said to have led to substantial efforts by farmers to fix leaks, clean canals and make other improvements, which in turn helped to improve water delivery and increase yields. However information on these impacts was never systematically reported. This would have been useful, since the relatively high costs per hectare of the follow-up training have raised questions about its value, and constrained implementation to only a small fraction of the area covered by broader WUTP training efforts.

In general, monitoring is not strongly focused on showing changes in irrigation performance. Equity of water distribution within areas of WUA responsibility is not measured in current WUA monitoring systems. Rotation between different units is usually the main approach applied during periods of shortage. Formal WUA have fallen far short of government expectations in terms of collection of routine fees for internal WUA use. Collection of routine fees by WUA differs from the episodic approach traditionally used to collect funds for specific works, usually at the start of the season, and pay those who distributed water, once crops have been harvested. Information is collected on the physical condition of structures and canals, but there does not seem to be a framework for comparing this with previous years information to see whether the condition of the irrigation system is being maintained or improved over time. Monitoring information is not collected on the resources mobilized by WUA or the amount of work done to repair or improve physical infrastructure. Information on crop yields is not collected as part of WUA monitoring.

The problem is not a lack of systems for monitoring and evaluation. These have been developed in abundance. Elaborate systems have been developed which may be feasible in a few favored sites, but are unworkable with the resources available in most areas. Elaborate information systems may simply not be implemented. If implemented, information may be late, inaccurate and not linked to management decisions. Information on the more important objectives may be lost in a mass of data about less important items.

One option to improve monitoring of irrigation O&M in participatory efforts would be to have a much clearer focus on indicators of performance in the key tasks of 1) equitably distributing water and 2) maintaining the condition of irrigation structures and canals. Both these can be measured fairly simply and objectively. Information on crop yields helps show performance, but the key tasks which are under the control of irrigation staff and WUA, concern equity in water delivery and maintenance of the physical condition of structures and canals.

C. LESSONS FROM PARTICIPATORY PROJECTS

This section reviews several lessons from past projects, focusing on changes which have been shown to be feasible, as well as factors which have affected the extent to which changes have occurred.

1. PARTICIPATION IMPROVES PLANNING

The clearest and most consistent benefits of participation in irrigation management have come from involvement of farmers in planning.¹⁰ The main focus has been on the use of joint walkthroughs and meetings to learn about local priorities and obtain local information on things such as past delivery problems, flooding patterns and land tenure which affect design of structures and canals. In addition to activities during the design phase, meetings at the beginning of construction provide a good opportunity to review issues, prevent problems and optimise use of local materials and labor.

Project experience: The High Performance Sederhana Irrigation Systems project showed that involvement of farmers before construction generated more farmer interest and contributed to better design of improvements than did organizing farmers after construction. The Madiun project explored how farmer involvement could contribute to the design of rehabilitation in jointly-managed schemes.¹¹ The turnover program institutionalized participatory design in a widespread program. The Small Scale Irrigation Systems Management Project developed procedures and manuals for guiding involvement of farmers in the planning of construction of new jointly-managed irrigation schemes, although these procedures have not yet been instituted as official policy.

Incentives for designers: Design work is often done under great time pressure, due to delays in budget availability, time required for selecting and mobilizing contractors and carrying out survey and design work and the need to have cost estimates available in time for deadlines in the annual budget preparation cycle. This makes it hard to allocate sufficient time to consultation during design, even when agency officials well understand the long term benefits of participation in design. More fundamentally, designers often receive little feedback about the performance of their designs. There are few rewards for making more effective or efficient designs, and so few incentives for design engineers to invest much time in consultation with farmers. Within Public Works the tendency has increasingly been to have construction managed by functional project units, separate from the structural staff responsible for O&M, which further increases coordination needs and weakens the incentives for attention to design performance.

Walkthroughs: Joint walkthroughs with farmers and agency staff have been the single most effective technique for communication and cooperation. Walkthroughs symbolize and implement the willingness of government to listen to farmers. Walkthroughs provide an empirical approach to identifying problems and discussing ways to make things better. These can then be followed-up by farmers and government. In the turnover program walkthroughs were a key means for farmers to share their ideas about what improvements should be made. In the ISF process annual walkthroughs allowed farmers to suggest their priorities for improving O&M. Farmer field schools in the Starter project emphasized hands-on approaches, with walkthroughs and other methods to discuss problems in the field and work on changes.

Women's participation in planning: In general attendance at meetings and other WUA activities have been dominated by male farmers. Some pilot projects have explored ways to better recognize the extent of women's involvement in irrigated agriculture and the potential contribution they could make through increased participation in irrigation management. Experience from such efforts suggests that women do not place a high priority on attending more meetings or becoming WUA officers, but are very interested in opportunities to improve their income from irrigated agriculture. It appears that in many sites, greater involvement of women can be stimulated by preparatory activities which focus specifically on women working together to identify ways in which irrigation development can better respond to their priorities, which include domestic water supply and home gardens, as well as rice and other irrigated field crops. Such focused participation in planning can then prepare and support the participation of women in general irrigation management activities in ways which better respond to women's concerns.

SIDCOM: To the extent time and resources permit, participatory methods are sometimes used for new construction and rehabilitation and upgrading of government schemes, during the "system planning" phase in current procedures, but this depends on the inclination and capabilities of the officials involved. Funding for community organizers represents a way for the government to subsidize some of the transaction costs of organizing participation in design, so that it is easier, and less costly in time and effort, for farmers and local leaders to participate. For routine (non-pilot) programs, except for turnover, specific funding has usually not been available for government staff or others to work with communities and facilitate their participation during planning. There is still no clear framework for integrating consultation with WUA in the process of construction planning, preparation for the efficient operation and maintenance program (EOM) and establishment of ISF. Ideally these all should be combined and mutually supporting as part of the overall SIDCOM process (Survey, Investigation, Design, Construction, Operation and Maintenance).

2. COST-SHARING INCREASES BENEFITS

Farmers can mobilize substantial resources for construction, operation and maintenance of irrigation systems. In most areas, farmers pay fees in cash or kind to specialists, such as ulu-ulu, who help distribute water and maintain canals. They also help periodically to clean canals and carry out other repairs. Farmers originally built most small scale irrigation systems on their own. Under the right conditions, farmers have been willing to contribute labor and materials to projects.

Project experience: The Starter project, and other projects following its model, have shown that farmers can contribute resources worth more than government inputs. The ISF project has shown, particularly in the pilot areas, that farmers can contribute 15,000 to 20,000 or more rupiah per hectare per year towards operation and maintenance costs of jointly-managed systems. Farmer contributions supplemented improvement works in other projects, even where contributions were not required or were not the focus of project efforts. Contributions are most often based on land area, but sometimes per household which can impose a disproportionate burden on those with smaller amounts of land. It has been left up to communities to work out the how contributions would be divided among landowners and cultivators. The complexity of land rental, leasing and sharecropping arrangements, especially on Java, would make it almost impossible to impose any simple formula. Women often manage household finances. It appears that in many cases when women are not involved in meetings and do not receive information about the goals and expected benefits of WUA activities, then they are reluctant to support fees and contributions.

Farmer contributions to construction: The positive incentives for farmers exist if their contributions result in better irrigation services, by making more resources available. Cost sharing and participation in construction by farmers can gain farmers a stronger basis for insisting that construction is done to good quality standards and using designs which better serve their needs. Individual farmers may receive recognition and greater status in the community based on the contributions they make. Farmers may contribute because of pressure from village government and other local leaders, and concerns about problems which could result if they do not cooperate. Projects may require participation, or farmers may fear that if they do not contribute then they will not receive assistance. Farmers have an incentive to pay ISF if fees will produce better O&M, and give farmers a stronger say in what is done. Farmers may fear sanctions from government if they do not pay.

Government: The benefits to government come from increased resources, and other ways in which cost sharing may contribute to more successful projects. Government assistance can be leveraged to create a greater total impact. If government officials are assessed in terms of the performance of the projects they work on, they would be motivated by those gains. However if their career opportunities and compensation are not affected by project performance, then they will have few incentives to promote cost sharing. Cost sharing is likely to require more time, working out arrangements. It may also lead to demands for greater accountability about how funds were used, as expected under ISF. If such accountability and transparency create problems for officials, then they may have incentives not to support participatory management.

3. REFORMS MAY IMPROVE BLOCK LEVEL WATER DISTRIBUTION

Some of the most striking gains from participatory efforts came at sites where farmers said that "before, whoever was strong got water, but now it is divided evenly." This change has shown up at sites in both the turnover and ISF programs. Efforts to help organize farmers have often highlighted problems in inequitable water distribution. If farmers simply take water on their own, those nearest the canal and closest to the head of the system often end up with abundant supplies of water, while others wait and receive the leftovers. Specialists, such as ulu-ulu (watermasters) and block leaders, can and sometimes do distribute water more equitably, and program interventions have sometimes stimulated improvements.

Customary gender roles still conceive of irrigation management as work for men, both in terms of the work of cleaning canals and distributing water, and in participation in local public activities, such as WUA meetings and leadership roles. Conceptions about gender roles mean that people think about labor being divided this way, even when in practice women may be very involved in canal management and community decisionmaking. Women in most parts of Indonesia work as much or more than men in rice production; planting, weeding and harvesting crops, including managing water levels in fields. Labor migration and economic diversification increasingly involve many men and women in non-agricultural activities. Many women now have to take on even greater roles in irrigation management than in the past. Going out to the fields takes away time from women's other activities, and may be particularly difficult and dangerous if it requires going out at night or during storms. Women often felt that they benefited particularly when water distribution was put into the hands of a specialized worker.

4. TRAINING IMPROVES PIM CAPACITY

In total, a huge amount of training has been carried out by various programs dealing with more participatory approaches to irrigation management. This has shown the willingness to invest substantial budget and staff time in training. Training has contributed to changes in attitudes and skills. However there are serious questions about the effectiveness and efficiency of much training, particularly in comparison to the time and money which have been invested. Training has tended to be focused on lectures, with attendees mainly in the role of passive listeners, although there have been attempts to use more participatory approaches to training.

The Water User Training Project represents the largest amount of training for government staff and farmers. Thousands of government staff and farmers have been trained, although little information is available on impacts

after training. Most training has emphasized standard, prepackaged curricula. Over time, WUA level training has shifted to include more identification and analysis of specific local training needs.

Virtually all irrigation field staff are male, as are most agricultural extension workers. They usually tend to contact and work with male farmers. Outside of a few pilot projects, there have been few efforts to improve the capability of agency staff to increase the involvement of women and ensure that irrigation management serves their needs. Training could help government staff become more aware of the benefits of involving women in projects to develop irrigated agriculture and more skilled at facilitating women's participation.

Training has helped introduce participatory programs. However, personnel changes often bring in new people, unfamiliar with participatory approaches, while those who had been trained move to other duties. It appears that new staff often have great difficulty in gaining a thorough understanding of participatory programs such as turnover and ISF only based on written manuals and information from co-workers. Continuing programs for training and orientation would contribute greatly to institutionalizing capacity for using participatory approaches, which otherwise seems to decline over time.

The Starter Project used farmer field schools, meeting in sessions spread over a period of time, to provide more training, without requiring participants to be away for too long at a single time. The Starter project also applied some of the methods used in Indonesia's Integrated Pest Management Program. IPM has been innovative and highly successful in using practical, field-based training, with farmers training other farmers.

One way to make WUA training more efficient and effective would be to use monitoring information on performance indicators to prioritize sites for training to help deal with particular problems. This would support a customized, better targeted approach to training. Further steps would be to enable farmers and WUA to initiate their own requests about what type of training they want, or even to provide WUA with funds or vouchers to pay for training of their choice.

5. A LEGAL FRAMEWORK FOR WUA HAS BEEN ESTABLISHED

In total many thousands of water user associations have been registered. This has involved substantial efforts, in terms of local meetings, selection of leaders, approval of constitutions and by-laws and registration with district authorities. Registration has been required in the turnover program, so that there would be an organization to receive the transfer of management responsibility and authority. If WUA do not exist in ISF areas, or are inactive, then WUA and WUA federations are formed. The WUTP is supposed to train WUA leaders and farmers. In a few cases women have been selected as WUA heads, treasurers or other roles, but in general leadership and participation in WUA meetings has been dominated by men.

Legal status: Registration with the district head has been considered sufficient for turnover and most other WUA development activities. However in the past it was not clear whether this gave WUA the full legal status possessed by other legal bodies such as companies and associations. The mechanisms have now been clarified through which WUA can gain the full legal status needed to open bank accounts, enter into contracts and have legal standing to defend their interests in court. This requires legislation to be passed by district assemblies. The Ministry of Interior has instructed provincial governments to guide district governments in supporting this process, which is now going on.

WUA development is often heavily focused on completing the paperwork required for formal registration. Registration with the district provides a clearly measurable target, and one which is considered a necessity for implementing turnover and ISF. In principle WUA registration is the responsibility of regional governments and the provincial and district level. In practice water resources staff often are heavily involved in shepherding WUA through the formal registration process, since they have the most stake in ensuring that formal requirements are fulfilled so that a project can proceed.

Farmers often hope that WUA organization may lead to more assistance from government and better local management. By comparison with customary local irrigation leaders, government officials may be more willing to recognize WUA leaders as legitimate representatives of farmers, and might be more inclined to take action on their requests. Farmers often hope that having a WUA with an explicit legal foundation and government backing may give them more authority to make people abide by rules on water distribution and payment to O&M costs.

Lack of customization: In principle, WUA development is supposed to be based on existing local irrigation organizations, which exist in a variety of traditional and customary forms. However, due to various factors, including limited time and belief in the superiority of standard bureaucratically approved procedures, there is a frequent tendency to impose standard models of WUA organization, with little adjustment to fit local circumstances. This is most apparent in the use of standard, preprinted constitutions and by-laws for WUA, and cases where customized, locally developed by-laws have been rejected by district offices because they did not conform to standard models. Requirements that leaders be literate and able to interact with government officials sometimes exclude traditional local leaders from leadership positions, but result in newly chosen leaders who lack the authority to carry out their responsibilities.

Current bureaucratic models for WUA development require a substantial amount of meetings and paperwork, usually without providing corresponding gains which would give farmers incentives to sustain a more formal approach to management. Current approaches unnecessarily impose overly formal bureaucratic models, which risk disrupting effective local institutions. The underlying issue is whether WUA are developed as organizations for farmers, or only as instruments for government which push burdens on farmers without sufficient incentives to make participation worthwhile. The large number of formal WUA which have been registered does demonstrate

the extent of efforts which have been made, and the capacity which has existed to pursue institutional development. If such efforts could be used in a more efficient and effective approach, then there might be substantial benefits in strengthening local irrigation management institutions.

Enabling framework: It is important that the government provide an enabling policy framework, so that organizations which need legal status can obtain it. It appears that at present many, perhaps most, WUA do not require formal legal status to fulfill farmers' needs. Rather than assuming all current irrigation organizations can and must be transformed such support could be selectively provided where it can make the most difference, within a policy framework which enables WUA to grow autonomously in response to their own needs.

6. POLICIES SUPPORT PARTICIPATION

Projects have worked out detailed procedures for turning over irrigation systems, consulting with farmers about designs, jointly assessing needs for O&M, collecting service fees through WUA, and other activities involved in participatory irrigation management. In the past it might have been said that participation was only a broad policy, without substance. There is now an abundance of regulations and guidelines detailing how participation can be carried out.

New policies regulations, guidelines, manuals, training curricula and other formal paraphernalia do not necessarily translate into changes in implementation. Practice still falls far short of policy in many ways. Policies may be ignored, constrained by lack of resources or subordinated to more urgent concerns. Project managers almost all come from engineering backgrounds, and are much more skilled at building physical hardware than changing institutional software. In many cases project implementation continues to emphasize physical and financial progress, focusing on these more easily measured targets, rather than key steps for consultation with WUA, let alone the more remote goals of better water distribution, maintenance of physical structures in improved condition, increased yields and higher incomes for farmers. Much has been learned which could be used to optimize procedures. Current policies are a starting point for further improvements, not a stopping point.

However despite the problems which exist, it is important to recognize the extent of change in policies which have occurred. The broad policy changes included in the 1987 policy statement on irrigation operation and maintenance, including turnover and ISF, have now been spelled out in great detail, and implemented in irrigation systems covering many hundreds of thousands of hectares. Lack of policies and procedures can no longer be used as a reason for not carrying out participatory approaches. The capacity to change policies demonstrated in this process can be used to institute further reforms in policy and practice.

7. KEEP IT SIMPLE, AND KEEP PARTICIPATION

There has been a persistent tendency to make procedures more complicated than necessary, rendering it difficult or impossible to fully implement participatory approaches with the staff and resources available under ordinary conditions. Excessive complexity increases the risk that during simplification, key elements are left out or receive too little attention.

Complicated curricula and procedures in the Starter project made it harder for outsiders to understand how the project worked and what lessons it might hold for other projects.

Having some twenty or more record books for WUA to fill in was one of the most extreme examples of how bureaucratic models for formal WUA were unworkable for farmers.

Almost all turnover systems have had physical improvements before turnover, so the procedures for group A and group B shown in Appendix 2 are largely irrelevant. Detailed information was collected in inventories and profiles of systems to be turned over, but often went unused. Elaborate forms and procedures were developed for monitoring and evaluation of turned over systems, seemingly without first figuring out how to implement even simple methods with the scarce resources available.

Formulas for linking ISF with the level of service received were too complicated for farmers and agency staff to understand, and ended up being replaced with oversimplified uniform rates which make few or no distinctions about service levels. The complicated series of steps laid out for ISF may obscure the key objectives of jointly assessing O&M needs, finding out who actually receives water and charging them ISF accordingly.

In all programs there was a tendency to insist that policies had to be implemented in full, without clarification about which aspects were most important to develop first. This left implementers on their own to decide priorities, influenced more by convenience and implementers' own skills and interests than by program goals. In particular there has been a continuing tendency to emphasize construction in turnover, and fee collection in ISF, without adequate attention to consultation with farmers in planning of construction and O&M. Furthermore, most programs have gotten caught up in the complexity of their own implementation and often lost sight of the more fundamental objectives of improving irrigation performance and farmer welfare.

There is a key lesson that future programs should be simpler, not more complex. Aspects which are "nice, but not necessary," should be left out, or clearly identified as things to be added later on once the basics are working well. Implementation should concentrate on core elements of participation, such as walkthroughs, as shown by impacts on performance indicators such as equity in water distribution and maintenance of canals.

D. ISSUES AND ALTERNATIVES

Indonesia has made massive investments in building and rehabilitating irrigation systems. The programs to improve participation and otherwise strengthen irrigation operation and maintenance have involved a major effort. Whatever can be achieved by large-scale, top-down, supply-driven approaches to strengthening O&M, and to irrigation development more generally, has in the main already been achieved. For future investments to be productive, there is a need for a fundamentally different strategy, emphasizing bottom-up, decentralized, customized, demand-driven approaches to developing irrigated agriculture.

Participatory irrigation management is an essential part of such a new strategy for irrigation development. Past projects with participatory irrigation management components have laid the foundations for the shift to such a strategy. The government's policies to decentralize to the district (Tk. II) level stress the need for more localized approaches, and recognize the capability of government agencies and local people to be the prime movers in development.

This section explores several issues which show the potential for alternative approaches to participatory irrigation management.

1. DIVERSIFYING AGRICULTURE

There is increasing recognition of the importance of diversifying agriculture and developing agrobusiness. Government policy has shifted to allow farmers greater freedom in choosing their own crops, but movement is constrained by continuing concerns to maintain self-sufficiency in food production. Rice production offers low and declining returns to farmers, whose hopes for better income from irrigated agriculture are more likely to lie in horticultural crops. Indonesia's size, labor force and geographic location mean that it will have a long-term comparative advantage in production of tropical crops, if adequate marketing systems, technical skills, quality levels and other requirements can be achieved, including support in how irrigation services are planned and provided.

The means for supporting diversification are somewhat beyond the scope of this paper. It is clear that the primary role must be played by farmers and the private sector. However there is a necessary role for government in 1) reforming regulations which impede diversification; 2) encouragement of a pro-competitive (non-monopolized) business environment in which ordinary farmers, traders and investors can reap the fruits of their efforts; and 3) careful, selective intervention where it will help diversification and agricultural marketing, for example perhaps through better information about prices and (private sector) quality standards for agricultural products, both for domestic and export markets. If agriculture is more profitable, then farmers will be more interested in irrigation management. Increasing incentives and better aligning PIM with farmers' incentives is essential if participation is to have any hope of being sustained.

2. WATER USE RIGHTS AND PARTICIPATION IN BASIN WATER MANAGEMENT

Increasing competition for water is bringing increasing pressures for reallocation of water from irrigation to other sectors. Industrial development sometimes results in pollution which harms crops. WUA and WUA federations can provide a structure for participation in water resource management. Reallocation is likely to be smoother, more equitable and more successful if based on good information about farmers' concerns, and ways that reallocation can respond to farmers' interests as well as those of municipal and industrial users.

While a legal framework exists for issuing water permits to provide water use rights this is not currently applied for irrigation and other rural water use. Thus farmers in turned-over systems do not have an explicit water right, though design of headworks is based on an indicative flow (debit). At some pilot ISF sites, efforts were made to specify water delivery services and install suitable measuring structures within systems. Such methods do not seem to be a major part of the current expansion of ISF. Clearer allocation of water rights, to farmer-managed systems and within larger systems, could help reduce conflict and facilitate trading and compensation arrangements for reallocation and efficient water resources utilization. As in other areas, participation can be very effective in preventing problems and finding "win-win" solutions. Pilot projects are currently exploring ways to include farmer representatives in basin water management and provide clearer water use rights to irrigation systems.

3. WUA AS BUSINESS ENTERPRISES

PIM projects often assume that they will improve farmer incomes, but have not included elements directly focusing on income generation. However one avenue for strengthening WUA and increasing benefits to farmers may be through development of WUA as business enterprises. Opportunities include a range of activities from fisheries, joint purchase of agricultural inputs, marketing of crops, to electric power generation.

WUA as business enterprises could organize members to respond to the specific business opportunities that are present in a particular system. Such WUA development has three dimensions: 1) facilitate and support members to run their irrigated agriculture enterprises, 2) generate income for WUAs to enable them to perform their functions in an effective and efficient manner, 3) promotion of suitable businesses.

Advantages are that farmers can: 1) pool their resources to achieve economies of scale in running irrigated agricultural businesses, 2) facilitate members' access to support services in an effective and efficient manner and 3) reduce risks of exploitation with regard to any particular business opportunity.

Given the environment in which the system operates, different irrigation systems will have different business opportunities for WUA to respond to. Factors in the environment include access to markets, water availability and access to other productive resources (information, credit, inputs).

In the Gunung Nago irrigation system in West Sumatra, secondary canals have been used for fish culture. As of mid-1996 there were about 250 fish cages (sized approximately 2m x 1m x .5 m) in the canals. One fish cage could yield its owner a net income of Rp. 150,000 to 200,000 every four months. In the same system there were also fast running water type fish ponds (kolam air deras). In the Sicaung irrigation system, a WUA federation organized provision of agricultural inputs, as well as collecting ISF. A number of farmers are using their fields for fish cultivation, which they believe is quite promising. Both these systems are large, jointly-managed systems, but similar tendencies can be observed also in smaller systems.

There is some ambiguity in policies, as to whether WUA are organizations only for acquiring and delivering water, or can be a vehicle for farmers to run irrigated agricultural enterprises and other water based economic activities. Most policies seem to have envisioned WUAs as dealing with water, but the policies may still enable WUA to expand into other activities.

Reforms in the orientation of WUA development may require changes in the institutional framework for WUAs and agricultural development. These reforms need to be directed toward creating a suitable environment for WUAs to exist as business enterprises. Three areas of policy reform need to be considered:

- 1) institutional and legal basis for WUA to develop and grow as business enterprises
- 2) developing a program of business promotion and providing appropriate support services for WUAs to respond to business opportunities.
- 3) institutions and regulatory bases to enable appropriate links between WUAs and other organizations (including private sector organizations) to develop in relation to business.

4. CONTRACTING FOR IRRIGATION MANAGEMENT

WUA development in Turnover and other programs has emphasized a model of organization often based on quasi-voluntary leadership and part-time management. While this may be suited for smaller schemes and more remote areas, it is much more problematic in more commercialized areas and in larger irrigation systems.

Turnover of smaller systems has been easier where only a single village is involved and local traditions of self-help are still strong. Average farm sizes of less than half a hectare, and even smaller on Java, mean that a hundred-fifty hectare system already includes several hundred households. Larger systems often involve multiple villages, and more challenging problems of cooperation. Relying on quasi-voluntary management seems much more difficult with multiple villages. More commercialized areas, closer to major towns often have higher levels of share-cropping and absentee ownership. These make WUA management more complex, particularly when absentee owners need to be consulted. In areas which are more commercialized, busy farmers are more reluctant to contribute labor, and more willing to pay for O&M services.

Even in smaller, more "traditional" systems there are interesting examples in West Sumatra and elsewhere, in which individuals have offered to take over management responsibilities, and sometimes even to build the irrigation system, in return for receiving a fee or share of the crop. In West Sumatra's Sungai Jernih irrigation system, a group of farmers have made a contract with other farmers-through community leaders-that they would build the weir and be responsible for operation and maintenance of the irrigation system. For their services, they receive 20% of the farmers' harvest. In the Ladang Laweh irrigation system, O&M has been contracted to a group of farmers who are entitled to get payment from each farmer equal to the amount of seed used for their paddy fields. In the Bunian irrigation system, the WUA offers the maintenance work for a particular season to a group of farmers who will take the work in return for a specified total payment.

Contractual approaches to management can give clearer responsibilities and incentives to those hired to assume full time responsibility for irrigation management. This covers not just more technical tasks of distributing water and cleaning canals, but also management tasks such as planning water allocations, managing conflicts and mobilizing resources. Such approaches, with written contracts, and sometimes with competitive tendering, have been widely used in China and Vietnam. In a more professional model for WUA management, WUA and federation leaders would only need to take part in reviewing the operator's performance and major policy decisions such as constructing major improvements. More professional models for irrigation management by full time-specialists, accountable to farmer representatives, have been a key part of turnover of large irrigation schemes in Turkey and Mexico.¹²

5. FARMER FINANCING FOR IRRIGATION DEVELOPMENT

Current arrangements for financing irrigation development in Indonesia give farmers few choices but to act as supplicants, pleading for government aid. Institutional arrangements do not enable farmers to join collectively to borrow funds for irrigation development against the benefits they will receive in the future. Aside from legal recognition for WUA, little has been done to increase the financial capacity of WUA to mobilize and manage resources. This lack of institutions to strengthen the financial capacity of farmers and water user associations is all

the more surprising since Indonesia has some of the world's best and most innovative programs for rural microfinance.

There are a range of mechanisms which have been used in other countries to enable farmers to finance irrigation development.¹³

In many areas of Indonesia farmers earn good returns growing tobacco, onions and other high value irrigated crops. They may need some technical guidance, but would be quite capable of financing irrigation improvements themselves, if suitable mechanisms existed. Instead their only choices are either to lobby the government and wait for aid, or else make unauthorized changes on their own, a bit at a time.

Farmers in an East Lombok irrigation system collected stones for four years. Once they finally accumulated enough material, they got cement and tools from a project using the approach pioneered by the Starter project. At many sites in the East Lombok, benefits from having a permanent dam were so high that they would repay the capital cost within two or three years, but aside from subsidized government programs, few institutional mechanisms are available to finance such construction. In many irrigation systems, when urgent repairs are needed, a wealthier villager may advance the funds, and be willing to wait for repayment at harvest, but this is limited to the amounts one or a few such individuals are able to put at risk. Ordinary farmers are not helpless, but are usually limited to the money that they can save over a single season or year, in the face of many competing demands. Innovative arrangements could do much to increase the financial capacity of farmers and WUA to help themselves.

Existing microfinance programs around the world make effective use of groups who borrow together and guarantee each others' repayment of loans. A similar approach could be used in irrigation, perhaps dividing up financing to keep groups of a manageable size. Canal lining and structures within systems often serve specific subgroups of farmers. Even though a dam may be a single unit, cement and other materials are easily divisible as inputs into construction. For works within their current capacity, farmers already commonly divide contributions into shares of materials, money and labor to be contributed according to irrigated land area.

As discussed earlier, the legal framework has been clarified though which WUA can obtain the full legal status needed to enter into contracts and carry out activities such as obtaining loans. The key differences between community financing of irrigation and individual loans would be 1) the need to ensure suitable technical guidance, and 2) mechanisms so that after a vote or other collective decision all those benefiting from the irrigation improvements would be obligated to contribute to repayment. Such procedures are already used by irrigation districts in the U.S., Japan and other countries.

Irrigation districts usually have the power to enforce payment through the courts. The power to take land often is an ultimate sanction, since cutting off water is often difficult or impossible to implement as a sanction. As with any sanction, if enforcement is credible, then the sanction itself rarely needs to be imposed. In practice, enforcement of fee payment usually relies on more immediate sanctions, social and legal. Some of the most effective micro-finance programs internationally do not require collateral, knowing that in practice repayment must be based on cash flow, and that other sanctions can be more effective. Natural disasters might mean that farmers need to delay payment for a season. The irrigation service fee program has already worked out arrangements at an individual level for checking and certifying whether farmers deserve exemption due to factors beyond their control. Similar mechanisms could be applied for collective borrowing.

If the government believes that gains to consumers and other benefits from irrigation justify a subsidy, then it could provide grants to combine with loans, based on a lump sum amount per hectare or a percentage matching basis. Such subsidies would be simplest as one-time payments, with farmers repaying the remaining amount at regular interest rates. The history of rural credit programs makes clear that such programs will only be sustainable if done using market interest rates, through banks or other financial institutions which have strong incentives to ensure good selection of borrowers and repayment of loans. Since subsidies may be scarce, and require more time-consuming processing, farmers should have mechanisms for borrowing without subsidies, if they prefer greater speed and flexibility.

6. RE-ENGINEERING O&M

While turnover of irrigation systems smaller than 150 hectares has proceeded fairly smoothly, there has been reluctance and concern about turning over larger systems, particularly the headworks. These are often permanent dams, technically somewhat complex, representing a substantial investment of government funds, and with greater risk to life and property if poor operations resulted in failure.

At the same time there are many secondary canals within larger schemes which in practice are largely or completely farmer operated. Shortages in staff, vehicles, communications equipment and operational budgets constrain the ability of irrigation offices to provide services. Farmers may be asked to assist with maintenance of secondary canals, or needed maintenance may go undone, although it would clearly be within the capacity of farmers to manage. Some systems larger than 500 hectares are de facto farmer operated, in particular, the agency may play only a minor role in O&M below the headworks.

With increasing competition for water in many basins, even if dam operation and maintenance is turned over to WUA, the government still must retain the authority to supervise water allocation, so that upstream systems do not unfairly deprive those downstream during periods of shortage. Similarly, regular technical inspection of diversion dams is necessary, to identify problems where inadequate maintenance might risk harm to life and property of those downstream. So, there are limits even to the "full" turnover of headworks carried out in smaller schemes.

Farmers in some areas would prefer to take on more responsibility in O&M, using their knowledge and own labor to improve operation and maintenance. In other areas farmers would be happier simply paying a fee and not having to be too involved in management and contributing labor. The experience from turnover and ISF, and the problems outlined above provide a basis for reconsidering the division of responsibilities which was formulated ten years ago, before either policy had been tried in the field. Rather than insisting on perpetuating a somewhat arbitrary criteria of 500 hectares, it may be worth thinking about letting farmers have a choice of whether they want to pay a service fee, or take over O&M responsibilities. A reformulated policy could draw on the strengths of both the turnover and ISF programs, while allowing more scope to adjust policies to local capabilities and circumstances.

E. NOTES

1 Bryan Bruns is an applied sociologist who has worked extensively on participatory irrigation management in Southeast Asia, including Indonesia's program to turn over small irrigation systems to water user associations.

Helmi is a lecturer in the socio-economics of agriculture at Andalas University in West Sumatra, who has conducted research on many aspects of irrigation development in Indonesia, particularly turnover and water user association development.

The paper draws on the work and insights of many people with whom the authors have discussed these issues over the years. The many people who have worked to create, implement and improve participatory irrigation management in Indonesia deserve primary credit for any useful ideas contained in this report.

2 There is relatively little written information on the implementation of turnover. The most extensive review was done for the IISP-II project by Mott-McDonald (1993). The Institute for Social and Economic Research, Education and Information (LP3ES) assisted development of the program from 1987-1991 and then was involved in developing monitoring and evaluation approaches. Their final report on monitoring (LP3ES 1993) draws on case studies and consultation with officials to discuss major issues affecting implementation. Several Masters' theses (Koeswanto 199?__ and Judawinata 1991) and a dissertation (Helmi 1996) help illuminate the accomplishments and shortcomings of the program in the field.

3 The study was done only a few years after the projects had been finished, so it is not certain whether gains will be sustained (Bruns, Kurnia and Tajidan 1994).

4 Rachbini (1990) reviewed the On-Farm Water Management Program.

5 This study was a focused assessment of specific impacts of the Starter and Turnover Program, done to assist design of a methodology for assisting farmer managed irrigation systems. Bruns, Kurnia and Tajidan 1994.

6 A follow-up study of the Madiun project was done by Richard Hutapea (1993), who had been involved in the original pilot activities by DGWRD and Satya Wacana University in the early and mid-1980s.

7 Aziz and others (1991) followed up on HPSIS about ten years after the project, providing a useful long term perspective.

8 Sustainability of WUA was analyzed and questions raised in a worldwide review of World Bank experience (Cernea and Meinzen-Dick 1992), in Pakistan (Byrnes 1992) and in a review of experience in Asia and Egypt (Goldensohn and others 1994)

9 Murray-Rust and Vermillion in their report on IIMI's work assessing the initial phases of the turnover program (1989) noted how dynamic context of small scale irrigation, subject to landslides, flooding and other changes, made institutions more crucial for sustainability than seemingly permanent physical works.

10 Effectiveness of participation in planning and difficulty of sustaining WUA was a major conclusions in the review of WUA in Asia and Egypt by Goldensohn and others 1994

11 Hutapea (1993) confirmed the value of participation in planning in Madiun.

12 Cernea and Meinzen-Dick (1992) discuss the role of professional management as part of their contrast between "American" and "Asian" types of irrigation management organizations. However the relevant factors seem less concerned with continental location and more with other factors, such as the commercialization of agriculture and feasibility of recruiting competent managers.

13 Small and Carruthers (1991) provide a broad review of the problems in recovering irrigation costs from farmers, and some of the methods which have been used. The failure of investor built irrigation schemes in the western U.S. is important in showing the difficulty or impossibility of mobilizing outside capital, unless the farmers themselves (and their land) are directly responsible for repayment.

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APPENDIX 1. PARTICIPATORY PROGRAMS - IN BRIEF

1. HPSIS - High Performance Sederhana Irrigation Systems Project experimented with the use of community organizers to facilitate participation in construction and utilization of small schemes.
2. Madiun Project - Farmer participation, facilitated by community organizers, in planning and implementing rehabilitation of a jointly-managed irrigation system in East Java.
3. SSIMP - Small Scale Irrigation Management Project. Developed procedures for consultation with farmers in planning and construction of jointly-managed irrigation systems.
4. Starter - On Farm Water Management Development Project. Provided agricultural training and construction materials to stimulate improvement of farmer-managed irrigation systems, carried out by farmers.
5. WUTP Water Users Training Program. Trained larger numbers of government officials at provincial, district and local levels, as well as farmers, about water management and water user associations. Follow - up activities were conducted at some sites, with village level training and activities to improve irrigation O&M.
6. Turnover - Turnover of Small Irrigation Systems to Water User Associations. Participatory planning of improvements to small irrigation systems smaller than 500 hectares, listed as "government" systems, which were turned over to WUA.
7. ISF - Irrigation Service Fee. Introduction of fees for irrigation service on all government (jointly-managed) irrigation systems larger than 500 hectares, with institutional mechanisms for farmer voice through participation of WUA in identifying O&M needs during walkthroughs and representation of WUA federation leaders on district bodies, BAMUS, overseeing utilization of fees.
8. FMIS - Farmer Managed Irrigation Systems Project. Methodology for providing farmers with technical advice and materials for improving infrastructure, management and agriculture in existing irrigation systems. Pilot technical assistance synthesized approaches from turnover, starter and other earlier projects. Project scheduled to begin in 1996.
9. Village Irrigation Project (PID - Proyek Irigasi Desa) improvements to farmer-managed irrigation schemes, implemented by state companies with some consultation of farmers during in design and construction by paid farmer labor.

APPENDIX 2. FLOW CHART OF TURNOVER ACTIVITIES

APPENDIX 3. KEY STEPS IN ISF INTRODUCTION

Key steps in ISF as developed during the pilot period and subsequent expansion involve the following:

1. Information campaign to all water users and government officials
2. Socio-hydro mapping to delineate WUAs and federations
3. WUA and ISF database with water user and landholding registration information
4. System walk-through to inventory service issues and levels
5. Defining O&M, in consultation with WUA federations, specifying O&M, including cropping calendars and cropping intensity by blocks
6. Calculation of the ISF part of needs-based budgets for O&M
7. Discussion and agreement on O&M costs and ISF tariff
8. Service agreement signed between WUAs and district institutions
9. District legal decrees to further establish district level legal basis for ISF
10. Accounts and collection, preparation of forms and issuance of payment requests