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CONTRASTING APPROACHES TO WATER MANAGEMENT DEVELOPMENT IN SRI LANKA

by

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From a social science perspective much past discussion of "law in development" has been at an unproductive level of abstraction. Fortunately, the concerns of many within the field are now turning to specific subjects where concreteness offers opportunity for interaction and mutual learning between lawyers and social scientists. One such area is "water management." This paper explores different approaches to the establishment and use of farmer organizations to manage irrigation facilities and distribute water. The purpose is to contrast the approaches and assess how "law in development" relates to each.

Water management is a crucial factor in many countries, dependent as they are on increased agricultural production. While the global race between population and food expansion at first glance appears to hinge on increased land and improved technology, requiring ever-increasing capital investment, water supply is a more critical constraint than land or capital in many countries.[1]

It is estimated that $50 to 100 billion or more will need to be invested in irrigation systems by the end of the century to alleviate this constraint.[2] But unless the water generated by such investment is efficiently utilized--ultimately and literally at the "grass roots"--the investment will not pay off, and many countries may face mounting food shortages.

Irrigation is a comprehensive process requiring, first, the design and construction (or reconstruction) of physical facilities which capture and convey water--dams or reservoirs, gates, main canals, distributary channels, various control structures, and field channels. Beyond this there are the decision making and associated activities to achieve operation and maintenance of the system--allocating water and assuring its flow to desired locations in the intended amounts at specific times. In addition, and often neglected, drainage facilities must be maintained and excess water must be removed where it is no longer needed.

"Water management" basically refers to all those aspects of irrigation beyond the design and construction of facilities. These activities range from the level of the main system down to the farm level, with the middle reaches presenting the most difficult challenges of coordination

among engineers and other technical staff and farmers, who are the ultimate managers of irrigation water. There needs to be some integration of physical, biological, social organizational, administrative, economic and legal factors to achieve objectives of agricultural production, but with concomitant benefits for the participants in the system.

Speaking analytically, we can distinguish three levels of water management. The first may be called water delivery, where water is to be released from the headworks (or diverted from a river) and carried through main channels and branch channels to the distributary CD-channel gates, in specified amounts according to an agreed schedule. This amounts to "wholesaling" irrigation water. The "retailing" tasks of water distribution involve moving water along the D-channel, allocating it among the field channels, and distributing water along field channels so that each field gets its appropriate share in a timely way. The last stage is on-farm water management, which requires farmers to have fields properly leveled and prepared to utilize the water efficiently once it arrives. This represents the "consumption" of irrigation water.

Most "water management" (WM) research has focused on activities at the farm level, and indeed sometimes these have been viewed as encompassing WM. In fact, too little attention has been paid to "managing the main system," as Chambers and Wade persuasively argue,[3] and hardly more has been given systematically to the problems associated with what is called here "water distribution."

There can be a fairly clear division of labor between the first and third levels. Engineers have bureaucratic, and often legal, responsibility for water delivery; but if this first level of WM is not handled in a predictable and equitable way, other levels will function less effectively. On-farm WM, on the other hand, is left to farmers, but irrigation staff may try to enforce certain WM practices, backed up by legal sanctions.[4] The middle range of activities is the most complicated because it can be handled either by technical staff or by farmers (if they are organized); or the responsibility can be discharged jointly. This middle WM area is the focus of this case study.

Efforts to improve water management are complicated by the fact that in practically all irrigation agencies of government, most of the professional (as well as personal) rewards go with the design and construction of systems rather than to their operation and maintenance (O&M). If there were more prestige and payoff accruing to O&M, engineers would have more reason to spend more time dealing with deficiencies in main system management. While these issues are beyond the scope of this report, we

need to appreciate that there is a range of operative responsibilities and roles, from the engineers at the top, through the technical staff at intermediate levels, to the farmers, whose receipt and productive use of water constitutes the objective of the whole irrigation enterprise.

The legal dimensions of WM differ from the law associated with irrigation. We are not concerned here with water law or riparian rights as generally dealt with in legal codes. Rather, the primary focus is on organizational and legal frameworks for getting better use of water--with how equitable, reliable and adequate is the distribution. Legal rules by themselves have limited effectiveness. If disputes over interpretation are adjudicated in formal institutional terms, a delay of even a few days can have quite detrimental consequences for a crop, and for the farmers involved. Law thus needs to play a facilitative role rather than a sanctioning one in order to support productive behavior.[5]

In the context of rice cultivation, variables include the schedule of cultivation (from first preparation of land for cultivation to final harvesting of the crop--if all farmers adhere closely to a common schedule, water issues can be more appropriate and limited), the crops planted (rice cultivation requires more water than other crops, and mixed cropping complicates the requirements for water), the varieties planted (different maturation periods affect the appropriate timing of water issues) and cultivation practices (fertilizer and pesticide applications should be coordinated with water applications).

These and other variables mean that hydraulic activity (water delivery) must be related to plants, soil, climate, and the people who make the system work or falter. Legal norms which might be feasible if WM involved only water delivery appear quite inadequate when confronted with needs to get the best use of water; the scheduling requirements can vary, for instance, between an area with predictable rainfall and one where it is erratic. If there are labor shortages in an area, the government can hardly require certain timing of operations; imposing fines on farmers suffering climatic or labor problems is no solution.

Water distribution is only one of the essential WM functions to be performed at different levels. There is also need for maintenance of the physical facilities which involves the mobilization of labor, equipment, and often finances (fees, taxes, etc.) to keep the system operating satisfactorily. Drainage activities may also be important. Further there is need for conflict management, since even in the best operated systems there are invariably disputes over water and related matters. If not satisfactorily resolved, they will interfere with distribution and maintenance of the system.

These functions are affected by individual (private) decisions, but we are also dealing with social processes requiring a high degree of cooperative behavior. Accommodation between individual and collective interests leads toward an optimum solution for the largest number of water users. Private maximizing behavior undermines the functions of WM.

What makes water management difficult and challenging, intellectually and theoretically, is that certain participants (head-enders) are inescapably "more equal" than others (tail-enders). In WM, one contends not only with conflicts between individual and collective interest, in which motivations, sanctions, ideology, etc., are all complex.[6] One also deals with locational factors which, however predictable, make it difficult to match up private and public good. Fortunately, head-enders and tail-enders along a field channel or even distributary, who may have conflicting interests in distributing a given volume of water among themselves, usually have a common interest in getting a larger volume from within the larger system. So locational factors do produce some countervailing incentives for solidarity despite the ever-present ones for division.

WM offers an instance where equity and efficiency go together rather than confront each other with antagonistic goals.[7] When water is more broadly and evenly distributed, total production is usually increased. Of course there can be exceptions when the amount to be distributed is so limited that most of the crop would die if equally watered, or if irregularity of water issues means that some crops served by a rotational schedule would not survive the gaps in delivery. As a rule, total production (not necessarily each individual's production) will go up when water is shared more evenly,[8] particularly if land holdings are relatively equal.

I. BACKGROUND ON WATER MANAGEMENT IN SRI LANKA

The importance of water management (WM) in Sri Lanka is gaining acceptance. Ten years ago the subject was hardly distinguished from irrigation. Yet water appears to be the most significant constraint to increasing food production; maximizing returns to water is more important for national output than maximizing returns to land or labor.[9] The Sri Lankan government has embarked on a massive irrigation project, the Mahaweli scheme, to irrigate 600,000 acres and rehabilitate 300,000 more. Originally planned to take 30 years, the project has been accelerated to less than ten years (if financing and construction capacity permit) but scaled down somewhat in area. The estimated cost of the Mahaweli scheme is approaching $2 billion, and still rising.

Since investments in large-scale irrigation are very expensive, improvements in WM offer a cost-effective avenue to raising production.[10] Indeed, WM is a particularly urgent matter where large irrigation schemes with modern technology have been at high cost and where the difficulties of operating the main system, so as to link water deliveries with farmers' needs are greater.

It is not just a matter of numbers, though there can be a hundred or even a thousand times more farmers and acres depending on a large scheme than those who depend upon a village-operated tank. In small schemes, farmers are better able to operate the system themselves. Water waste is visible, and it often hurts neighbors, even kinsmen. By contrast, farmers in a large scheme have little knowledge about how much water is available and how much area is to be served. Any water hoarded is "wasted" at the expense of "strangers." Because more is at stake with large schemes, and because WM is more difficult to institute and sustain, our discussion will focus on them. We need to consider briefly the agency which is responsible for constructing and operating such schemes, the Irrigation Department, because its orientation and capacity affect crucially the viability of any attempted approach to water management.

The Irrigation Department

Water management problems have commonly been viewed as caused by farmers. But we increasingly see that farmers' behavior is most directly shaped by the reliability and adequacy of water issues from the main system and by their relations with the "bureaucracy" that regulates water supply.[11] In Sri Lanka, the Irrigation Department (ID) is thus the key actor, the Prince in our water management "Hamlet."

The Department has a long and honorable tradition, seeing itself as the inheritor of a monumental irrigation legacy of ancient Sinhalese times. Founded in 1900, it has undertaken to rehabilitate tanks left in ruin for centuries, and it has launched many new schemes in the Dry Zone of Sri Lanka.[12] It has sought to maintain its professional competence and independence by keeping politics at arm's length. It is staffed by technical personnel, with civil engineers, rather than agricultural engineers, providing leadership and setting the terms of reference. Not surprisingly, design and construction are given more recognition and reward than operation and maintenance; and maintenance often assumes more importance than operation of the system.

There has been some decentralization with each administrative subdivision (range) headed by a Deputy Director of the Department. He is

part of the cadre of senior engineers who share experience, attitudes and interests and who are inclined to operate the ID in a relatively collegial manner. This, plus the formal decentralization just mentioned, helps to mitigate the common problem of a gap between central headquarters and the field operations, which is no less common in Sri Lanka than elsewhere. The manner of decision making and implementation has for decades been essentially "top-down," and field staff alternately look for direction from above and chafe at its imposition. Staffing technical positions has become more difficult as the private sector, the Mahaweli project and the lure of lucrative positions abroad have reduced the ID's ranks of engineers.[13] The current budget squeeze puts the Department under further stress. It does not have the necessary personnel or budget resources to meet all expectations. Efforts to "decentralize" and develop collegial decision making have only partially ameliorated the problems.

These kinds of institutional considerations are often ignored in legalistic approaches to improving WM--approaches which assume that legal rules can make institutions operate as they are supposed to, and that they are capable of accomplishing all that is assigned to them. The attitudes and orientations which officials embody, and which are "outside the law," will shape the behavior of officials and the public as profoundly as any legal prescription can. The institutions, processes and officials through which governments act are seldom neutral in the eyes of the public, even if the law turns a blind eye towards these structural deficiencies. There is in Sri Lanka the added influence of "history" which is deep and understandably important. Lawyers and other "experts" often fail to take adequate account of these influences on behavior.

Historical Perspectives

Ancient Ceylon developed a remarkable civilization between the fifth century B.C. and the 12th century A.D. based on major tank irrigation schemes. Although the political system was a monarchy, there is little to show that it was a "hydraulic civilization" in the terms that Wittfogel argues,[14] though his thesis may be rescued in the eyes of some by pointing to the fact that the system was based on decentralized tanks rather than a single riverine source. The huge tanks were built with mathematical and engineering skills of which there is no record apart from the monumental structures. One main canal linking two tanks was constructed with a drop of only six inches per mile for 18 miles, a feat difficult to match even with modern technology.

There is some disagreement over how water was managed under these tanks, though a leading historian, K.M. de Silva, suggests that most administration was fairly decentralized, with considerable local management.[15] One of the few written records about water management, an inscribed pillar found in the Gal Oya area, described stiff fines and penalties for cultivator infractions, but noted also that these were decided upon by the cultivators themselves, to be enforced by the king's agents.[16] We know that with the irrigation facilities provided, farmers produced a material basis upon which an elegant civilization flourished until it inexplicably collapsed between the 12th and 13th centuries.[17]

During the period of British colonial rule, from 1815 on, local institutions which regulated water use and organized maintenance--village councils known as Gam Sabha--were first abolished and then restored because they were so essential to sustaining food production.[18] The role of a water headman (vel vidane) was recognized officially and a share of the crop went to him as payment for his services of overseeing water distribution and system upkeep.[19] The vel vidane's powers to enforce planting schedules, to resolve disputes, to get protective fencing put up around the cultivated area, to collect his fee, and so forth, were rooted in the social structure; he was usually from one of the wealthier and more influential families, and often himself owned more than the average size holding. Compliance was thus based on more than voluntary consent, but, the main sanction was community pressure against those who broke ranks to seek individual gains at others' expense. Significantly, such social cohesion and pressure is lacking in the colonization schemes such as Gal Oya where settlers were moved in from different provinces across Sri Lanka.

In the 1930s, after internal self-rule was granted by the British, the government began to resettle the Dry Zone, which covers all but the southwestern quadrant of the island.[20] This latter area, known as the Wet Zone, has two monsoon seasons a year, whereas the rest of the island has only one. The 80 inches of rain that fall on average in the Dry Zone are a substantial amount, but rainfall is quite concentrated. With 75 percent falling in a single three-month period, only one crop can be grown in a year without irrigation, and even that crop benefits from supplemental water supply.

The largest irrigation-settlement scheme in Sri Lanka, until the advent of the Mahaweli project, was Gal Oya in the southeast corner of the country. By building a large dam across the Gal Oya river and creating a giant reservoir (Senanayake Samudra, named for Sri Lanka's first prime minister and the moving spirit behind Dry Zone colonization when he was Minister of Agriculture), an area offering irrigation for over 120,000 acres was created between 1948 and 1952.

II. THE GAL OYA PROJECTS - OLD AND NEW

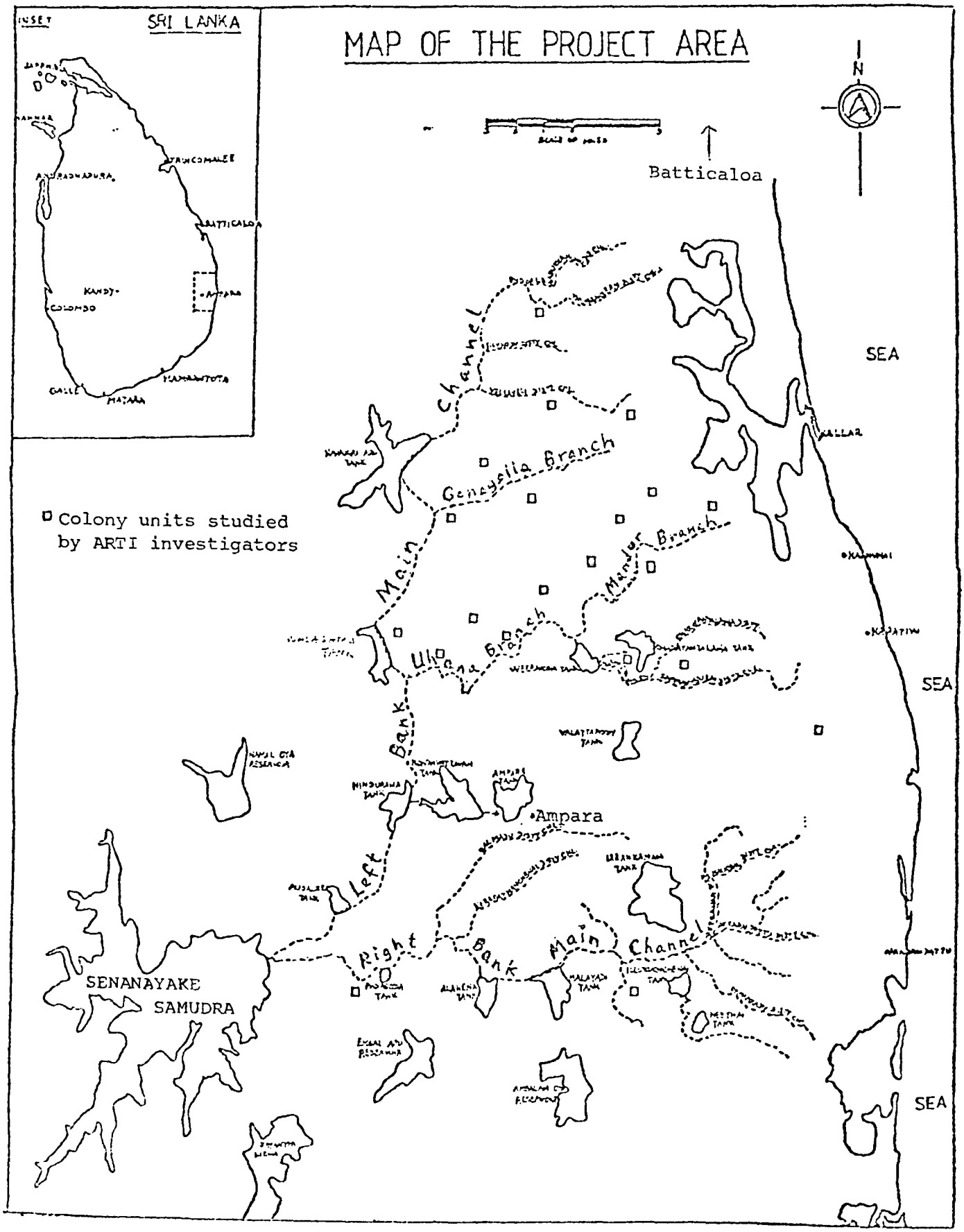
There are really two Gal Oya projects being implemented by the Irrigation Department. The first was an irrigation and settlement project financed by the Government. The second (undertaken with $9.8 million in loans and grants from the U.S. Agency for International Development) is a water management project. Physical rehabilitation of the deteriorated system is the main financial component, but improvement of management of the system is central to the outcome.

The original settlement program involved about 6,000 households each getting a three or four acre irrigated allotment with an acre or so of non-irrigated "highland" for a house, garden and subsidiary crops. In order to prevent subdivision and to preserve security of smallholder tenure no titles were given out, only certificates of occupancy. Fragmentation and alienation of land proved difficult to prevent by legal means, however. The rule was that only one descendant could legally inherit a colonists allotment, but land has in fact often been shared within a household and even parcelled out informally to multiple heirs. Various leasing arrangements and de facto "sales" of land often circumvent the intent of the legal restriction. Settlers were assigned to one of the 42 colony units (numbered or lettered, not named) on the Left Bank. Holdings in the River Division remained under their original owners, as did privately-owned land in the Left or Right Bank areas. Additional colony units were established on the Right Bank.

The Left Bank has been the main focus of past settlement efforts (42 colony units) and of recent rehabilitation efforts now, and it is the source of most social and economic problems affecting WM. Most of the Left Bank settlers came from Sinhalese communities in other parts of Sri Lanka, but Tamil and Moslem households already living in the lower reaches of the Left Bank area, near the coast, were resettled as colonists in tail-end colony units.[21] This socio-economic division was only one of many problems which the scheme encountered.

Physical, Social and Administrative Problems

To begin, this area, reputedly the "granary of Ceylon" hundreds of years earlier, was not as suited to irrigated cultivation as had been believed. No detailed soil studies have ever been made of this terrain, wh which has considerable variation and is quite uneven. Much of the soil was too porous to hold water well, and other areas, particularly nearer the coast had drainage and even salinity problems. Indeed, a 1970 study commission on the Gal Oya scheme concluded that no further work should


MAP OF THE PROJECT AREA
INSET
SRI LANKA
Batticaloa
N
SEA
SEA
SEA
Colony units studied by ARTI investigators
Main Channel
Genaysila Branch
Mandur Branch
Ulhitana Branch
Bank
Ampara
Left
Right
Bank
Main Channel
SENANAYAKE SAMUDRA

be done on the scheme without a thorough soil study first.[22] Unfortunately, the designers of the new project showed no knowledge of this expert report. Yet the soil and drainage problems in the area make water management itself a more difficult task.

A purpose of the settlement itself was to alleviate population pressures in the Wet Zone. So when accepting household for settlement, preference was given to large families. This had the advantage in the short run of enlarging the household's labor supply. But it meant even more pressure on limited soil and water resources, as the children matured and needed farms of their own. This led to encroachment on government land reserved for pasture, forests, irrigation system maintenance access and other purposes.[23] The disorder in the system, making water management problems more serious, can be traced in part to this initial decision to introduce large families.

The settlements themselves were planned to be relatively homogeneous socially, but adjacent units were often inhabited by different ethnic or caste groups. Getting cooperation between different groups is necessary when a distributary channel, or sometimes even a field channel, crosses unit boundaries, and little effort was made to match social and hydrologic units. Even within units there were often problems of cooperation when the newly-established households did not share the same ties of kinship which made "old" villages more cohesive entities.[24] The provision of promised amenities lagged, giving settlers other grounds for discontent. Persons used to the climate and facilities of the Wet Zone often found the heat, seasonal drought and general conditions of Gal Oya oppressive. Still, the human capacity for adaptation seems to have triumphed as new communities took root.

Other problems are created by the limited water supply. The reservoir has filled only twice in 30 years, and occasionally, as in 1981, it has suffered severe shortage due to failure of rains in the catchment area. Compounding this has been the steady increase in cultivated areas within the scheme, due mostly to encroachments which are illegal but are meeting human needs. The "command area" of the Left Bank was planned as 42,000 acres, but by 1980 it reached between 60,000 and 75,000 acres (nobody knew exactly how much). With such a disparity between the water available and the area needing water, there are bound to be shortages, even severe ones. This was made more serious in human terms because much of the Left Bank area depends for its domestic water on water issues through the main canal and distributary system to charge the ground water enough to operate wells. With such shortages, the predictable problem of disparity between head-end and tail-end areas becomes more acute. Some

tail-end units have received no water through the system for years. (In 1980, one unit at the tail, unaccustomed to receiving any water, finally got a delivery, but only after it had already commenced harvesting its crop). This disparity is sharpened because of the ethnic differences between head-end and tail-end colony units. ID engineers insist that the failure of the tail to get water is not due to ethnic discrimination against Tamils, since most of the engineers serving in the scheme are themselves Tamil.

Problems of head-end and tail-end differences exist at many levels of the system. Those at the tail of a distributary even high up in the system can still suffer a lack of water if not enough is delivered into their D-channel, or if farmers ahead of them along the D-channel use water wastefully. Head-tail difficulties are complicated by the way colony units and administrative boundaries were laid out, without regard to hydrological areas commanded by a given field channel or distributary. Some D-channels run through several colonies; and some colony units have members farming along several different D-channels, so they have less need to cooperate than if they shared a common water source. When administrative and social boundaries do not coincide with hydrological ones, many difficulties can arise simply from this discrepancy.

These several problems--soil conditions, population pressure with resulting subdivision and encroachments, social heterogeneity, insufficient water, and inconsistent boundaries--represent constraints affecting water management which, except for the last one, are not amenable to conventional "legal" solutions. They constitute "givens" which must be taken into account when trying to assess new approaches for improved water management.

Emerging Problems in System Operation

Beyond these "givens" there are other adverse dynamics which have worsened in recent years. The Gal Oya irrigation system, established with great hopes, has deteriorated physically. In general, water control has become less feasible and water distribution more inequitable as the physical system has fallen into disrepair. Lack of maintenance has permitted channels to silt up or become crowded with weeds and lose carrying capacity. Banks have been breached and large amounts of water run out of the channels into unintended "reservoirs" losing water through evaporation or seepage. Banks are so eroded that many gates and turnouts no longer function as designed--indeed, some structures stand mutely in the middle of channels widened by scouring currents over the years.

There are many reasons for this situation. Locationally, head-enders have little incentive to dig out channels in their area because they can get enough water without such effort, and maintenance would only help water flow past them to farmers downstream. In Gal Oya specifically, farmers do not own the land they cultivate and have tended to view the irrigation system, like the land, as being "the government's," not as "theirs." This means attributing responsibility for all upkeep to the ID, even if the ID has not the resources to discharge it. That all communities were artificially created, with no established social structure, makes organization for maintenance more difficult. Ironically, with most farmers having equal-sized holdings, few are in a position to assert leadership and have it accepted as in "old" villages, where status and wealth reinforced the authority these other resources conferred on notables. It is also unfortunate that the Buddhist institutions of temple and priest are not so strong in the settlement area, because priests who are respected and active can mobilize voluntary labor to clean channels and repair bunds.

If the non-state institutions are weaker in the area, so are the state ones. The perenially short-staffed under-funded ID in Gal Oya has been unable to de-silt channels thoroughly or repair all damaged structures.

The breaking of structures, particularly gates to control the flow of water into D-channels and also turnouts regulating flow into field channels, is by now particularly serious. As farmers have encountered water shortages, they have taken it upon themselves to acquire more water by any means. This includes not only breaking gates but also those checks built across channels which raise the water level for others. A farmer may even put in his own (illegal) checks to divert more water to his own channel or field. It is estimated that about three-quarters of the control structures in the Left Bank of the Gal Oya system have been broken.[25] Yet, budget and personnel can handle only about one-tenth of the number damaged. The ID faces a vicious circle effect, where it cannot control water because structures are broken, and structures are broken because it cannot control water.[26]

The ID can presently monitor and operate only the seven main regulators within the system, sending water down the main and branch channels roughly as intended. At lower levels, even when the gates are working and can be operated by lowest-level ID staff possessing keys, the farmers have just as effective home-made wooden keys.[27] They can use these to change gate settings as soon as the staff member has bicycled away. There is enough farmer solidarity that none who benefit will complain or inform against the offender.

As settlement has increased, interstitial areas which lie between the colony settlements and have access to drainage water have been encroached upon or registered outright by private owners (sometimes with forged papers known locally as "Japanese deeds"). Field channels may be extended (illegally) to serve areas outside colony boundaries, or drainage channels may be operated as field channels by enterprising farmers. Such re-use might be welcomed since it increases the efficiency of total water use. But once an area becomes regularly cultivated, it stakes a claim on water which may compete with that of others previously being served. This greatly complicates the issue of who should become a member of water-user associations, and whether such encroachers should have equal rights with colonists.

Indeed, when large extents of "private lands" are controlled by influential persons, such as merchants who are not owner-operators, this results in the anomaly of powerful tail-enders. If they rent out the land they have acquired to tenants, this creates a further problem for assigning rights and duties in water management. Should the tenant or the landowner be the member of a water-user association? Or should both belong? The expansion of such "private lands," occurring particularly in recent years, takes on a dynamic of its own, creating new interests that compete with those of the colonists. Small encroachments in the areas adjacent to colony holdings may not present much of a problem, but large ones do. Even when the encroachers are offspring of colonists, when water is in short supply there is the possibility of conflict.

These various factors taken together have contributed to actual or potential conflict within Gal Oya communities, between units which compete for water, between farmers entitled to irrigation water and encroachers relying on drainage water, between tenants and large landowners (neither of whom have legal status), as well as the universal tensions between head-enders and tail-enders and the particular division in Gal Oya between ethnic communities at the head and tail. On top of this there has been antagonism toward the Irrigation Department. Many of the farmer complaints are about things for which the ID is not responsible, or over which it has no control. But other matters can justifiably be raised. The interaction between farmers and technical staff, compounded in some cases by difficulties in understanding the language or technical terms used, is quite often unsatisfactory to both sides.

Most of these problems are not unique to the Gal Oya scheme, or even to the ID. All can be found in various forms in other large-scale schemes, and "bureaucratic" or "technocratic" relations with the public are widely deemed unsatisfactory in Sri Lanka. What is different for Gal Oya is the

intensity and combination with which they occur, making this a scheme which urgently needs improvement, both in terms of physical rehabilitation and in terms of farmer organization and participation for water management.

The Current Gal Oya Project

The importance of improved water management, sketched at the beginning of this paper, has not been lost on the Sri Lankan government or on foreign donors. In particular, the U.S. Agency for International Development (AID) concluded by 1978 that WM represented one of the main components of any successful development effort for Sri Lanka and indicated its willingness to make WM a priority in its aid program for Sri Lanka. Improving WM was seen as a complicated task, requiring 10-20 years for substantial progress. Sri Lankan institutional and professional capabilities in this area were very limited, and what little work had been done on the subject in Sri Lanka had been done mostly by expatriates. Upgrading the capability of the Irrigation Department to deal with WM problems and expanding the number of Sri Lankans with sufficient interdisciplinary competence to provide critical analysis and intellectual leadership was seen as a first step toward long-run impact.

An initial Water Management Project (WMP) was conceived to combine efforts at physically rehabilitating an existing irrigation system with institutional development to improve water management, including experimentation with forms of farmer organization. It was agreed that Gal Oya, the oldest and largest major scheme, badly in need of rehabilitation, be selected for the pilot effort. The four-year project was to be the first stage of a longer effort by AID and the Government of Sri Lanka to achieve institutional strengthening in the WM area.

The advisability of beginning with the most difficult scheme is debatable. A senior ID official told the author, "if we can solve the problems in Gal Oya, we can solve water management problems anywhere in Sri Lanka." The consultant team which undertook to design the project adopted an optimistic "can do" attitude. To be sure, it was limited in the time it had for the assessment of so complicated a situation and problem. But its members spent only one to two weeks in the field out of the two months in-country. Its willingness to work from official statistics meant it was constrained to think within the parameters of prevailing perceptions. The knotty problem of "private lands" within the schemes, for example, was not taken into account because these were outside the "target group" colonies. More serious field work could and should have identified this problem, which directly affects the colonists and their water management possibilities.[28]

The project design resulting from the consulting team's work was almost entirely focused on rehabilitation, with concomitant upgrading of ID capacity seen only in technical terms. Regarding farmers' role in WM, it was assumed that they could be required to cooperate with the ID on planting schedules, maintenance work, etc. The Irrigation Ordinance provided for penalties, fines and even prison, for breaches of prescribed irrigation practices. It seemed a simple thing to the technical consultants to rely on enforcement of the law, without inquiring why the law was more widely breached than honored. The Ordinance was a legacy of the colonial era when government officers felt unconstrained about issuing orders and enforcing them. Under the British, it was the local revenue officers who were entrusted with responsibility for overseeing the production calendar and rules in consultation with farmers. That they had extensive tax powers surely augmented their effectiveness in irrigation matters, something apparently not understood by the consultants.

The AID mission in Sri Lanka took the initiative to add a "farmer organization" component to the project design. Two aspects of this form the crux of our analysis. AID offered to provide the services of a legal consultant to draft amendments to the Irrigation Ordinance, to enact a legal basis for water-user associations operating under the administrative aegis of the Irrigation Department. At the same time, AID and the Sri Lankan Government delegated responsibilities for implementing the socio-economic aspects of the project to the Agrarian Research and Training Institute (ARTI), which operates under the Ministry of Agriculture but serves the whole agrarian sector. These aspects included, in addition to baseline surveys, special studies and monitoring, the formulation, testing and refinement of models for farmer organization to improve WM in the project area and, it was expected, eventually the rest of Sri Lanka. The Rural Development Committee of Cornell University, which had had an interdisciplinary working group on water management problems, was asked to provide short-term and long-term consultancy in support of ARTI's efforts.[29]

This background prepares us to consider the different approaches taken as part of the Gal Oya project. It should be stressed that neither approach would be regarded by its proponents as the "ideal," since many institutional and resource constraints had to be accepted from the outset. Both approaches embody "legal" and "organizational" mechanisms, though the first proposed working from legal enactment to creation of organizations, while the second sought to introduce and experiment with organizations prior to specifying legal provisions. The two approaches could be loosely characterized as more "top-down" and more "bottom-up," but this does not express the extent to which both sought to induce "bottom-up"

capacity of farmers to participate in better water management through different kinds of "top-down" initiative. The best distinction might be in terms of the more "deductive" method of the first, reasoning from legal principles and experience elsewhere, and the more "inductive" strategy of the second, following a "learning process" approach analyzed elsewhere by Korten.[30] Experience in the Philippines and Nepal was considered in formulating the design of this experimental program, particularly the catalyst role of "institutional-organizers," but it was expected that field experience would produce different understandings and recommendations than a priori reasoning, even by consultants with considerable experience elsewhere.

III. A DEDUCTIVE APPROACH TO WATER MANAGEMENT IN GAL OYA

The potential value of farmer organizations and participation in the WM enterprise was appreciated in both of the approaches provided for by the project. The issue was how to introduce and sustain them--with what degree of formal-legal authorization, with what prior knowledge of the system and its variation, with what amount of experimentation, and how much uniformity? The project paper initially conceived of farmer organizations (FOs) as being introduced as an activity separate from but parallel to the physical rehabilitation of the system. During the four years of the project, there would be efforts to experiment with and set up FOs, while the work on dredging channels, reshaping them, repairing gates and other control structures would be done. At the end of this time, FOs would take over responsibility for operating and maintaining the system, at least at the lower levels, in the WM equivalent of a "turnkey" operation. There was a statement in the project paper that farmers would be expected to contribute labor to rehabilitate the field channels as part of the reconstruction effort, while the ID was improving the main and distributary channels. But this was not spelled out, and farmers had not been consulted on this proposed mode of "participation," so it was not clear what implications, if any, this had for getting farmer WM groups started.

The legal consultant who came out to Sri Lanka to advise on a new irrigation ordinance had studied water-user associations elsewhere, especially in Spain.[31] He had previously prepared a legal framework for such associations in Pakistan, and the same basic scheme was incorporated into a draft law for Sri Lanka, using a Sinhala designation for the farmer organization to operate at the distributary channel level, the Jala Sampath Palaka Sabhawe (JSPS), meaning Council for Administering Valued Water Resources. The proposal called for a multiple-tier structure, with farmer committees (or representatives) at the field channel level joined together in the JSPS, which would manage water within a D-channel command area. In turn, JSPSs would be represented on a Project Committee at the "apex" level, such as for the Left Bank or for the whole Gal Oya scheme.[32]

No criticism is made of the concept of a multi-level organization, which we have found quite sound in other analyses of development experience.[33] Rather, questions may reasonably be raised about the way such organizations were to be introduced and about the assumptions made concerning the roles and incentives for farmers and ID staff.

(1) A first concern was the emphasis upon the D-channel level as the most important level of organization, with the JSPS becoming the pivotal institution in the scheme of water management. It is argued by some that the field channel, which serves 5, 10, 15, or 20, even up to 50 farmers is too small for an efficient organization. But this combines the economists' logic of economies of scale, which may be offset by economies of de-scale,[34] with the lawyer's logic which looks for entities that have or can have legal standing. It seemed difficult to set up and deal with a thousand "basic" organizations in legally correct terms, so there was a preference for having "corporate" bodies organized at a higher level than suggested by sociological analyses which stressed group identity and solidarity as motivational factors. Having larger organizations permits more resource aggregation and provides a larger pool from which to draw leadership, but it dilutes the strength of attachment to the organization, and offers greater heterogeneity of background and interest which may inhibit organizational effectiveness.

An empirical fact is that D-channels vary greatly in the number of farmers and area served. Along the Uhana Branch channel, one distributary has as few as 30 farmers cultivating 61 acres, while another has 377 farmers on 748 acres.[35] Some field channels are as large as 82 farmers cultivating 185 acres and even one sub-field channel area is almost as large as the smallest D-channel area. The draft law provided that the ID's Project Engineer would define boundaries, and could set up more than one JSPS on a large distributary, or combine several small distributaries into one JSPS unit (Sec. 12). But this would still leave considerable variation in the basic units of organization, with variable attachment to them by members because of the different circumstances of cultivation.

In setting up the JSPS, the Project Engineer would instruct all water users along each field channel within the D-channel area to elect a Field Channel Committee (FCC)--or select a Field Channel Representative (FCR) if there were 15 or fewer farm plots on the channel. One representative from each field channel (a FCC would select one member to serve as its FCR) would come together to form a Representative Assembly for the JSPS, and to elect an Executive Committee from among its membership. Once constituted, the JSPS would become the pivotal organizational actor in water management, with farmer membership in the JSPS considered primary.

(2) At the field channel level, there were some options suggested. As just noted, a Field Channel Committee needed to be formed only if there were more than 15 plots along it; otherwise a single representative could be chosen. If there were an "existing farmer representative" overseeing WM activities, such as a Vel Vidane carrying out a traditional water headman role, such a person could be designated to perform the same functions as the FCC or FCR (Sec. 15.2). This was a valuable provision in that it was flexible, but it was not clear why the number 15 or any other had to be a universal cut-off point if farmers could be given an option in how they would be represented and supervised in WM matters. In fact, by January 1982, when farmers in the pilot organizing area of nearly 4,000 acres had been encouraged to form their own water management organizations in whatever manner they preferred, none of the 71 field channels had set up committees. But almost all had chosen representatives for roughly every 15 farmers. (Two-thirds of the groups were between 12 and 18 farmers, with an upper-size limit of around 25 perceived by farmers, and a lower one of 7 or 8). So the proposed law was not far off in focusing on the number 15, but was too elaborate in specifying committees above this and too rigid in not allowing farmers to vary the structure of representation to meet local social and hydrological variation. When there were more than about 25 farmers on a field channel, with only two exceptions, farmers themselves divided the channel for organizational and management purposes into two groups. Above 40 or 45, they would choose three representatives. A committee mechanism at the field channel level, however, was not supported. Farmers said this was too much like the many formal organizations they had previous unhappy experience with.

(3) At the other end of the organizational spectrum, the provisions for an apex organization at the project level were innovative, given the fact that farmers presently had at most de facto authority at the field channel level and no recognized voice at all above that. By making all JSPS chairmen members of the Project Committee, this meant that even with ex-officio members from the government side, farmers could have a large majority. Their authority, however, would be ambiguous since resolutions of the Project Committee would have no effect until approved by the Minister. The contradictions and possible conflicts arising from such token authority were left unaddressed.

(4) One of the most attractive features of the proposal was that the Field Channel Committees and JSPS Executive Committee would have representation weighted in favor of the middle and tail. In a five-member EC, for example, the head, middle and tail would have 1, 2, and 2 representatives, respectively (or 2, 3, and 4 in a nine-member committee). FCCs would thus by law have a majority from the middle and tail (though

this would not prevent the head and middle from having a majority against the tail). It was taken for granted that determining cut-off points between head, middle and tail would be sufficiently obvious to be non-controversial, probably because of an oversimplified view of what is a "typical" channel. Also, this recommendation did not allow for the possibility and problem of having powerful tail-enders as do indeed exist sometimes in Gal Oya. They need no enhanced representation. The committee structure proposed to assist "weak" tail-enders would not be universally helpful, and in any case, would be more cumbersome than farmers want.

(5) Probably the most questionable part of the draft was the formulation of JSPS "powers" (Sec. 9). While these are introduced as if they were "rights," most really amounted to "responsibilities." Most were new impositions, and those which had been previously declared were not being effectively enforced. Only one stated a clearly positive benefit for farmers: "Ensure that all members' rights under the law are respected, and that each member gets his share of water in a timely fashion" (15.13). Other sub-sections sought to impose obligations such as annual maintenance of field channels and farm ditches, improving water courses, land leveling and economic practices, collecting general and special fees, providing labor for emergency repairs, installing and maintaining drainage facilities for fields, ensuring that all members contribute their share of labor, money, etc., and preventing "encroachments." (The latter is a particularly difficult and onerous task since relatives may be involved.) Since the JSPS was to be mandatory, membership would become compulsory, but this could hardly assure the expected effort and cooperation when more burdens than benefits at least in the short run, were laid upon farmers by law.

A careful reading reveals that the draft law proposed no responsibilities for the irrigation bureaucracy, on whom farmers depend for water and for their livelihood. The ID would retain virtually all of its current powers, some in law and some unspoken. Only if the Project Committee functioned effectively at the apex would farmers be able to impose some responsibilities upon the technical staff. How this change could be implemented was not spelled out, but it would probably be difficult to accomplish. There was a definite asymmetry in the conception behind this formulation. Farmers are subject to the law and are seen as the "problem," while officials are instruments of the law, who impose a "solution."

(6) The mechanism for introducing and managing this system of water-user associations was to be the Irrigation Department. The Project Engineer is to demarcate boundaries for each JSPS and subsidiary field channel units, to give notice for elections as suggested above, to set up

initial meetings of the representatives, to oversee their elections, to register each JSPS and keep a current register of members, certifying that all are owner-cultivators or tenants. There is no hint that there are any negative attitudes of farmers toward the ID or that this would affect the elicitation of participation in the new organizations. Yet everything we know about participation suggests that this would constitute a serious obstacle.

There are real questions whether, even if it had farmer cooperation, the ID could institute organizations down to the "grass roots," given its shortages of staff. Vast responsibility is placed on the Project Engineer, who in Gal Oya has tens of thousands of acres under his responsibility. And even if he were able to get farmer participation in this "top-down" manner, the result would be rather like "company unions." David Korten, a consultant for the Ford Foundation in Manila, assisting the National Irrigation Administration in the Philippines with its program to get irrigator associations established to work in cooperation with the NIA, commented on the draft law for Sri Lanka:

> ...at every step of the organizing process the Project Engineer or his representative would assume the initiative and hold the authority. The members would have no say in whether they wanted an association, how the organization would be structured, what the powers and duties of the association and its members would be, or even when the organizing meetings and elections would be held.
>
> All the signals during the formation process would communicate to participants that this is a government-dominated organization established by government to serve government interests and that the only role espected of them was compliance. The officers who emerged out of such a process would likely be those already reasonably well connected and intent on exploiting every opportunity to consolidate their local power base. Most water users would be likely to perceive it as only one more attempt by the government to control their lives and avoid involvement to the extent possible.
>
> ...Would membership give me (if I were a farmer) any greater assurance of getting water when I needed it? Nothing in the draft suggests it would. Do I have any interest in helping to enforce cropping schedules set at District or Project levels? Definitely not. Since the ID

> has so little effective control, water conditions vary substantially throughout the scheme even on irrigated plots. To get a decent crop under these conditions I have to follow my own strategy based on my best estimate of what my local conditions are likely to be. Standard cropping schedules, even if set by farmers, do not serve my interests.

Korten added that the act:

> might even inhibit the formation of more effective voluntary associations of water users to respond to their self-defined needs. I think here of the case in the Philippines where the introduction of a legal requirement that all farmers form pre-cooperatives actually inhibited the operation and formation of voluntary cooperatives which were effectively serving member interests. The government-mandated co-ops by contrast simply absorbed resources from the farmers while doing little for them.[36]

Korten suggested that this unfortunate outcome might be duplicated in Sri Lanka through passage of the proposed law. His observations point up the problems inherent in such an approach of prescribing the formation of organizations by law and delegating its implementation to a bureaucratic agency, especially one at odds with the persons expected to become members.

(7) A final problem arising with this approach is one of timing. One of the purposes of asking ARTI and Cornell to work on farmer associations in an experimental mode was to acquire experience on what kinds of WM organization would work best, under what conditions, as well as how they might be most effectively initiated. It would take at least two years to get enough activity started on the ground and enough experience so that this could be assessed fairly systematically. Yet the draft law, prepared by the consultants in a matter of months, presented ARTI with a model to implement rather than to test. The Ministry of Land and Land Development agreed that the ARTI/Cornell activity would have flexibility to try different models of organization, though ARTI could be seen as "testing" the JSPS model. As it turned out, questions were increasingly raised about the practicability of the draft law and the Ministry withheld action to get the law enacted as drafted. The "inductive" approach was thus given a chance to proceed more according to social science rather than some a priori legal theory. As no formal organizations were being set up to begin with, no legal requirements were raised. The Government Agent could give some interim authority to the exercise if that were needed.

IV. AN INDUCTIVE APPROACH TO WATER MANAGEMENT IN GAL OYA

The alternative which ARTI undertook with Cornell assistance emphasized organization as an instrument for mobilization of resources, regulation of behavior, generation of area-specific and problem-specific information and enlisting more voluntarists' action. Organization--and perhaps "non-state" law, rather than state law--was the instrument for such purposes. Ultimately, organization may need some legal buttressing from the state just as the conventional legal approach must work through viable organizations. Law and organization must be complementary rather than competitive if each is to succeed. But when one "walks on both legs," it makes a difference as to "which foot" one leads with. Legal arrangements should support organizational processes rather than attempt to create such processes by fiat. The alternative, inductive approach has the following elements.

(1) It is more flexible. There is no assumption that some single model will be optimal or should be prescribed, given the variety of local circumstances. This does not mean utter diversity, which is anathema to policy makers, lawyers and bureaucrats alike, but rather evolving frameworks which both guide behavior toward widely-accepted goals and permit some differences in the way problems are solved. A corollary of this is that some significant degree of participation, or self-management, is called for, to tailor group efforts to agreed-upon needs.

The initial request made to ARTI in the WMP paper was to design and test a model of water-user organization for replication throughout the project area and subsequently elsewhere in Sri Lanka.[37] As the team assessed the situation in Gal Oya and the task before them generally, it became clearer that no single model would likely be optimal within the Left Bank (given its hydrological and ethnic diversity), let alone for all of Gal Oya or all of Sri Lanka. So the team began to think in terms of developing models (plural), and then, even this seemed too narrow. Efforts turned to formulating a process whereby, with some outside stimulus, farmers would be encouraged to start forming organizations to manage water. How similar or how diverse the ultimate organizational structures would be remained to be determined from experience. By the end of two years it was expected some fairly tenable conclusions would be drawn. An undertaking as important and as novel as this should be prepared to reach conclusions earlier if possible but to reserve judgment for longer if necessary. Actually, within a year, what appeared to be fairly common patterns of farmer initiated organization had emerged which could be supported by law.

(2) Because the interactions among farmers within an irrigation area as well as between farmers and "outside" persons such as ID staff (or the "change agents" discussed presently) are so important to efforts to get new individual and collective WM behavior, these interactions need to be examined carefully. In introducing new organizational modes, one needs to know how they are perceived and how those persons introducing them are received--to determine how the organizational modes and approach might be modified to be more acceptable to farmers and thus more likely to "take root." For this reason, the inductive strategy included a specific process documentation component, with certain persons designated and supervised to keep records of the organizational effort as it unfolds. This information is fed back directly to the organizers so they know more about their reception and progress. But it goes also to the program supervisors who evaluate the work and how it might be improved. The program is not introduced as if it were testing a hypothesis in a formal scientific way, running the experiment through to the end before assessing it. Rather, each feature of the program represents a hypothesis of some kind, but modifications should be made as quickly as there is evidence that some other manner of working promises better results.[38]

(3) Rather than use official personnel to introduce the new organizational modes, a new cadre of institutional-organizers were recruited, trained, posted in the field and supervised closely. (They are trained and supervised to be facilitators and catalysts, not implementers of a work plan "made in Colombo.") Even if individual government personnel have positive attitudes toward farmers and good communication skills, there is a legacy of imperious dealing between officials and farmers which is to be avoided. The organizers, indeed, have no authority over farmers or other low-level government staff; all must be done by persuasion and example.

Some programs in the Philippines which send out catalysts to work with farmers and set up irrigation associations call their personnel "community organizers." They are trained as advocates to act on behalf of farmers vis-à-vis the government departments. Initially they followed a "confrontational" mode of organizing, after the philosophy of Sol Alinsky in his strategy for anti-poverty efforts in the U.S., but when this approach was not effective it gave way to a more "collaborative" mode. We concluded that the latter posture would probably be more suitable in the situation of Gal Oya for improving water management activity. Because we have made progress in a more "cooperative" mode, we have not experimented with alternative modes.

The young men and women recruited as IOs are university graduates in arts or science or agriculture (Sri Lanka has a surplus of these

graduates at present), and they were selected essentially on their qualifications including personal experience with irrigated paddy farming in the Dry Zone, and without political considerations.[39] Because most of IOs knew farming themselves, they were better able to satisfy farmers that the program represented a serious effort to help them. (When one farmer challenged an IO saying this was just another program to give jobs to unemployed graduates, the IO's assistance to another farmer by sowing seed by hand answered that question.) When women IOs might be asked how they expected to help farmers with water management, they responded that they were farmers' daughters themselves.[40] Certainly a good share of the credit for what success the approach has demonstrated so far belongs to the IOs, a very capable and highly motivated group. But the same can be said of the farmers, as will be seen below, since their initial response when approached in a solicitous, serious way has been most encouraging. The organizers are presently working under ARTI, but the understanding at the outset was that the ID would take them on as regular staff after two years, assuming that they demonstrated WM progress. It will remain to be seen how well their attitudes and performance are sustained in such a transition.

(4) Rather than start with the distributary level as the focus of organizational activity, this approach begins with the field channel, which usually has 10 to 25 farmers cultivating along it. While head-and-tail-end farmers may have conflicting interests over the water reaching the turnout structure which feeds their channel, they have a common interest vis-à-vis the rest of the system. Often they will be related or may have had informal labor exchange relationships over the years that provide a basis for cooperation. Our assumption in this strategy was that one best begin with a unit having some greater degree of social solidarity, which means it must be relatively small and homogeneous. Our earlier work on local organization in Asia, previously cited, established the case for having such small units linked together into higher levels of organization. The effectiveness of such higher levels depends in large part on the strength of their base organizations, however. Thus, without detracting from the importance of having D-channel organization, our efforts have focused first on the field channel. Each IO was assigned several such channels during the initial, more intensive phase of organizing work. being responsible for an area of about 120 acres with about 60 farmers.

(5) One hypothesis of the strategy being employed is that it is best to begin with informal organization and to move toward more formal (legal) organization at the farmers' own pace. This means that rather than set up a formal organization first, and then undertake work through that organization, one encourages informal organization to begin carrying out useful

work, and then introduces more formal associations when these are seen as useful to the farmers for solving problems they cannot handle adequately on an informal basis.[41] In a sense, this is the element of the "inductive" strategy most at odds with the "deductive" approach. But it is supported by the observation of the director of ARTI, Mr. T.B. Subesinghe, that there is no problem in setting up organizations in Sri Lanka--a law can be passed and government officials can get something started and registered--but there is a problem in keeping them going--such paper organizations accomplish little and disappear quickly.

(6) The project paper, as noted already, conceived of the physical rehabilitation of the system as proceeding separately and parallel to the effort to establish farmer organizations for water management. At the end of the four-year life-of-project, farmers were expected to take over the management of field channels, but also, if the legal framework proposed in an annex to the project paper was enacted, at higher levels as well. This seemed to make little sense in terms of behavioral theory because it was so discontinuous. Rather, the organizational approach adopted undertook to link the building of farmer organizations with farmer participation in the rehabilitation program, to get away from the "turnkey" psychology.

To the extent that farmers would be involved in the redesign of channels and would be investing their labor in some of the reconstruction,[42] they would regard the system more as "theirs." Also the actual new design should be a better one for having input of detailed local knowledge concerning soil variations, drainage problems, etc., which it would be costly and even difficult for technicians to know and specify. What was interesting to observe was that the expectation that farmers would provide labor to renovate the field channels created certain "power" in their hands. Unless they were consulted on the new design and were satisfied with it, they could refuse to do the desilting and bund reshaping work, or do it so grudgingly and badly that the project was delayed and costs escalated. Although there was no disposition initially for engineers to meet with farmers on the specific redesigns for each channel, procedures for this were devised and once engineers started meeting with farmers in groups of 15-20, they discovered that farmers had indeed some useful information to contribute. Also, some of the engineers involved appreciated the improved rapport which resulted from farmers getting more consideration.

The team's initial judgment has been that the organizational effort should begin in the middle of the Left Bank system, where water problems were thought more severe than at the head, but not so debilitating as at the tail. Because the first year's construction program was scheduled for 4,000 acres at the head of the system, however, most of the initial 10

postings were to this area. These IOs had to move very quickly to construct profiles on their field channel areas as well as set up meetings between farmers and ID staff for the redesign effort. (One team of IOs was posted to an area further downstream, scheduled for the second year's construction program, in order to get some experience with farmer organization problems when impending rehabilitation was not affecting IOs' and farmers' behavior.)

There were some drawbacks to becoming so tied in with the construction effort. It preoccupied the IO program in the first-year construction area and impinged on the plans to combine training and supervision over the first six months to build up more organizing skills and confidence. Instead, IOs were thrown into a situation where they have to begin "delivering" right away. That they did so gave them more legitimacy in the eyes of the ID, and probably also with the farmers, though that could be depreciated if experience with the reconstruction work turns to be bad. The strategy did give a basis for engaging farmers in needed activities, collecting information for the redesign, planning meetings with ID staff, organizing work on the field channel, etc. These things could be done informally, and in the process it was expected that new leadership would emerge. Once certain farmers demonstrate commitment and competence for helping other farmers solve their water problems, it should be possible to get a new cadre of leaders coming forward from the farming community, rather than have just the usual local leadership, politically ambitious and socio-economically advantaged. There was already some indication after a few months of this happening.[43]

The principle, that work should proceed flexibly, building in options as much as possible, has yet to be fully explored. To the extent that similar patterns can be introduced or can be produced out of initially diverse organizational activity we will move in that direction, as the program seeks to accommodate rather than promote, diversity. Some farmers from the outset have indicated feeling a need for some kind of organization at the distributary level even though they agreed with beginning in field channel groups (called "turnout groups" because they are served by a common turnout). Tail-end farmers know they must cooperate with head-end ones to keep the top sections of distributaries cleaned so that water will come more easily to the tail. Also groups along a D-channel know that their bargaining power with the ID is enhanced when they act together. In the set of field channels being organized outside the first-year construction area, farmers requested formation of a D-channel level organization federating their various turnout groups within several weeks of forming these. Had such an organization been instituted mandatorily by the ID, however, farmer readiness to participate would we think have been much less.

One form of flexibility in the organizational approach was to respond to an impending crisis during the yala (dry) season of 1981, when the rains that usually fell in the catchment area failed and the reservoir of water fell to only a fraction of its usual supply. This meant that only a much smaller area could be planted and that even this was at risk of failure if no further rains came. By the end of April, when the IOs had been in the field for only six weeks, it was evident that there was an immediate need for improved water management to save as much of the crop as possible. Accordingly, the IOs were asked to discuss the situation with farmers and to encourage them to work out whatever arrangements for sharing and saving water would be agreeable.

There were three elements of such an effort: (1) rotational distribution of water within field channels so that all fields along it, including the tail, got enough water; (2) voluntary labor (shramadana) to clean and repair channels to make water run more quickly and efficiently along them; and (3) reduced off-takes from the main system. Any combination of these would be helpful, though shramadana might not be needed if the channel had been kept in good condition (the minority of cases). Shramadana channel cleaning would facilitate rotation and make it more feasible. Rotation might reduce the amount of water needed to serve the area adequately, so farmers by better WM could "donate" water to others downstream without harming their own crop. When water at the head end was sufficient, farmers could close off the D-channel sooner than they needed to and send one, two or three days' worth of water to the tail.

These forms of WM improvement by improving efficiency of water use should not jeopardize farmers' production, though there was some risk that if water conditions worsened, some crops assisted by the sharing would die anyway and the areas which had given up water earlier could be less well off. Also, because the ID was not issuing water on a regular schedule such as five-days-on, five-days-off (indeed, there was no evidence that farmers were informed of a definite schedule by the ID), this could put real stress on the paddy crop by extending the time it was without water if such a rotation rather than continuous application were followed, and might reduce yield.

We might expect that in such crisis circumstances, farmers' willingness to cooperate and to exert themselves to save water for someone else's benefit would be minimal. But in fact, we observed surprising cooperation. As seen below, farmer cooperation was not complete, but considerably more than could probably have been achieved by other means. A legalistic approach which ordered farmers to clean channels, rotate delivery within channels, and reduce total off-take would have been unimplementable on such short notice. Farmer capacity to circumvent WM

requirements they do not agree with has proved to be almost inexhaustible. While farmer cooperation was not complete, it was considerably more than could probably have been achieved by administrative-legal means.

The area covered by IO efforts was 3,142 acres, and according to the information they compiled it was cultivated by 1,686 farmers along 71 field channels or sub-field channels (grouped in 56 organizing areas). Only 10 percent accepted neither rotational deliveries nor water-saving schedules. Thirty-seven percent instituted some kind of rotational system (most with some shramadana work done to facilitate water distribution); 26 percent undertook both rotation and water-saving schedules to send water downstream; and 27 percent agreed among themselves to reduce their off-take by one or two days (by 20 to 40 percent).[44] As an average for the whole area, farmers agreed to what amounted to a 16 percent reduction in water draws, though some of this had to be rescinded because of problems which such water saving caused farmers (mostly encroachers) depending on drainage water for their fields. We cannot know whether such an extent of cooperation and WM effort would be achievable or sustainable when water conditions are less dire, though the individual and collective need for this would also be less then. What we see is that the approach outlined in this section elicited some marked behavioral change under circumstances in which one might have expected farmers to be more resistant to cooperative efforts. The extent and expansion of farmer cooperation and initiative in water management continuing in the following season (Maha 1981-82) has been even more encouraging than the first season's activity.[45]

V. COMMON PROBLEMS

Discussion thus far has contrasted two approaches to securing participation in water management and thereby equity and efficiency in allocation of water resources. However, it is important to emphasize that both approaches must still find ways of resolving some common problems.

(1) The social unit of organization. The bases for creating water management groups is very important: criteria for inclusion and exclusion determine whether the group is essentially made up of people accustomed to cooperation with one another, how willing they are to make some sacrifices for other members, how much confidence they have in other members and in the group.

The original units of settlement in Gal Oya were relatively homogeneous in terms of ethnicity and region of origin. They were not delimited in hydrological terms, but simply according to administrative boundaries that had little reality for water distribution, and so they included a number

of distributaries with subsidiary field channels which often cut across the lines of more than one colony. This meant that the normally difficult relations between head and tail were compounded if farmers at the head and tail had different administrative and sociological identies.

Administrative boundaries could be redrawn to correspond to hydraulic units--the command areas of separate channels--but this would not change, at least for some time, the sociological reality that people were accustomed to living and working together in some different grouping. An "inductive" approach can try by persuasion to establish new units of cooperation. In the initial organizing effort, problems arose where channels crossed unit boundaries; but in several instances, within one season, new patterns of cooperation through farmer-representatives replaced previous patterns of conflict.

(2) Coordination of provision of water with provision of other agricultural services. Farmers need draft power, seeds, fertilizer, credit, etc., to take advantage of water's productive potential. The problem of securing coordination of services is difficult: bureaucratic self-interests invariably give precedence to suiting the agenda of one's administrative superior rather than that of collateral administrative agencies--or farmers. The draft amendment to the Irrigation Ordinance provided that water-user associations may take on other agricultural functions besides water management once they can effectively discharge this primary function. Cultivation Officers of the Agrarian Services Department, which handles complementary inputs, would be ex-officio members of the JSPS Executive Committee, a reasonable provision, and the Project Committee would include the Assistant Commissioner for Agrarian Services as a member. The alternative approach taken envisions the same broadening of functions, but it did not spell out membership of higher-level associations above the field channel level, though such an arrangement is quite compatible with its conception. In fact, officials from all relevant departments have now begun meeting regularly with farmer-representatives at the sub-district level.

The solution to these needs for coordination (if there is one) seems to rest not so much in legal injunctions as in the interpersonal influence which farmers can exert when pressing claims for better service on administrators--and politicians. This is a "demand-side" rather than a "supply-side" theory of administrative performance. Client groups know better, and more quickly, when there are lapses in agencies' work. The organizational approach, building up from cohesive field-channel groups, would seek means to put legitimate pressure on government officers to provide both the amount and the proper coordination of services due to

farmers. There is some evidence (from a system of farmer committees introduced into the Minipe irrigation scheme not too far from Gal Oya) that the performance of lower-level staff, not only in the ID but in Agrarian Services and other departments, is improved once farmers are organized.[46]

(3) Private lands and encroachments. The project was designed to serve only land in the colonies. Yet 15,000-30,000 acres have been operated within the system, by using drainage water or tapping directly into the irrigation system. The majority of these cultivators are smallholders with only a few acres, but as noted above, some control 20, 50 or even 100 acres and rent it out. The power they add to the "tail-enders" was something not considered in the legal approach, which, as drafted, would give weighted representation to them. The lawyers, like the engineers, tended to ignore drainage areas as they were not supposed to be cultivated; but they are.

Unfortunately, there is no good solution to this problem in an organizational approach. Should these cultivators be included in the water-user association? Should the owners or tenants be represented? Should they have their own associations? The initial efforts of the institutional-organizers to get farmer cooperation to cope with water shortage in the 1981 yala season were in some instances thwarted by drainage-area farmers. The conservation of water introduced by colonists cut the flow of water in drainage canals by as much as 50 percent, but this led encroachers on drainage land to open the gates, break them or steal the boards closing them off, to get more water sent through the D-channels. So far, the large landowners with drainage land, having no legal status, have tried to prevent their tenants from being involved in the meetings for organizational purposes.

Experimentation must be attempted to find ways to handle this problem. Simply enforcing legal prohibitions on ownership (or control) of such land, especially control of landholdings in excess of the legal ceiling, would be helpful, but it is most difficult. The ID in recent discussions has indicated it would incorporate encroached areas within its jurisdiction into its redesign and give them field turnouts with a maximum of two acres each. It would then be up to the government to distribute these small holdings as provided by law to eligible (landless) cultivators. We will see if this works.

(4) Accommodating existing water management roles. This means accepting any Vel Vidanes currently functioning in such roles as Field Channel Representatives. Since few Vidanes function for such a small area only, it is not clear that they could be "reduced" to this level of

representation. But more serious is the fact that such "traditional" irrigation headmen generally are members of the local elite and have often used their position in the past to aggrandize themselves. Farmers may defer to them because of their power but not necessarily because of intrinsic respect. To co-opt them into operating a "modern" system of WM raises questions of equity as well as of voluntary participation by farmers.

Unfortunately, the inductive approach has no certain answer to this. If farmers are to elect their own representatives, they may elect such persons out of fear or to be sure of getting favors. On one of the channels where IOs initially attempted to introduce rotational distribution of water, we found that the person elected as Farmer-Representative under the Agrarian Services Act to handle agricultural inputs was the former Vel Vidane, and politically influential. He opposed the IO's suggestions, not revealing why. It turned out that although his land was at the tail-end of the field channel, he had gotten an ID official to raise the pipe inlets to the plots of those farmers above him, so his field even though situated at the tail got water before the rest. Any farmer organization was a threat to his privilege. The other farmers resented this action; but they had never before had any outside person villing to be supportive; so they agreed to both rotation and shramadana, but this former Vel Vidane got the rotation stopped by bringing complaints.[47]

This episode finally had a happy outcome. After learning of this conflict in June 1981, I was concerned to know what had happened when I visited the area in January 1982. This particular person had in the meantime been fully "converted" to the farmer organization approach, including its egalitarian and participatory features, and had been elected as a representative himself. When visiting a neighboring scheme (Muthukandia) with three other farmer-representatives in January to talk about farmer organizations for water management, he was outspoken and articulate in favor of this approach. Similarly, the other local elite figure who had been opposing farmer organization last June had come around fully by January to be one of the program's biggest boosters. We attribute these changes of heart to the fact that IOs started by communicating directly and individually with farmers to explain the purposes of organization and to elicit encouragement for new, more cooperative and equitable arrangements concerning water. This appears to create an environment in which more privileged farmers have to go along or be passed by. We do not know how widespread such a dynamic can be, however, or how successful the organizational approach can be in other settings. Resistance by local elites must be anticipated and dealt with by any WM approach.

(5) The orientation of engineers toward working with farmers. Initially the attitudes of engineers toward farmers was not very respectful, and the farmers reacted to this treatment. Much of the "irrational" or "anti-social" behavior of farmers--breaking gates, putting in unauthorized pipes from channels to their fields, cultivating "reserved" areas along channels that are moist with seepage water, etc.--is a response, justified in their eyes, to the unrealistic rules or bureaucratic rigidities of the ID. Our work in Gal Oya has made clearer than before the extent to which farmer behavior in WM is a reflection of the practice, good or bad, of the technical department concerned.

The draft law, as noted, listed many responsibilities for farmers and none for engineers. Any approach, however, must have the support of the latter, since water management, as described at the outset of this paper, requires cooperation between engineers and farmers. The latter can handle on-farm water management pretty much on their own, but the middle range of WM activities--water distribution among and along distributary and field channels--involves great interdependence.

An axion formulated early in our fieldwork is that farmers will not change their behavior unless and until the engineers change theirs. Here is where the biggest problem for improving water management comes in. Lapses in ID performance are common rather than the exception. The deductive approach, especially as framed in this instance, did not address them. The IOs (with the involvement of ARTI supervisors and Cornell consultants) have been trying to foster better understanding between farmers and engineers, particularly to show the degree of responsible WM performance that farmers are capable of if approached constructively. This has been helped by sensible suggestions from some farmers in their meetings with engineers about redesign of channels, including some solutions that are technically sound which had not been considered by the ID staff.

One of the most gratifying results of the approach so far has been the extent to which such cooperative relations have arisen, quickly and with apparent good will on both sides. The engineers' and technical assistants' responsiveness to farmer-representatives has been an encouragement in turn for farmers to discharge water management responsibilities at the field channel and even D-channel level more effectively. What we have been seeing justifies some modification of our earlier formulation in that farmer initiatives in response to the IO efforts have helped to change the attitudes and performance of technical staff, which changes in turn are an incentive for better farmer attitudes and performance. The point of particular relevance here is that legal enactments implemented by government

staff operating in their previous manner would be unlikely to achieve this reorientation on both sides.

VI. CONSIDERATIONS FOR IMPROVING LEGAL APPROACHES

The purpose of the foregoing discussion has not been to discredit the use of legal instruments for improving water management but rather to emphasize the need to examine assumptions and limitations of proposed enactments, with a view to fitting them to an effective integrated strategy for water management. "Bottom-up" efforts need some legal sanction and support. Here some elements that could strengthen a legal approach are suggested.

(1) The need for some experimentation in advance of drafting and enactment of legislation seems obvious in something as complicated as water management. While some legal authorization may be needed for experiments, this can be done on an ad hoc basis. In Sri Lanka, it can be done presently on the authority given to Government Agents in each district for implementation of development programs. An approach which works deductively, from some body of a priori legal principles, seems particularly inadvisable.

(2) The need to work from an ample knowledge base, rather than some imported model (as appears to have been the case here) is also obvious. There must be an understanding, for example, of the extent and role of private lands and of the real role of Vel Vidanes if they are to be incorporated fruitfully into the legal scheme. The innovative suggestion of weighted voting to favor the tail-enders turns out in Gal Oya to be mistaken in many potential JSPS areas because of the anomaly of powerful tail-enders.

The sociological research needed is not necessarily detailed or expensive. Cornell consultants learned a great deal about these problems after only several weeks in the field with their Sri Lankan colleagues, at least enough to know of their existence and the need to adapt legal provisions accordingly. We would caution, however, that seasonality plays a particularly important role in any agricultural activities and getting some knowledge of how the system will require at least a year's observation. The law, indeed, should probably make some bows to the difference between "wet" and "dry" seasons, for example, as the relevance of farmer organizations and various WM practices can differ dramatically between the two.[48]

(3) The agency which introduces new activities and structures is more important for success than the technical construction of the law establishing them. This is especially relevant when it comes to development, which often involves getting quite different behavior, rather than regulating existing behavior. The agents of change in effect embody the law in the eyes of those subject to it. Entrusting the task of communication and persuasion to bureaucrats or technocrats with a legacy of often adverse relations with the public is likely to be much less successful than having specially trained, supervised and motivated "catalysts" presenting the new ideas and expectations. A legal approach can provide for such latter roles, but it is not disposed to do so unless made especially aware of this possibility.

(4) The need to provide for use of more than one model is important --so that variations can be made to suit local circumstances. The elementary principle of justice is not to treat all cases alike, but to treat all like cases alike. There are definite diseconomies of differentiation when it comes to administering a program and these must be weighed. Variation should not be maximized but rather provided for. The draft law in this case did provide some options, quite commendably, to have a representative instead of a committee at field channel level, or to use existing WM roles. But beyond this, the legal framework was conceived, in its deductive way, as quite uniform.

(5) Perhaps it is the homogeneity of water as a resource, and the ubiquity of farmers' need for water that implies a feasibility for standardization in water management practices. The rules governing its management should switch depending on water circumstances, whether in scarcity or abundance. Observation of how farmers themselves manage water suggests this need. There is no point in having strict rules and ambitious enforcement of allocation schemes when water is abundant, and perhaps special rules of strict rationing, rather than optimizing distribution, may be appropriate with severe shortage.[49] Management activities entail costs to farmers as well as to the relevant officials, and there is a trade-off to be considered always as to whether increments in management effort "pay"--and to whom? We observe that farmers have various "fall-back" strategies as a rule, letting management lapse when water is more abundant than usual and progressively instituting stricter controls as relative scarcity increases. As usually conceived now. legal rules do not allow for such variations in water availability. But with some imagination, and some testing, more flexibility could be written into the laws, particularly to differentiate between "wet" and "dry" seasons.

(6) Building in incentives for compliance should be part of the task of formulating legal solutions to social problems. From a farmer's perspective the draft law entailed many more onerous "duties" than attractive "powers." The drafter had not put himself in a farmer's position and asked (as Korten did), "what is in this for me?" The presumption that behavior required by law will be forthcoming is patently unrealistic in LDCs, even one as administratively integrated and "penetrated" as Sri Lanka. The most effective impulses on behavior come from social pressures arising from one's membership in a group (a formal group or an informal one, or only a reference group from which one derives status and satisfaction). The organizational approach seeks to build group consensus so that members are indeed satisfied that the expected behavior is acceptable. A legal approach would do well to look for such avenues to get more voluntaristic compliance.

(7) The attitudes and behavior of government staff are critical to the attitudes and behavior of persons subject to the law. There is a tendency to "blame the victim" for failures of government programs, when in fact the program and its presentation should be scrutinized before externalizing fault-finding. This has been one of the most dramatic conclusions from our involvment in the Gal Oya project. Like lawyers, students of public administration tend to regard bureaucracy as fairly impersonal and relatively neutral. In fact, the characteristics of the bureaucracy are anything but neutral as far as many parts of the public are concerned. Thus when seeking legal solutions to development problems, one should be sure that the "channel" for solving the problem is not a problem in itself.[50]

(8) Legal reforms need political support, not only for passage but for implementation. Especially if the kind of flexible, experimental approach suggested here is followed, there is need for political authorization, for funding of special staff to supervise and monitor new activities, for promoting cooperation from other agencies, etc. Legal initiatives in development need not only to be "sold" to politicians but their active understanding and interest need to be solicited so that innovations will not get left "twisting slowly in the wind." This, of course, applies as fully to an organizational approach, which may run afoul of vested interests more quickly than a legal approach.

This reminds us that developmental change, whether because it is instigated by political institutions or has ramifications for them, is not sustainable without a strong measure of political support from some quarter or quarters. A difference between the two approaches is that the organizational approach once started is more likely to generate some political support on behalf of the new system. It is more likely to create a

constituency that makes continuing developmental change politically feasible, even if opposed by some. This set of issues, of course, gets us well beyond questions of "law in development." But it needs to be mentioned in conclusion because a-political efforts at legal reform for development will probably be more vulnerable, the more significant are the needed changes they attempt.

FOOTNOTES

1. See Council on Environmental Quality and Department of State, The Global 2000 Report to the President, Volume II, Chapter 9 (Washington: Government Printing Office, 1980). With regard to Sri Lanka, this has been argued by Robert Chambers, Water Management and Paddy Production in the Dry Zone of Sri Lanka (Colombo: Agrarian Research and Training Institute, 1975).

2. The World Food Conference in 1974 estimated that $85 billion was needed worldwide to build new and rehabilitative existing irrigation systems to meet increasing food demands; in 1981 dollars, the estimated expenditure would be $150 billion, and even more if sustained development is sought rather than just feeding the population. A study by the International Food Policy Research Institute based in Washington has indicated a need for $100 billion by 1990 to meet food needs--half of this ($52 billion) in water resource development.

3. Robert Wade and Robert Chambers, "Managing the Main System: Canal Irrigation's Blind Spot," Economic and Political Weekly, XV:39, September, 1980.

4. In Sri Lanka, to economize on water use, a cultivation calendar is set before each season, prescribing dates for ploughing, first water issue, etc. Once it is promulgated by the Government Agent, it has legal standing. But its enforcement is almost impossible because farmers have so many excuses for delay that the valid and invalid ones cannot be readily sorted out. One main reason for non-compliance is the unpredictable management of the main system, which gives farmers reason to follow a very conservative coltivation strategy, not trusting the set schedule.

5. The value and importance of a legal framework for improving water management is cited along with other factors by Anthony Bottrall, "Improving Canal Management: The Role of Evaluation and Action Research," Water Supply and Management, 5, 1981, p. 72. This analysis is based on a research project he carried out for the World Bank.

6. There is a growing and theoretically substantial literature in political science and economics on "public goods" and "collective behavior," thus far best represented by Mancur Olson in The Logic of Collective Action (Cambridge: Harvard University Press, 1965).

Economic theory has regarded equitable distribution of resources and their efficient use as opposed to one another. Unequal distribution, it was thought, led to accelerated capital formation and greater increments to output, and to more incentive to progress. Both the incentive effects and the linkage between capital and output, as well as inequality's impact on saving and investment, are now questioned. See William R. Cline, "Distribution and Development: A Survey of Literature," Journal of Development Economics, February, 1975, pp. 359-400; and Joel Bergsman, Growth and Equity in Semi-Industrialized Countries, World Bank Staff Working Paper No. 351, Washington: World Bank, August, 1979.

John W. Mellor et al., Developing Rural India: Plan and Practice (Ithaca: Cornell University Press, 1968), p. 112. This is discussed further by Robert Chambers in "In Search of a Water Revolution: Questions for Managing Canal Irrigation in the 1980s," Report of a Planning Workshop on Irrigation Water Management (Los Banos: International Rice Research Institute, 1980), pp. 25-28.

See Chambers, Water Management and Paddy Production in the Dry Zone of Sri Lanka, op. cit. Of course farmers may be trying individually to maximize returns to their labor, land or capital.

For the Gal Oya scheme, discussed below, one of the Cornell consultants, Professor Randolph Barker, Department of Agricultural Economics, has estimated, based on Philippine research, that as much as 50 percent of the potential yield increase from better management could be achieved from improvements in the main systems, with only minor physical repairs and without costly major rehabilitation. The resulting yield increases would be attained at relatively low cost.

This was one of the main conclusions of an international seminar organized by the Agricultural Development Council and held in Colombo in August 1980. See seminar report by Gilbert Levine and Henry C. Hart, Mobilizing Local Resources for Irrigation (New York: Agricultural Development Council, 1981). For analyses of experience in Philippines and Thailand which demonstrate this point, see T.H. Wickham and A. Valera, "Practices and Accountability for Better Water Management," and S. Duncan, "Local Irrigators' Groups: Assessment of Their Operations and Maintenance Functions," in International Rice Research Institute, Irrigation Policy and Management in Southeast Asia (Los Banos: IRRI, 1978), esp. pp. 74 and 191.

12. The history of the ID is presented in a 75th anniversary jubilee volume, Diyawara--Irrigation (Colombo: Irrigation Department, 1975). The colonization schemes are chronicled and analyzed in B.H. Farmer, Peasant Colonization Schemes: Land Settlement in the Dry Zone of Ceylon (Cambridge: Cambridge University Press, 1960). Interesting insight is gained from the reminiscences in Diaywara of a former Deputy Director who entered the ID in the 1930s. A village headman who failed to address a Technical Assistant with enough deference was told indignantly, "Ask permission (to address me), man!" and the man fell prostrate on the floor. At that time, a Technical Assistant would be addressed by peasants as "Your reverence," and his supervising engineer was called "Great reverence." The Director of Irrigation was referred to as "God-like Reverence." "Such were things when I joined the Irrigation Department," the former DD wrote.

13. As the ID's director recently observed, many disciplines and departments are involved in some way in water management, but when problems arise it is most often the engineer who gets blamed (remarks at Inginiyagala, January 16, 1982).

14. Karl Wittfogel, Oriental Despotism (New Haven: Yale University Press, 1954). For a Sri Lankan critique citing the Ceylonese case, see R.A. L.H. Gunawardana, "Irrigation and Hydraulic Society in Early Medieval Ceylon," Past and Present, November 1971; see also E.R. Leach, "Hydraulic Society in Ceylon," Past and Present, April 1979.

15. K.M. de Silva writes: "The administrative infrastructure, especially at the village and district level, appears to have been strong and resilient enough to cope with periods of turmoil during power struggles in the upper reaches of the administrative structure at the capital, or during foreign invasions. These were, in a sense, more enduring than the central government institutions....No doubt the maintenance of this system in good repair, quite apart from its expansion, required a sophisticated machinery of administration under central control. But it was the permanent institutions rooted among the people at the village level which ensured the survival of the system during the periods of turmoil which were a regular feature of Sri Lanka's ancient history." Sri Lanka: A Survey (Honolulu: University Press of Hawaii, 1977), K.M. de Silva, editor, p. 36.

16. This pillar now stands in the district headquarters at Ampare, where the Gal Oya project administration is centered.

17. The Collapse of the Rajarata Civilisation in Ceylon and the Drift to the Southwest, edited by K. Indrapala, Ceylon Studies Seminar Series (Peradeniya: University of Ceylon, 1971).

18. Michael Roberts, "The Paddy Lands Irrigation Ordinances and the Revival of Traditional Irrigation Customs, 1856-1871," in E. Walter Coward, Jr., editor, Irrigation and Agricultural Development in Asia: Perspectives from the Social Sciences (Ithaca: Cornell University Press, 1980), pp. 186-202.

19. This role is best described in E.R. Leach, Pul Eliya, a Village in Ceylon: A Study of Land Tenure and Kinship (Cambridge: Cambridge University Press, 1961). Its lesser importance in a Wet Zone village is described in Marguerite S. Robinson, Political Structure in a Changing Sinhalese Village (Cambridge: Cambridge University Press, 1975).

20. During the Anuradhapura and Polonnaruwa civilization, the Dry Zone supported most of the country's population, perhaps as many people as now inhabit Sri Lanka. This was made possible by the network of major and minor tanks covering the area. With the collapse of the civilization and tanks (see source cited in footnote 17), the population withdrew to the Wet Zone, which now supports two-thirds of the country's people on just one-quarter of its area. The colonization policy was meant to reduce this concentration of population while increasing food production and employment opportunities. See Farmer, Peasant Colonization Schemes, op. cit.

21. Sinhala-speaking Sri Lankans form the majority of the country, about 70 percent and are predominantly Buddhist; the Tamil-speaking minority is mostly Hindu and had considered at least the coastal region of the Gal Oya area as a Tamil area for some time. Moslems, mostly Tamil-speaking, form another minority and are more numerous in the project area than elsewhere in Sri Lanka.

22. Report of the Gal Oya Project Evaluation Committee, Sessional Papers I-70 (Colombo: Government Printing Department, January, 1970). This Commission was chaired by Professor B.H. Farmer from Cambridge University, probably the most knowledgeable person on Sri Lankan settlement schemes.

23. A study of this second-generation settler problem has been done by Shyamala Abeyratne, A Study of Second Generation Settlers in the Gal Oya Project, Sri Lanka, M.S. thesis, Department of Rural Sociology, Cornell University, 1982.

24. It is also said that village headmen in the Wet Zone, instructed to recruit households to be settled in Gal Oya, which already had a bad reputation as an undesirable area, chose this opportunity to get rid of "trouble makers" or "misfits" in their villages. To the extent this was true, the initial population would be less disposed toward cooperation than even their mixed places of origin would provide.

25. This is reported in the consultants' report on which the Gal Oya project design was based: CH2M Hill, Proposed Water Management Program for Major Irrigation Schemes in Sri Lanka, February 1979.

26. It was reported to us during a field trip in Gal Oya during June, 1981, that some staff of the ID removed working gates from the Left Bank and installed them on the Right Bank, where they had private land of their own, with the expectation that the AID-funded project would repair or replace all gates on the Left Bank anyway.

27. This same kind of situation is reported for the Philippines and Indonesia by Frances F. Korten in a paper presented to the World Bank Sociological Workshop in July 1981: "Building National Capacity to Develop Water Users' Association: Experience from the Philippines," pp. 30-31.

28. The design team did include a sociologist, with more experience in Sri Lanka than the technical team members had. But his inputs to the report were relegated to a minor position and were hardly integrated with the rest of the analysis and prescription. That he was British as well as a sociologist made him doubly marginal in a team of American technicians.

29. The Cornell Water Management group included faculty in agricultural engineering, agricultural economics, anthropology, rural sociology and political science, as well as graduate students from these and other disciplines. The Rural Development Committee's chairmen to date have both been involved in the Sri Lanka work.

30. See David C. Korten, "Community Organization and Rural Development: A Learning Process Approach," Public Administration Review, September-October, 1980.

31. The comparative analysis of water management legislation and organizational experience in various countries which formed a basis for this legal advice is presented in a paper prepared for USAID/TAB/RD by George E. Radosevich, Improving Agricultural Water Use:

Organizational Alternatives (Fort Collins, Colo.: Resources Administration and Development, 1977). See also Radosevich, Water User Organizations for Improving Irrigated Agriculture: Applicability to Pakistan (Fort Collins: Water Management Research Project, Colorado State University, 1975).

32. Annex 12 to the WMP paper, cited in footnote 24 above, was written by Radosevich and entitled "Organizing Farmers for Water Management in Sri Lanka." It discussed water users' associations in Spain and the Philippines and proposed the JSPS framework in very specific terms.

33. In a study of Asian countries' experience with rural development, such multi-tiered organization was found associated with the more successful cases. See Uphoff and Esman, Local Organization for Rural Development: Analysis of Asian Experience (Ithaca: Cornell University, Rural Development Committee, 1974).

34. This concept, which emphasizes some opposite effects of economies of scale and some advantages of small-scale enterprises, is discussed in Clement Onyemelukwe, Economic Development: An Inside View (London: Longmans, 1974).

35. This is the figure which the ARTI Institutional-Organizers were able to determine. One unofficial estimate puts the maximum figure at nearly 1,000 acres.

36. Draft Irrigation Act and the Organization of Water User Associations, Memorandum to Ministry of Lands and Land Development, from David Korten, ARTI/Cornell Consultant, September 10, 1980, pp. 1, 3 and 4.

37. The project paper's formulation was mostly a "legal," top-down one as it stated a target of having 19,000 farmers "organized" by the end of the fourth year of the project, following the passage of a law for water-user associations. ARTI was to have designed and tested a "best" model. The two efforts should probably have been tackled sequentially rather than simultaneously.

38. This element of development strategy is discussed in Korten, "Community Organization and Rural Development," op. cit. The "process documentation" strategy was evolved in support of the work with irrigation associations by the Philippines' National Irrigation Administration. More detail is given in Frances Korten's paper cited in footnote 27.

39. Getting this latter provision delayed the program by several months, but it was critical for the success of the IOs that all have the necessary qualifications and not be able to slack off because of political sponsorship protecting their job regardless of performance.

40. One of the "hypotheses" tested in the first batch of IO recruits was whether women could perform adequately in this role. Two programs similar to this in the Philippines found that their women organizers were on the average probably better than the men. There was doubt this would be true in Sri Lanka, however, with its South Asian rather than Southeast Asian attitudes toward women's roles. Almost one-third of the recruits were women and after three months in the field, all supervisors agreed the women were on the average at least as effective as the men. They were screened more carefully to begin with, and are perhaps more concerned about proving themselves effective. Farmers appeared more willing to respond to requests and suggestions from the women.

41. Actually, in the area where IOs are active in advance of the rehabilitation program, farmers set up explicit water management groups fairly quickly, with elected representatives, but these are not legally registered yet. How they will be formalized and federated will be explored with them and government officials as part of the experiment.

42. The latter was called for in the project paper, but it seemed prompted mostly as a way to get free labor and contain project costs, as well as to have some evidence of farmer "participation" in the project.

43. IOs were told specifically not to put themselves, or let themselves get put, into a situation where they became spokesmen and community leaders. After three months, we queried IOs on whether irrigation-oriented leadership had emerged, and already in this time period, on three-fourths of the channels some evidence of farmer leadership could be pointed to, though not all was new. Uphoff, "Initial Report on Water Management Activities of Institutional-Organizers for Water Management Project, Gal Oya, Sri Lanka, May-July, 1981" (Colombo: ARTI and Ithaca: RDC, September, 1981) mimeo, pp. 13-14.

44. Data are from the report cited in previous footnote. IOs were asked to provide data on a channel-by-channel basis, and these were analyzed and summarized in the report.

45. Information on this is reported in the author's trip report, "The Institutional-Organizer (IO) Programme in the Field After Ten Months: A Report on Trip to Ampare/Gal Oya, Sri Lanka, January 14-17, 1982" (Colombo: ARTI and Ithaca: RDC, February, 1982), mimeo.

46. The ID's Deputy Director for the range administering Minipe has been unusually innovative in promoting such a system on his own initiative and authority. It is reported by the Deputy Director, N.G.R. de Silva, in "Farmer Participation in Water Management: The Minipe Project in Sri Lanka," Rural Development Participation Review, III:1, Fall 1981.

47. In this case, the person spreads rumors against the IO involved, first alleging that he used and sold marijuana, and then claiming that the IO program was a plot to raise production for farmers, and get them on the IO's side, and then to make a revolution in Gal Oya. Friendly farmers brought these rumors straight to the IO.

48. An empirical study of water-user groups in two large-scale irrigation schemes in the Philippines, testing for causes and consequences of effective group performance, found substantially different statistical relationships between the "wet" and "dry" seasons. See unpublished Ph.D. thesis by David M. Robinson, "Determinants and Results of Performance of Water Users' Organizations in Two Large Philippine Irrigation Systems," Department of Government, Cornell University, 1982.

    Similar differences in water management behavior, under very different ecological circumstances, were found by an interdisciplinary research team from the Cornell Rural Development Committee studying management of small catchment dams in Botswana by state-sponsored "dam groups." During the first nine months of field work, the team could not ascertain why the farmer groups were so "ineffective." They didn't have meetings or collect fees to maintain the dams as they were legally supposed to do. But, when other sources of water had dried up and the dams became critical to farmers' and their herds' survival, the groups came to life (like the grass on an arid plain after the rains come again). They carried out necessary functions quite effectively. But all this was missed during other parts of the year. See Louise Fortmann and Emery Roe, Water Points Survey (Gabarone: Ministry of Agriculture, 1981). Year-round rules of water management, irrespective of water conditions, made no sense to the farmers, and were not "efficient."

49. These alternatives are examined in an article by the author with M.L. Wickramasinghe and C.M. Wijayaratne, "'Optimal Participation' in Water Management: Issues and Evidence from Sri Lanka," which lays out the theoretical considerations for when farmer participation in water management is most productive, and finds empirical support for the analysis from detailed data collected by ARTI investigators in the Gal Oya area.

50. This issue is dealt with at more length in David C. Korten and Norman Uphoff, "Bureaucratic Reorientation for Participatory Rural Development," NASPAA Working Papers (Washington: National Association of Schools of Public Affairs and Administration, 1981).