

The Institutional Context of Irrigation Management Transfer

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INTRODUCTION

DEVOLUTION OF SOME or all responsibilities for management of irrigation systems is nowadays seen as a major step towards effective and sustainable use of irrigation infrastructure. In the face of reduced availability of funds for initial and recurrent expenses and in recognition of the often disappointing performance of irrigation agencies, transfer of managerial and financial responsibilities can be an attractive strategy.

However, whether such a strategy is appropriate and feasible depends on the political, institutional and economic context in which irrigation management takes place. Transfer of control implies a basic shift in political power and managerial influence, which is not always possible or beneficial. Transfer of responsibilities implies more than a shift between otherwise unchanged partners; it requires irrigation agencies to be substantially modified and these or other public institutions to assume new, often more complicated, roles. It obviously assumes increased capabilities among organized water users. And finally, such transfer does not necessarily resolve the most crucial obstacles towards productive and equitable utilization of irrigation infrastructure in the national context.

In this paper we will investigate the various institutional parameters that determine, and often constrain, opportunities for successful decentralization and transfer. After discussing the historical and institutional setting in which irrigation systems in many developing countries were initiated, the major current bottlenecks, towards their effective utilization are reviewed. These bottlenecks are not new and have, over the last few decades, given rise to a sequence of strategies. The early strategies, each emphasizing a different aspect, had one aspect in common. They tackled **one specific** dimension of the farmers-system-agency triangle. Irrigation Management Transfer, the presently favored strategy, intends to rearrange those relationships in a more profound way. There has been sufficient experience with this approach to enable us to review the specific conditions for successful transfer. [These are illustrated with cases in which we²] are currently involved.]

The paper concludes with a discussion of what might constitute the next strategies towards more effective and equitable utilization of irrigation infrastructure: institutional reform and policy reform. The daunting requirements implied by those strategies and the limits to external sponsorship of such measures are considered.

THE SETTING

As recently as ten years ago, irrigation development was viewed as engineering projects strung together. In the minds of many, "development" itself featured as a project rather than as the flow of history. The great development economists of the early and not-so-early days--Tinbergen, Frisch, Altshuler, Seers, Watanabe and others--saw the central government as the prime mover in development. In Tinbergen's "big push" of the fifties, the central government was the initiator of development, the guardian of the collective good, and the ultimate power legitimately deciding what to do, how to do it, where and when. Society was ordered strictly hierarchically, with lower echelons being concerned with making central government's decisions operational. The formulation as well as the pursuit of the collective goals were exclusively and legitimately within the mandate of central government. "Collective" decisions were at all times to take priority over non-collective ones. These views have prevailed almost unchallenged until the early eighties. They were reflective of the widespread conviction of the "makable" world and of the austerity of the engineering concepts that went with it; "social engineering" was a concept then.

Their impact has been wide and deep. They have also affected irrigation development ever since the early fifties. Almost everywhere, the central government initiated accelerated irrigation development. It typically entrusted ministries of public works with the task of expanding irrigation infrastructure wherever technically and economically feasible. The result has been a spectacular expansion of both irrigation infrastructure and irrigated agriculture, virtually all over the world, but particularly, in developing countries. Millions of miles of canal have been built, thousands of large and small

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dams and reservoirs have been constructed, miracles of hydraulic engineering have been achieved. In their wake, food production has been accelerated and kept abreast of high rates of population growth.

So, here we are today, with a few hundred million hectares of irrigated agriculture around the world, more than two-thirds of which is the result of water regulating and conveying infrastructure built over the last four decades. And with central government in most cases firmly established as the main actor in all this. Can we, should we continue in this fashion? Can the necessary growth of agricultural production under irrigated conditions be sustained within prevalent institutional infrastructure? The answer is no, and this will be argued below from three angles: (a) increasing scarcity of land and water resources; (b) changing production functions; and (c) changes already taking place in society. Against that background, we will discuss the rapidly increasing evidence of the disappointing performance of irrigation agencies, and the visible and increasing deterioration of existing physical infrastructure

Scarce Land and Water Resources

Although exceptions do exist, in most countries irrigation development started off with "ready" opportunities, to embark on not-so-ready opportunities only later in the process. As a result, world-wide, land and water resources available to be mobilized at reasonable levels of investment and recurrent cost are becoming increasingly scarce. This in turn, means that the scope for new irrigation infrastructure is diminishing. Aggravating this tendency is the rapidly rising concern with the possible long-term environmental consequences of major technical interventions such as the mobilization of groundwater resources over and above a safe yield at environmentally acceptable depth to surface levels, and interventions that profoundly intervene with the natural regimes of rivers and marshes. Estimates suggest that between 30 and 46 million hectares are in poor condition due to salinization and waterlogging (El-Ashry 1991).

This diminishing scope for expansion of irrigation infrastructure is a first powerful factor forcing changes in the institutional dimensions of irrigated agriculture. Agencies partly or wholly deriving their social prestige, the size of their budgets and their role and power in the political arena from their mandate to build new irrigation infrastructure face decline and sometimes deep-cutting changes in their mandate and political reach. Countries and regions formerly looking at ever expanding irrigation facilities as their source of food supply and prosperity are forced to find new strengths to design new institutional infrastructure conducive to developing these new strengths. In some extreme cases, Romein's Law of Impeding Progress is in force and requires the public authorities to restructure profoundly, before new progress can be made.

Changing Production Functions

Aggregate food production under irrigated conditions today makes up a significant portion of the world's total food production. Some countries are virtually dependent on irrigation to meet their demand for food. With the diminishing scope for expanding irrigation facilities, agricultural yields and production can increase only as a result of successful intensification of the use of the existing facilities. Expansion of production is likely to take place less in a horizontal direction but rather in a vertical sense: not more hectares under cultivation, but more intensive use of those already cultivated. However, purely technical progress can only do so much to increase yields; other factors must come into play as well and often turn out to be more crucial. And even where technical innovation in itself offers scope for major improvement, social and institutional conditions are increasingly decisive for its successful introduction.

In situations, for example, where rice yields have increased greatly in Asian countries, this was contingent on pervasive changes in such diverse factors as credit availability, land legislation and tenure arrangements, communication and extension, market penetration, transport enhancement, etc. The purely physical factor of irrigation facilities is an important, but never sufficient aspect of change. Whether or not its potential will be tapped depends on contextual factors that lie in the domain of economics, politics and social relationships. And while agricultural production is increasingly drawn into larger economic systems, the relative weight of irrigation technology will become proportionally less, as many farmers in developed countries are learning the hard way.

The integration of technological consideration and facilities into larger production and marketing functions becomes more delicate and essential, and goes far beyond what the inevitably partial perspective of irrigation agencies can accommodate. It is doubtful whether any single agency can accomplish such integration and a probably more relevant perspective suggests that farmers themselves have to balance the various functions, in fluid and intensive interaction with a large range of public and private institutions. This, of course, puts heavy demands on the capability of farmers to deal with such a complex institutional environment.

Changing Society

The hierarchical and monolithic society of Tinbergen and Frisch has disappeared. In fact, it may have never existed. Nevertheless, during the first two to three decades of deliberate world-wide development efforts, the notion may have been a fair approximation of actual operations and certainly helped governments and communities to cut across many institutional obstacles and make the "big push" bear fruit.

Over the last thirty years, however, most developing economies have grown and become more complex; more and more sections of societies got educated and have become more articulate, and their internal interdependency and interactivity have increased; governments have undergone processes of deconcentration and decentralization. Virtually everywhere governments and societies are rethinking the roles to be played by the public and the private sector, and the procedures and legal frameworks which govern their interactions and discharge their responsibilities. In large parts of the developing world the former "big push" mechanistic patterns of decision making have ceased to be tenable, generally as well as in relation to the allocation of scarce resources.

The centralist, monolithic society is phasing out and is being replaced by a multi-system society, i.e., by an entity built up of many interactive and often competing smaller entities. Although central government is a powerful actor in multi-system society, it is an actor amongst actors; central government has become a party in the market place. To attain its goals, it now needs to negotiate, co-opt and convince. The goals themselves are these days often modified as a result of compromises concluded in implicit and explicit market negotiations.

To irrigation development, irrigated agriculture and to the farmer, these changes in society represent incisive changes in their institutional environment. Formerly, central governments instructed, specialized agencies executed, and the farmers at the end of the line were often unconsulted: a passive party to events. Increasingly, farmers in the developing countries effectively organize themselves and become articulate. In due course they may very well be market parties as strong as their counterparts in the developed countries. Already, particularly in some countries in the Far East, the growing organizational and political maturity of the irrigators is modifying the processes and procedures by which irrigation infrastructure is expanded, altered, maintained and managed. In these countries, the farmer is entrepreneur, a decision maker in interaction with other decision makers including the central government.

DISAPPOINTING PERFORMANCE OF SYSTEMS AND AGENCIES

It is against this setting that irrigation systems have been built, operated, maintained, rehabilitated and used. And in each of these activities, major problems increasingly come to the surface. What promised to be one of mankind's major steps towards intensification and expansion of agriculture has become an often disappointing investment, a burden on national governments and the focus of rent-seeking and tortuous communication between the farmers and agencies.

The observed malperformance of irrigation systems has contributed to a substantial reduction of international and national investments in this sector. Annual lending and assistance for irrigation in South and Southeast Asia by the major international agencies (WB, USAID, Japanese Overseas Economic Cooperation) has gone down from US\$1,301 million in 1977-1979 to US\$608 million in 1986-1987. Public expenditure in some Asian countries has fallen by 40% (Bangladesh 1981/1985 compared to 1986/1989), 55% (Philippines 1976/1980 to 1986/1990), 46% (China over the same period), 20% (India). Only in Thailand and Indonesia has such investment increased (Rosengrant and Svendsen 1993).

What then are the problems that have fed this disenchantment? Below we discuss the major ones: the under-utilization of irrigation potential by farmers, poor management of irrigation systems, inadequate maintenance of irrigation infrastructure, poor performance of irrigation bureaucracies and the meager recovery of costs from users.

Under-Utilization of Irrigation Facilities

The potential contribution of irrigation to increased agricultural productivity, as calculated under test conditions, assumes full commitment of well-informed and motivated farmers who have the necessary inputs at their disposal, aim at maximum production, solve all mutual disputes and are capable of incorporating the timing of irrigation water in their agricultural calendar. These, of course, are optimistic assumptions. Most irrigation systems never come even close to their theoretical production results, because of farmers not adhering to recommended practices, not having the complementary inputs or simply not fully switching to irrigated agriculture.

In Zimbabwe, for example, many farmers in the somewhat better agro-ecological zones, prefer to concentrate on their rain-fed crops in the wet season at the cost of their irrigated land, because of better returns and more individual flexibility. In India most tail-end farmers in the larger systems virtually ignore the irrigation potential, because they have learned that water supply is too erratic. In Bangladesh many farmers in larger schemes have found that water allocation is beyond their control and do not take chances by applying the full and expensive dosages of fertilizer.

Poor Management of Systems

The single, possibly most important factor responsible for the disappointing returns on irrigation investment in the larger systems, is the failure of proper, reliable and responsive management of the main system. Most systems are built by or under the control of the same agencies which are subsequently in charge of their operation. These agencies might be effective and efficient in design and construction, they seldom are in responsive system management. In many of the larger systems in countries such as India, Bangladesh and Indonesia, there is not really any **management** of the system in terms of **deliberate** water allocation and rotation over time and space **in response to** actual circumstances. There is only administration. As documented elsewhere (e.g., Chambers 1988), fixed schedules are blindly attended, regardless of rainfall, evaporation losses or actual demand. Multi-actor communication, if taking place at all beyond incidental meetings, does not usually lead to revising or fine-tuning water delivery. Farmers' actual behavior, such as sinking private tubewells, flooding fields or avoiding night irrigation, are ignored and incentives for more economic use of water are often absent. Tertiary blocks might have their water users' committees, offtakes might have a farmers' committee, but formal and factual influence by farmers at scheme level is usually lacking. Demand is not aggregated into requirements at system level; a platform and methods for rationally and publicly reconciling conflicting demands are absent. The centralized character of the responsible agencies reinforces the blueprint logic of engineering sciences and results in rule-oriented administration, rather than management led by opportunity and demand.

Inadequate Maintenance of Irrigation Infrastructure

"Big push" centralist promotion of development emphasized investment. As long as irrigation infrastructure kept on expanding at full throttle, little attention was paid to the "softer" issue of maintenance, sometimes none at all. The government budgets for maintenance were low, the organizational concepts regarding maintenance were primitive. Maintenance was left up to whomever was interested, undesigned, unorganized and totally under-budgeted.

As a result, the irrigation systems so painstakingly built and at such considerable cost, deteriorated and gradually lost their service capacity. The answer, quite often, was to launch rehabilitation projects, investments to cater to backlog maintenance. In many countries, Indonesia and Pakistan for example, rehabilitation projects and programs came to command quite large proportions of the development budget, and expansion of the infrastructure increasingly lost to restoring service capacity built at an earlier date. The consensus today is that proper maintenance of the irrigation infrastructure is at the core of sustaining levels of service. Much less consensus exists, however, with respect to how this can be achieved. In fact, maintenance has proved to be an unruly issue, with a complexity neither anticipated nor bargained for.

Maintenance refers to a continuous process of adaptation of the facilities concerned in response to the dynamics of its multi-dimensional environment. In most cases in which maintenance was paid attention to in the past, however insufficiently perhaps, the decisions were taken at levels in the hierarchy of the government, often far remote from the actual perceived need for maintenance. Most dimensions of maintenance, however, are local, tangible and concrete. They require consultations and decisions at the down-to-earth levels of farmers, farmers' organizations, local levels of government, which take us right back into the multi-system society, discussed earlier. Maintenance is a multi-dimensional process of adaptation, operating across a sizeable number of actors and interests. For maintenance to be both effective and efficient, these varied interests must be reconciled, inevitably through explicit as well as implicit negotiations.

Ultimately, we are discussing here the modalities of shifting balances of power. Functional shifts in connection with the maintenance of irrigation systems concern the decline of authority of a typical "infrastructure development agency" and the ascent of a typical "routine governance" agency. A second connotation of the shifting balances of power concerns the respective roles of the public and the private sector. As a country grows out of the mono-objective facility building phase, and maintenance of productive capacity becomes a powerful ingredient of daily political techno-economic and social life, many functions hitherto mandated to the government are being transferred to the private sector.

Poor Performance of Irrigation Bureaucracies

The capability of irrigation bureaucracies to learn, adapt and develop has turned out to be quite limited. Their lack of responsiveness has been widely noted. In countries with major investments in this sector, the national agencies responsible for the sector carry much political clout. They often are "empires" not effectively accountable to public and professional control. It is interesting to note that in countries such as Bangladesh, India and Pakistan, the irrigation bureaucracies succeeded in staying out of the horizontal coordination arrangements to which other departments are normally subject. They report only within their own structures, while budgets for investments are negotiated almost

directly with international agencies. The boundaries between these agencies and their environments are sharply drawn, with the agency having considerable leverage and autonomy and public accountability proportionally low.

Possibly not unrelated to this is the often displayed limit to internal dynamism: the ability to innovate, to foster new ideas and to meaningfully link incentives to actual performance at field level. Careers in irrigation agencies tend to be determined by the progress of time or by merit with regard to design, construction and administration. Involvement in operation and maintenance is less rewarding, and largely left to lower level staff more vulnerable to local and political pressures. While many irrigation systems never came close to their design capacity, showed losses of between 30% and 60% of the available water, rapidly deteriorated through siltation of dams, salinization, water logging and poor maintenance, many agencies did not learn the lessons contained in these facts.

The Meager Recovery of Costs From Users

Irrigation in many countries represents one of the largest single sectors in terms of capital investment; it also represents a substantial drain on the treasury in terms of recurrent expenses. This has been widely recognized and many attempts have been made to recoup some or all of these costs from users. The rate of success, however, is disappointing. Systems based on collection of taxes related to the land have often failed to even recover the collection costs, as in various parts of India. Systems where water users have to pay specific charges in order to qualify for specific water gifts tend to be cumbersome and hard to enforce.

Arrangements based upon irrigation service fees, where fee and service have a direct and locally determined relationship that reflects local cost levels have not yet resulted in consolidated systems and procedures that actually generate most or all of the required funds. Yet, there may be a good future in this type of arrangement. The introduction of irrigation service fee arrangements is in an early stage in the programs which we help to develop and execute in Bangladesh and Zimbabwe. The ISF program in Indonesia, also assisted by us, has by now reached a coverage of hundreds of thousands of hectares and is still expanding. As promising as these efforts can be, there often remain considerable levels of hidden subsidies, because collection and enforcement costs are met from public sources, salaries of various government staff and most of their overhead costs are not included and none of these programs, so far, recover all recurrent costs.

Of course, there are interesting and positive examples such as the Philippines, South Korea, Mexico, or the commercial farmers in Zimbabwe, where a substantial portion of operational costs are recovered from users. There are also encouraging cases of private sector operators taking over after government has withdrawn from some portion of irrigation provision, such as the case of Bangladesh where formerly government-owned deep tubewells are now privately owned and run, without subsidies. Other major and more frequent positive exceptions with regard to cost recovery can be observed in many of the smaller, farmers-managed systems, in which the users have no choice except to carry their own costs. But these are, indeed, exceptions in terms of hectares.

DIRECTIONS FOR IMPROVEMENT

It appears that irrigation planning, management and supervision finds itself at a difficult juncture. While the need for additional food production is undisputed, with unacceptably large (and again growing) numbers of food deficit people, and while physical resources do not and cannot increase proportionally, traditional approaches towards public management of the irrigation sector seem to have reached their limits. In increasingly complex, diverse and rapidly changing societies, central control over farmers and over the infrastructure they might use is losing its credibility and effectiveness. Whereas the infrastructure for large-scale irrigation still represents an inevitably public and centrally led intervention, the established institutional mechanisms for allocating the use of such infrastructure, its control, operation and funding are becoming ineffective, inefficient and unaffordable.

Of course, the above problems are not new. They have been amply observed and have given rise to more or less systematically conceived and implemented strategies for removing such problems. The last decade has seen a succession of such strategies, each emphasizing another aspect and proposing another approach and level for intervention. And this decade is likely to see yet other strategies. The following approaches have, successively, presented themselves:

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| 1970s-1980s: | 1) On-Farm Development (OFD) and other measures aimed at farmers. |
| | 2) Promotion of farmers' participation. |
| | 3) Strengthening of irrigation agencies. |
| Late 1980s-mid 1990s: | 4) IMT. |
| Mid 1990s: | 5) Institutional reform. |
| Late 1990s | 6) Policy reform. |

Each of these approaches tackles another aspect of the noted problems. And, put in the above sequence, each one tackles an increasingly wide range of factors.

- * **OFD** approaches focus on what farmers should do to optimally use the opportunities provided by the irrigation system.
- * The approaches centered around the **promotion of participation** emphasize the interface between agency and farmers and intend to better incorporate specific water user needs and views into the way systems are designed and managed.
- * Efforts towards **strengthening irrigation agencies** focus on possible weaknesses of the organizational and human resource aspects of these agencies, in order to make them more efficient and capable.
- * **IMT** deals with the issue of responsibility and authority over (parts of) irrigation systems.
- * **Institutional reform** takes the structure, strategy and resources of existing organizations as its central object.
- * **Policy Reform** takes a wider and longer-term view of public and private responsibilities with regard to natural resources management, of which irrigation is one aspect. One could visualize the specific fields of attention of these various approaches as follows:

The first three approaches have an essential element in common: each focuses on **one**, though different, dimension of the central triangle of farmer-system-agency relationships: OFD tackles the user-system aspect. Promoting participation targets the relationship between the farmer and agency. And agency strengthening attempts concentrate on the agency-system relationship. These one-dimensional approaches will be briefly discussed below. Thereafter, more detailed attention will be given to IMT and, in the concluding section, the last two approaches will be discussed.

Early, One-Dimensional Approaches

On-Farm Development. The first major drive towards improved utilization of irrigation infrastructure was directed at farmers. As the end-users of systems, they have been identified, approached, counted, observed, selected, trained, mobilized, forced, flattered, moved and motivated. The most characteristic effort can be found in the many OFD programs, executed all over the world. These are aimed at improving the physical and operational environment at the farmers' level, promoting efficient water use, enhancing skills and internal organization of water users. Often, as in the case of the Command Area Development Authorities (CADAs) in India, great efforts are made to encourage farmers to rearrange, level, contour and otherwise prepare their lands, to establish strict water rotation routines, to use the other inputs as prescribed, to draw on agronomic advice and to strictly adhere to extension messages.

While these programs have absorbed very substantial funds, their success has been limited. Of course, farmers need sound knowledge and skills to use irrigation resources wisely, and those should be reinforced. But when farmers experience that their individual and low-level collective efforts do not make much difference because the actual delivery of water remains beyond their control and the larger system performs poorly, their interest in "keeping their end of the bargain" will dramatically decrease. This is compounded by the fact that such OFD programs are often executed by under-equipped agencies, other than the irrigation agency itself. Much of the CADA experience shows that enhancing lower level skills without addressing issues of system management is not worth the effort.

Participation. The recognition that water users should be involved in design, planning, operation and maintenance has led to increasing insistence on farmers' participation. Socioeconomic surveys can be seen as an early attempt to incorporate farmers views and characteristics into design. Consultation of farmers and the demand for farmers to contribute to construction are another step towards their involvement. The formation of farmers' associations, water users' committees, water or scheme management committees and similar arrangements can be seen as a serious effort to share the burdens of management, coordination and resource allocation. And indeed, today there are few systems that do not have, at least on paper, some form of user involvement by way of committees, associations, etc. And wherever significant progress has been made in improving the performance of (aspects of) irrigation systems, substantial success in establishing and consolidating user participation has usually been a major, positive element.

The problem, however, often lies in the poor attention given to the actual generation and shaping of such participation and to the limits of real influence given to farmers. The process of bringing farmers together in decision making and resource management and establishing a meaningful interface between farmers and agencies, is often underestimated

or only gone through in a shallow manner. As much as is invested in physical engineering, as little is spent on "social engineering." And participation in most larger systems is severely constrained by the unwillingness of middle and higher echelons in irrigation agencies to share power with lower levels and with farmers. In addition, much of the actual management of the system is not subject to systematic control: not by farmers, but also not by the agency. This, again, points to the striking lack of accountability of agencies' staff and the weakness of managerial arrangements linking staff behavior to water flows.

Strengthening of Irrigation Agencies. In view of the earlier experiences, a logical and currently popular approach aims at improving the agencies themselves. And of course, proper skills, systems, knowledge and regulations need to be present in any organization dealing with such a demanding and complex mandate. Human resources development by way of the various forms of training, systems development (management, information, finance, planning and other aspects of organizational competence) and the provision of proper incentives and resources to organizations are essential. And much has been done about this. Impressive information technologies have been developed, technical skills are at times superb, and costly training programs are executed.

But glaring weaknesses remain in too many places. Most irrigation agencies have kept their mono-disciplinary culture, their vertical rigidity, their aloofness to farmers' realities. The transition from training individuals to actually changing structural aspects of the agency, especially reward and promotion systems, is often not made. The level of technical skills and dedication is usually high, but the signals that many organizations send to their staff are often confusing. Routines are prized, experiments are spurned. Rent-seeking is common, accountability is mostly upwards (where users are not represented). There is a persistent reluctance or failure to tackle the challenges of flexible operation and responsible maintenance. There is a refusal to face realities. Substantial efforts of international agencies to negotiate or enforce substantial changes of national irrigation agencies, even where their funding is used for leverage, have accomplished little (Nijman 1993). The political clout of such agencies in combination with the inherent problems of changing large-scale bureaucracies has proved to be a major obstacle to change.

IMT: Reshaping the Triangle

The idea that responsibility and authority over (formerly agency-managed) irrigation facilities should be at least shared with or entirely handed over to farmers, has been gaining acceptance for some years. IMT, in our analysis, does not merely tackle **one** of the three dimensions of the farmer-system-agency triangle; it attempts to change the terms or shape of the entire triangle. And it attempts to deal with all of the three dimensions in their physical, institutional, financial and social interrelatedness. Some lessons have, by now, been learned about the conditions that significantly affect the scope for effectiveness. The more interesting lessons concern the environment, agency, farmers and the IMT process itself, and are briefly identified:

The Political and Economic Context. Effective transfer of control over public investments represents a change of power. A political commitment to effective IMT is, therefore, essential. And this commitment is especially required where IMT means handing over parts of larger systems (as opposed to transferring entire systems). This was clear in successful cases, as in the Philippines, Mexico, Nigeria, Nepal. Or in, as yet, less successful ones, as in Bangladesh, India, Zimbabwe. Without unambiguous support from higher levels, IMT tends to get blocked or ends up in administrative and legal wrangles. On the other hand, the capability and involvement of **local** government is another deciding factor. Irrigation agencies cannot or will not carry out the process of IMT by themselves; support and, at times, correction by other segments of the government machine is needed, also to mediate between the agency and farmers. And local government (at block, district or provincial level) can be the effective third party, whose presence is required in any case as IMT concerns the transfer of control or even ownership of public assets.

The IMT process is delicate and full of potential conflict. Because of this, it will more readily take place under relatively stable political conditions. This can be the stability of an autocratic and hierarchical government or the stability of a consensual, democratically controlled government with a clear political commitment to the goal and process of IMT. But in either case, IMT does not mean that the government simply withdraws from irrigation management. In many ways the need for public sector intervention only becomes more sophisticated. Direct, centrally led implementation and administration is replaced by decentralized management on the one hand and, on the other hand, by much more delicate and responsive creation of an "enabling environment," often at a much higher level of intervention.

With respect to economic conditions, it is obvious that farmers need to make reliable profits to justify their (increasing) contribution to the costs of irrigated farming. The comparative advantage of irrigated agriculture has to clearly outweigh the high costs and considerable risks involved. This is, first and foremost, a matter of reliable system performance, but almost as strongly, one of market prospects. As the World Bank puts it in its inimitable language: "the price must be right." But prices are not spontaneous events. The organization of buyers, sellers and intermediates, marketing

arrangements, transport and storage facilities, access to credit and other banking functions, all affect price-setting and the position of market parties. And again, while reducing its direct involvement in irrigation management, the government has to assume much more diverse and variable roles vis-à-vis the economic environment, which might require new skills, systems and political agendas. In the process of IMT, it can become painfully obvious that irrigation so far attracted substantial, often hidden, subsidies and that, under full transfer of managerial and financial responsibilities to farmers, existing irrigation systems and methods are not viable any more. This requires more carefully targeted and monitored economic and agricultural policies where developing or maintaining irrigation resources becomes just one of the many choices to be made.

The Irrigation Agency A substantial degree of commitment within the agency is required, for IMT to take place. And this can be greatly encouraged by forcing the agency to increasingly rely on contributions from water users, as opposed to having a more or less automatic annual budget from central, public sources. In fact, the phased reduction of funds for O&M might be an essential pre-condition. (Svendsen Adriano and Martin 1990). For this to be effective, it is also necessary for the agency to gain a considerable degree of administrative and fiscal autonomy, which will make it possible and necessary for agency and groups of farmers to enter into new arrangements.

While these are necessary conditions, they are not sufficient, certainly not if the new situation requires the agency to remain actively involved in O&M of parts of the system. There needs to be a more immediate incentive for the agency to take this responsibility and users' satisfaction (more) seriously. Two approaches have been shown to be effective: (a) creating direct material incentives through allowing staff of the agency to keep a portion of fees collected from users, and (b) arranging for users to be represented at sufficiently high levels within the agency to influence decisions about staff management and budget. This, of course, is a drastic change from most existing situations, where participation by farmers usually does not go beyond expressing needs with regard to systems. And these are changes that will happen to the extent genuine decentralization takes place within the irrigation agency itself. IMT always involves some form of negotiation with groups of farmers and, for this to take place, considerable latitude for local branches or sections is necessary.

The challenge is to provide not only such flexibility and the desire to use it, but also to provide support and guidance to staff to act and interact in hitherto unknown ways. Such support can be internally established (e.g., through instituting new sections within the agency) or be externally mobilized (by contracting specialized institutions to arrange for training, monitoring, research). But in either case, a longer-term and more strategic concept needs to be developed about the new tasks and style of operation required for successful collaboration with farmers who will extend their responsibilities.

Farmers. It is clear that handling additional responsibilities at farmer level requires new or more capacity at individual as well as collective level. At the individual level the farmer will have to develop a (more) entrepreneurial orientation: recognizing and grasping opportunities in a market situation. The option of irrigated agriculture acquires a more clear-cut economic aspect, to be balanced against and among others. It needs to be well understood that IMT does not only or mainly present benefits to farmers. The withdrawal of direct public involvement has its price: at least a financial one, as a large share of operational costs will be born by the water users. But also a possibly greater risk of conflict and unreliable supply.

When questioned, many farmers in medium-and large-scale irrigation schemes in Zimbabwe, for example, preferred agency management to be continued, as they would rather rely on (stable and relatively impartial) agency operation than on (possibly unreliable and contentious) mutual arrangements. Collective costs can be high for farmers: the burden of financial and logistic management can be considerable and demands a level of organizational competence that cannot be taken for granted. Identifying, accessing and using specialist services (e.g., for equipment, repairs, energy), enforcing regulations, acting against defaulting members, resolving internal disputes and mobilizing internal resources are among the many tasks now to be shouldered collectively. For these, the skills and institutional capacity needs to be developed. And it is not certain whether all socioeconomic situations allow such capacity to evolve in an equitable way. Privatization of deep tubewells in Bangladesh has, so far, mainly benefitted the wealthier farmers, who could afford the related investments and who have access to the relevant support services. Access to markets and capital becomes a crucial factor when IMT takes place and, where this is severely biased, IMT can actually reinforce such biases. Such risks tend to be higher as scheme size increases and as the differences in socioeconomic and/or physical situation (in terms of location, soil, access to water, etc.) tend to be greater. And finally, the reduced role of public agencies can increase the risk of short-term exploitation and long-term destruction of the fragile land and water resources that are at stake. With the withdrawal of the possibly mitigating and regulating role of irrigation agencies, a free-for-all situation can jeopardize equity as much as sustainability.

The process of IMT. There are, by now, well documented cases of successful management transfer (among others: Burns 1993; Svendsen 1992; Burns and Amanto 1992; Yoder 1994; Korten 1989; Vermillion 1991). A few lessons can

be tentatively formulated. The main one has been mentioned already: the requirement of a clear and consistent political commitment at higher levels, which effectively translates into incentives for IMT at lower levels within irrigation agencies and which leads to the direct involvement of local government institutions. However, while the political target in terms of the desired end-situation needs to be clear, the process should be conceived in a phased manner and be allowed considerable operational flexibility. In all successful cases that process has, in fact, been a learning process, with ample opportunity for trial and error before detailed policies and regulations were consolidated. A process bringing a range of agencies at various levels together in intensive, open-minded interaction and reflection.

This points to two other requirements: process facilitation and documentation, in most situations by a third party. IMT requires transformation of agencies, farmers' organizations and their mutual relationships and this requires skilful support, monitoring and facilitation. It is, in many cases, doubtful whether the irrigation agency itself is the proper institution to provide such support. Not only does such an agency, as a rule, not have the relevant process skills, it is too much a party in a potentially stressful situation. An independent third party might be more appropriate. At the same time it has become clear that immediate involvement of and trust among agency staff is an indispensable ingredient. If this implies a more gradual process or a degree of compromise, that could still be the preferred approach to achieving long-term success. IMT, if forced upon agencies, especially by donor agencies, can and will be boycotted through public opposition (which creates opportunities for political manipulation) or, even more effectively, through passive resistance. In many situations, agency staff will be required to advise and assist in future, be it in another role, and this is one more reason not to alienate them. It is clear that the need to co-opt a possibly reluctant irrigation agency presents a delicate task, compounded by the need to think through the question of what the future task and structure of the agency will be. If this future is not conceived in time, one can end up in such a situation as the Bangladesh Agricultural Development Corporation, where 20,000 workless, made workless but not jobless and certainly not voiceless, constitute a powerful lobby.

FUTURE CHALLENGES: INSTITUTIONAL AND POLICY REFORM

It is not clear, in most countries, where the process of decentralizing, devolving and sharing irrigation management responsibilities will end. As discussed elsewhere (Vermillion 1991) there is a wide range of options, ranging from "merely" decentralizing and sharing financial responsibilities (e.g., by way of irrigation service fees), via joint management to privatization of assets. Each country needs to find its own solutions, often differentiating further for the various technologies, sizes, regions and socioeconomic situations.

But one thing is clear: IMT will affect the irrigation agencies as much as it will affect farmers. These changes will go far beyond the effects of earlier efforts towards strengthening these agencies. In fact, they probably will change the character of these agencies to such an extent that the well-known triangle of user-system-agency might lose its basic characteristics. Instead of reshuffling well-defined responsibilities between formally established water users' associations and government-controlled irrigation agencies, a wider range of institutional arrangements is emerging, including public-private partnerships, semi-public water corporations, community-based farmers' organizations, commercial contractors, development associations sponsored by local government, water vending subcontractors, and others.

These are the contours of **institutional reform** that are evolving as the next, and even more dramatic approach. The large-scale irrigation agencies, established and matured in another era, might have in-built limitations that make them less productive partners to farmers increasingly assuming management and control functions and needing less control but more support. The fluidity of this new situation, the need to create or imitate market-like situations and the necessary shift from operational towards enabling roles requires another type of organizational dynamics. Instead of being water users, selected by and organized around an irrigation system and agency, farmers will become the organizing party: selecting, negotiating, contracting and using a range of services of which water supply will be one.

In small-and medium-sized systems, there might not be many continuous roles left for irrigation agencies, considering the fact that specialized private sector institutions might be more efficient and interested in providing the incidental services that will be demanded by the groups of farmers acting like (paying) clients. In larger systems, there will remain a long-term role for one or more central agencies, charged with such functions as water production, regulation, allocation and monitoring. Political, financial, economic and environmental aspects will become more and more central to such functions, as distinct from the more technical and "hydrological" concepts underlying the classical irrigation agency. And, at the same time, such aspects need to be conceived and managed in a more responsive and cost-efficient way than centrally managed and funded bureaucracies tend to allow or encourage. It is not clear whether the classical irrigation agencies could, or should, make this shift. Their strengths do not lie in those fields.

This points towards the need for institutional reform: preparing, facilitating and effecting deliberate choices with regard to the mix of public, private and voluntary institutions that, in interaction with water users, can take up these new challenges. These institutions, separately and jointly, need to match resources, opportunities and activities with respect

to irrigation (and drainage) in increasingly specialized and sophisticated ways, and also in increasingly intensive and dynamic interaction with an expanding range of other institutions. This poses a challenge to professionals, governments, donor representatives and others associated with the irrigation sector for which no ready formulas exist.

And this challenge of institutional reform will be further compounded by the fact that irrigation cannot and should not be treated as a relatively isolated domain. The intricate relationships to drainage, water control, flood management have already been recognized. In some countries, the deliberate search for institutional arrangements that bring these aspects together is rapidly intensifying. In Egypt, for example, we are exploring how the concept of regional Water Boards can be adapted to local circumstances to address issues of regional water management and drainage. In Bangladesh, where the Flood Action Plan has put long-term water management on the political and donor agenda in a major and controversial way, Euroconsult helps to execute a real-life pilot project in compartment-based water management, which will bring together irrigation, drainage, flood control, agriculture and aquaculture.

But the issue is more profound: water is becoming recognized as an increasingly scarce and essential resource. Not just for agricultural purposes, but for the survival and development of entire social and ecological systems. With growing frequency and bitterness, local, national and international conflicts arise and escalate about access to and control over surface water and groundwater. Environmental degradation is more and more directly linked to the quality and availability of water, an asset that rapidly acquires the characteristics of an exhaustible natural resource. The notion that water is a free commodity, to be tapped at will for more intensive and extensive agricultural production is not valid any more.

This introduces two new aspects, for which no ready answers exist: the price of water, so far calculated only in terms of the costs of services related to its handling, needs to be reconsidered in view of more fundamental economic aspects of using this finite resource. This complicates the way irrigation should be treated, as just one application of water, in increasingly stiff competition with other applications. This requires a level of sophistication in prioritizing, regulating, legislating and monitoring water allocation and utilization for which neither farmers nor irrigation agencies are prepared at present. And the other aspect also points away from irrigation agencies and farmers: water utilization needs to be understood and, to the extent possible, managed within hydrologically defined spatial areas (essentially watersheds) and from a multi-disciplinary point of view. Most irrigation agencies in developing countries observe different spatial patterns and historically operate outside local and regional structures and formats. The mono-disciplinary character of these agencies, their limited ability to assess their ultimate impact, and their mono-functional treatment of water have been noted earlier.

All of this points towards the need for **policy reform**, which will go beyond the present emphasis of IMT and the emerging trend towards institutional reform noted above. The need for conceiving, executing and monitoring long-term policies concerning more selective and responsible use of water within large eco-systems is increasingly felt. The absence, in most developing countries, of institutions capable of dealing with such a level of complexity and controversy and, at the same time, capable of moving back and forth between abstract, long-term analysis and vision and very mundane levels of administering, sanctioning and regulating is obvious. This absence will become more perilous, where central, dirigistic government is forced to retreat, but interdependency and social and ecological risks intensify. In a situation where public agencies are redefining, and often reducing their roles, the capability to initiate and sustain policy reform in this sector is decreasing, rather than growing. And this, in the end, is a capacity that cannot be substituted by external expertise or fostered by international agencies. It needs to be rooted in the political and institutional fabric of society itself.

IMT, of course, is not meant to be an answer to this problem. But more serious is that IMT might compound the problem, by introducing an increasingly fluid multi-actor situation, not only beyond the traditional control of the traditional, central irrigation agencies, but beyond any control at all, at least within today's institutional arrangements! This might be an unintended and unanticipated side of what, otherwise, appears to be an answer to a genuine problem. A problem, however, that is part of a larger one.

CONCLUSIONS

Centralist, big-push government interventions achieved an unprecedented and needed expansion of the world's productive stock of irrigation infrastructure over the past forty to fifty years. However, the institutional strength that made all this possible is at the same time a major threat to the sustainability of the services to be rendered by the infrastructure. Increasing scarcity of the world's land and water resources, changing production functions, changes in society itself and both the institutional complexity of and the sharply increased need for proper maintenance are major factors that force the institutional infrastructure to irrigation development to change profoundly. The roles of the state, the private and voluntary sector are being rethought, in many countries competencies are being reformulated, multi-party consultation and negotiation is becoming the rule rather than the exception in maintaining, altering and expanding the irrigation sector. New legislative, financial and organizational arrangements are being explored.

Today well-tested instruments, policies, organizational and financial configurations are still lacking to ensure the institutional sustainability of irrigation. Yet, our database is increasing. Intelligence is being built up by institutions like the International Irrigation Management Institute (IIMI), by research departments of agricultural universities, by research teams and by projects run under the auspices of international agencies. In addition, however, we are learning from fieldwork, from projects and programs geared towards actually changing the institutional infrastructure. Such projects can, if properly designed, documented and shared, indeed be taken as policy experiments (Rondinelli 1983) and might, at present, offer the only way to learn and increase our collective grasp of a confusing and changing world.

Perhaps this helps to remind us that, after all, development is not a project in the hands of the central government, nor a technical matter. It is instead a process of history involving many actors with diverse interests in complex and forever changing interrelationships. A process that often triggers conflict and that will only gradually reveal its meaning. There are no short cuts to development.

Figure 1. Society according to early development planning.

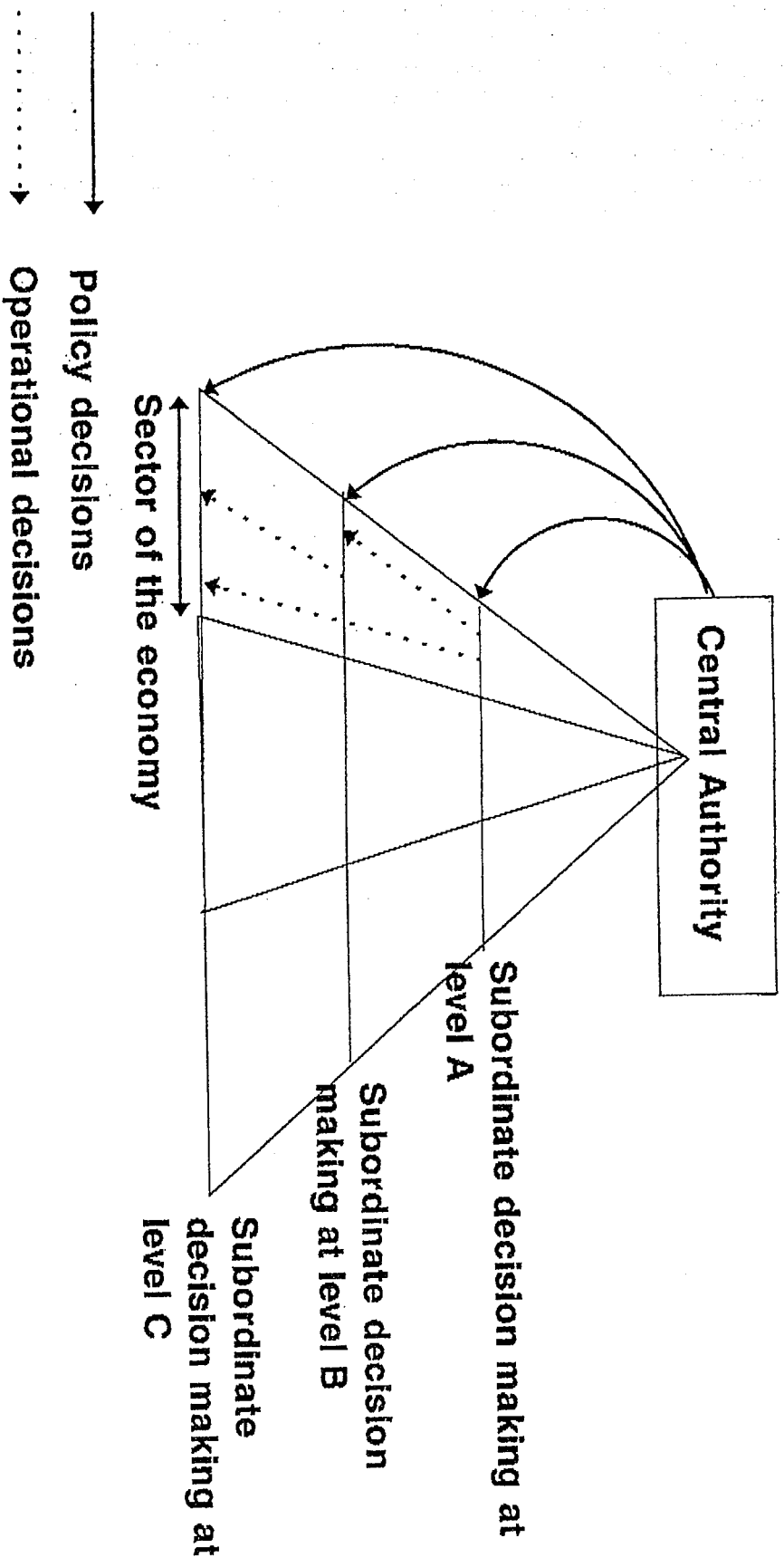


Figure 2.1: Paddy yields in Japan (curve fashioned after Takase).

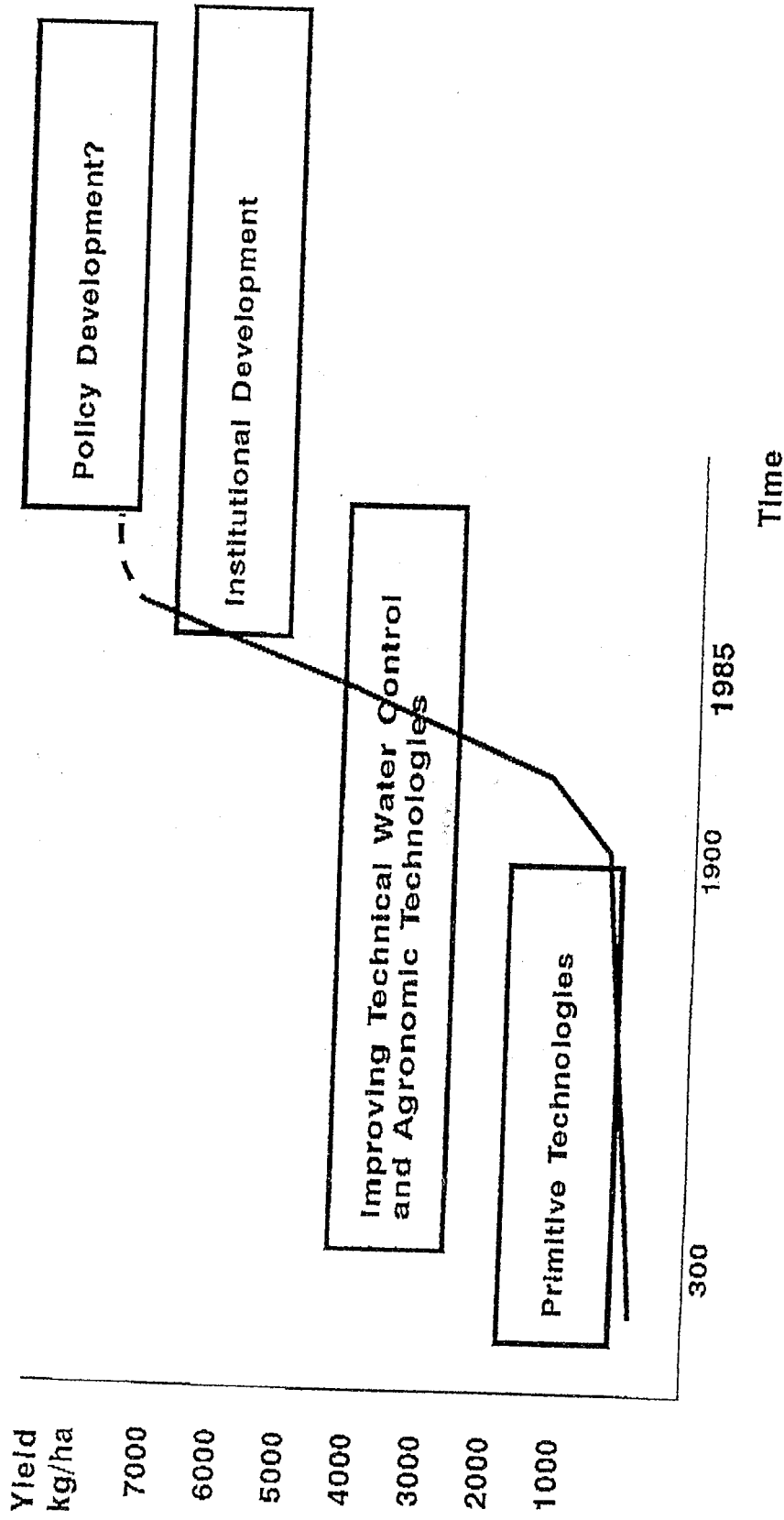


Figure 3. Today's view: Society as a market place.

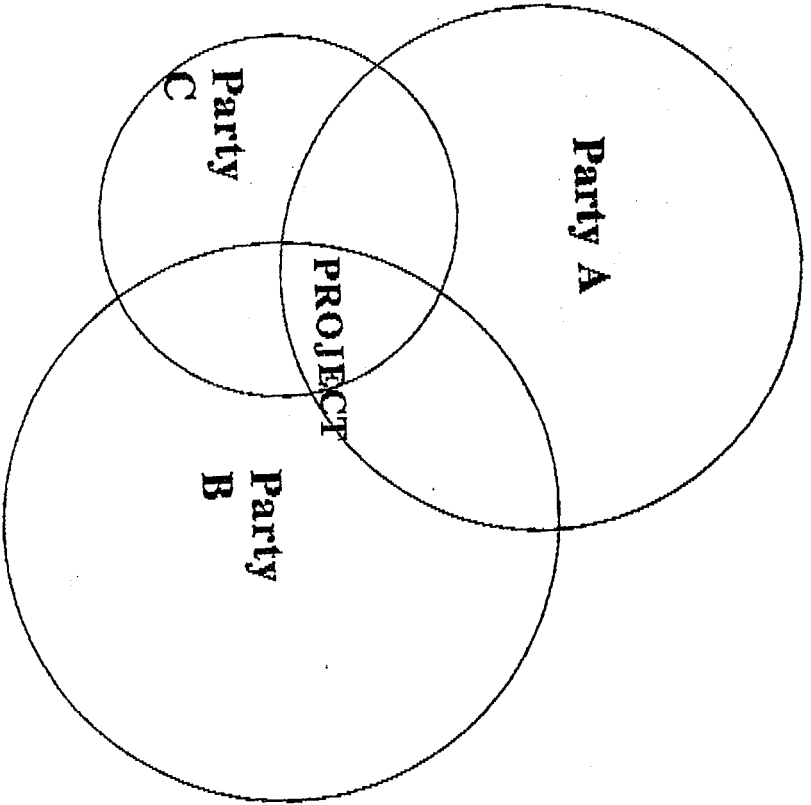
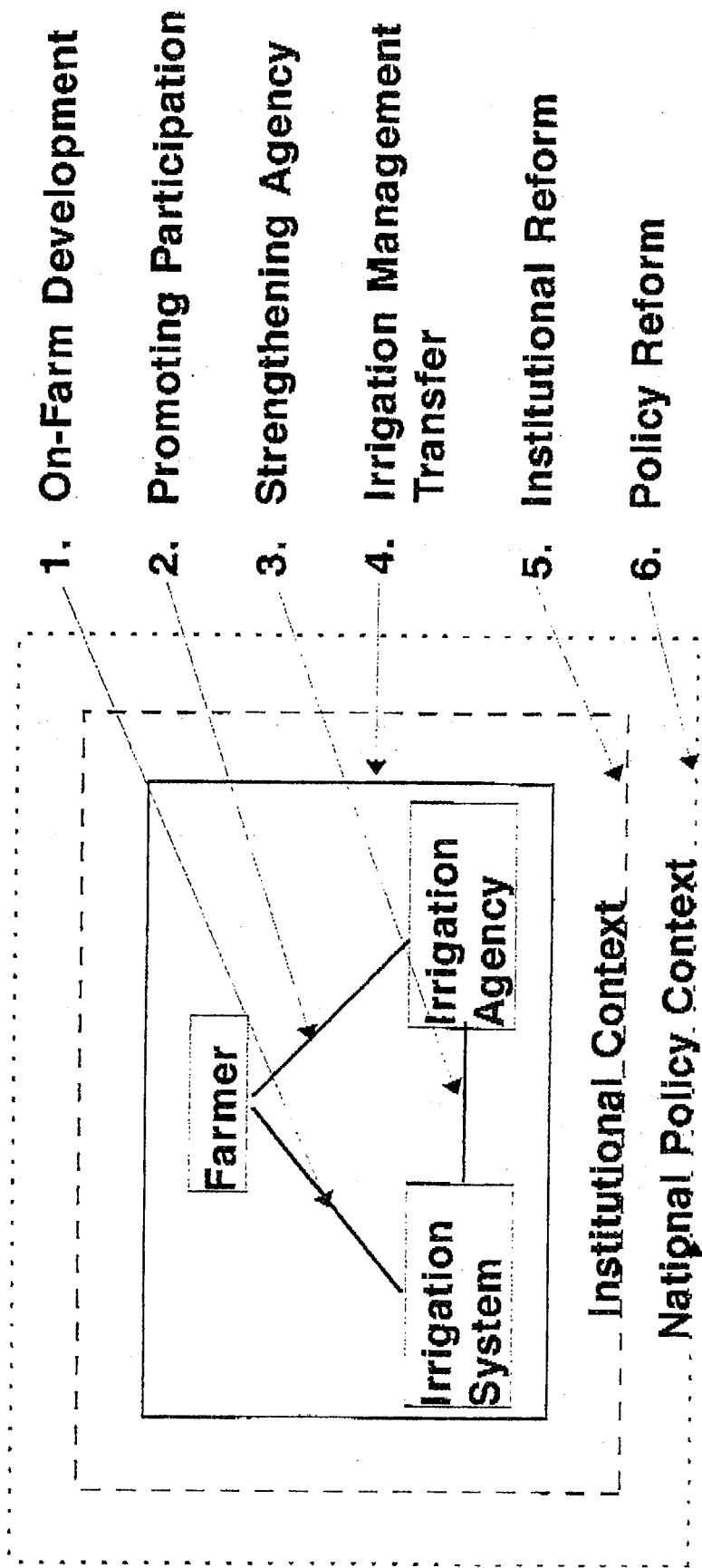


Figure 4. Various approaches and their targets.



References

- Alfonso, F.B. 1982. Assisting farmer controlled development of communal irrigation systems. *In* D.C. Korten and F.B. Alfonso (eds.). *Bureaucracy and the poor*. West Hartford: Kumarian Press.
- Burns, B. 1993. Promoting participation in irrigation: Reflections on experience in South East Asia. *World Development* Vol. 21 (11): 1837-1849.
- Burns, B.; and I. Soelaiman. 1992. From practice to policy: Agency and NGO in Indonesia's program to turn over small irrigation systems to farmers. *Overseas Development Institute Network Paper No 10*. London: ODI.
- Burns, B.; and S.D. Amanto. 1992. How to turn over irrigation systems to farmers? Questions and decisions in Indonesia. *Overseas Development Institute Network Paper No 10*. London: ODI.
- Chambers, R. 1988. *Managing canal irrigation. Practical analysis from South Asia*. New Delhi: Oxford and IBH Publishing Co.
- El-Ashry, M.T. 1991. Policies for water resource management in semi-arid regions. *International Journal of Water Resources Development*. Vol. 7 (4): 230-234.
- De Graaf, M.; and J. Ubels. 1993. A better deal: Service fees and the improvement of irrigation systems. 15th ICID Congress, question 45. The Hague. September 1993.
- Gerards, J.L.M.H.; B.S. Tambunan; and B. Harun. 1991. Payment for irrigation services in Indonesia: Creating mutual accountability through participation and voice; experience with pilot project introduction (1989-1991). *ICID Eight Afro-Asian Regional Conference, Bangkok 1991. Proceedings-Volume B*.
- Nijman, C. 1993. A management perspective on the performance of the irrigation subsector. Wageningen: IIMI/Agricultural University.
- Rondinelli, D.A. 1983. *Development projects as policy experiments; and adaptive approach to development administration*. London: Methuen.
- Rosegrant, M.W.; and M. Svendsen. 1993. Asian food production in the 1990s: Irrigation investment and management policy. *Food Policy* February 1993: 13-32.
- Svendsen, M.; M. Adriano; and E. Martin. 1990. *Financing irrigation services: A Philippine case study of policy and response*. Washington: [Food Policy] Research Institute.
- Tang, S.Y.; and E. Olstrom. 1993. *The governance and management of irrigation systems: An institutional perspective*. London: ODI.
- Yoder, R. 1994. *Locally managed irrigation systems: Essential tasks and implications for assistance, management transfer and turnover programs*. Colombo: IIMI.
- Vermillion, D. 1991. *The turnover and self management of irrigation institutions in developing countries*. Colombo: IIMI.
- World Bank. 1993. *Water Resources Management. A World Bank Policy Paper*. Washington DC.