AN UNOFFICIAL DONOR PERSPECTIVE ON IRRIGATION SYSTEM RECURRENT COST RECOVERY[1]

Mark Svendsen[2]

Introduction

The economic and fiscal viability of public irrigation systems in developing countries is currently receiving intense scrutiny from a variety of observers, policy makers, and practitioners.[3] These topics have recently been the subject of a critical report by the U.S. General Accounting Office (GAO, 1983) and two subsequent studies on irrigation system O&M and associated recurrent costs commissioned by USAID (Carruthers, et al, 1985; Easter, 1985). Another major study on a similar set of topics has just been completed at the International Irrigation Management Institute (IIMI) with support from the Asian Development Bank (ADB, 1985). Recurrent costs have also been treated extensively in recent

---

[1]The views presented in this paper are those of the author alone and do not necessarily represent those of the United States Agency for International Development.

[2]Presently Senior Irrigation Management Specialist in the Asia/Near East Bureau of AID in Washington.

[3]The systems considered in this paper, as in most writing on the topic, are medium and large-scale government-owned systems where primary management responsibility rests with a government irrigation agency.

editions of this newsletter and in a number of other papers and reports (ODI, 1985; FRC/CHECCI, 1985; DAI, 1984; Prasad and Rao, 1985; Rao, 1985).

Thus, although this is not a new set of issues (Michael Roberts (1980) has discussed similar problems existing a hundred years ago in the colonially-administered irrigation systems of Sri Lanka) the wealth of recent study and research offers a promising opportunity to reassess established thinking on the topic. Such a reassessment is particularly timely in the light of several recent trends. One of these is the apprehension felt in a number of Asian countries over increasingly stringent fiscal and balance of payment problems. This has led to a new concern with efficient operation and maintenance, and to reductions in, or even the elimination of, O&M subsidies from national treasuries.

In addition, many of the best sites for major irrigation system construction have been exploited, leaving more marginal sites as new project opportunities. For these more marginal sites to be economically viable, performance expectations have to be raised, which implies management that is more effective and efficient than the prevailing standard. This, in turn, implies higher O&M costs, exacerbating already stressed operational budgets.

Furthermore, a number of bilateral and multilateral donors are ideologically committed to increased fiscal responsibility and a reduction in government subsidies and "distortions" in the economies of countries which they assist. In the context of LDC irrigation sectors, one effect of this approach has been to focus particular attention on the fees generated by governments in exchange for the irrigation services they provide.

The purpose of this paper is to examine the means of meeting the recurring obligations entailed in operating and maintaining public irrigation systems from the point of view that a reasonably enlightened donor agency might employ. The recent studies and papers mentioned earlier comprise a primary source of information for this examination.

As used here, "cost recovery" refers only to the recurring costs of operating and maintaining existing systems and not to the original capital investment in them. This is a rather arbitrary definition of the issue, although it is noted that outside of East Asia developing countries do not generally make serious attempts to recover the capital costs of large-scale public irrigation systems from the direct beneficiaries and that change in this general policy is unlikely[4].

---

[4]A case in point is the new (1984) cost recovery policy in Sri Lanka which is presented explicitly as a charge to farmers to pay for proper operation and maintenance of their system (ECL and DPCL, 1985).

A Performance Perspective

A consideration of the recurring obligations involved in operating and maintaining an irrigation scheme, and the attendant recurrent cost obligations, leads straightaway to the question of the scheme's performance. Although an antiquarian's approach to the maintenance of a scheme's physical infrastructure is possible, it is not particularly useful. An irrigation scheme is a productive asset, and we are properly concerned principally with its output of agricultural goods, and possibly with other less tangible outputs such as increased levels of employment or regional economic growth. In short we expect it to perform--and effective O&M is essential to attaining expected levels of performance.

Unfortunately, "performance" is not as clear-cut a concept as we would like, especially when the famine-insurance objective of many of the "extensive" systems on the Indian subcontinent is included along with the production-maximizing goals that we are more familiar with in other parts of the world. Nevertheless, it is important not to stray too far from this fundamental (though broad) concern with "performance" in considering recurrent cost policies and collection procedures. It is all too easy to become preoccupied with interesting questions of pricing theory and

marginal returns while losing sight of the larger purpose of the endeavor.

Certainly performance and cost recovery have economic dimensions as well as physical, institutional, and agronomic ones. But to treat these in isolation from the others, or to assign them primacy, is not terribly useful. Economic theory offers us tools for setting public policy that optimizes the performance of an economic system when certain conditions are met. But so many of the present difficulties with irrigation system operation and cost recovery lie in administrative, financial, organizational, political, and technical domains that a more pragmatic performance-oriented perspective seems to be a more useful one.

Fees Funding and Performance

Given that the performance of public irrigation systems is quite often disappointing, let us ask what impact policy decisions regarding irrigation service fees can have in making improvements. To set the stage, it is useful to focus on two rather important connections that are often assumed in the traditional chain of argument that leads from irrigation fee assessment to effective O&M.

Irrigation Fees and Efficiency

The first of these is the connection between the level of the irrigation fee charged to farmers and efficient resource (water) allocation. Nothing is closer to the heart of Western economic theory than the idea that prices broker supply and demand and, appropriately set, result in an efficient allocation of resources and an efficient economy. Thus a farmer will apply more urea at 1 Rupee a kilogram, than if it were 2 Rupees a kilogram, and, if the price of urea makes sense in the overall scheme of things, all farmers will make reasonably good decisions about how much urea to apply without being wasteful.

The following passage from Irrigation Age, an American trade magazine, illustrates this point well.

> Milas Russell, Jr. doesn't consider himself a pessimist. Realist is more like it....Water costs about $9.50 an acre foot from his Imperial Valley water district. Compare that with $150 an acre foot irrigators in San Diego County pay....
>
> Russell admits that he, and many other irrigators in the Valley, have wasted water in the past. The only real incentive to not waste water is the threat of a "triple-charge" fine. If drainage at the "waste box" exceeds 15% of the amount of water received at the headgate, and the irrigator is caught by the district, he has nine hours to fix the situation or he is subject to a fine two times the initial water charge.
>
> "But", said the Brawley, Calif. farmer, "that isn't too much of a worry for some of these guys who have 15,000 acres of high value crops." (Irrigation Age, 1986)

This simple notion has proved to be a remarkably powerful device both for understanding how the marketplace works and for making

it work better. We do economic theory grave injustice, though, when we expect it to perform this minor miracle on commodities that are not paid for on a per unit basis.

All depends on a rational decisionmaker choosing to buy (and apply) more or less of an item (input) based on its cost and his return. If the price paid is divorced from decisions about how much to buy then it is unreasonable to expect "price" to perform a rational allocative function. In fact, the effect tends to be exactly the opposite of that intended. There is a good analogy with a 30-day rail or airline pass which allows unlimited travel within that period for a fixed payment.

The question we must ask then if we expect pricing mechanisms to promote efficient allocation of irrigation water, is "to what extent is irrigation water actually delivered and paid for on a per unit basis in practice?" To begin with, we observe that cases of true volumetric delivery of irrigation water by public agencies anywhere in the third world are vanishingly rare. On the other hand, it is also uncommon to find water delivered for a fee that is absolutely constant for all users.

In practice, pricing mechanisms fall on a continuum that ranges between metered and flat rate service but does not include the endpoints. The first adjustment to a hypothetical flat rate scheme that is usually made is for the area owned or irrigated.

Subsequently, crop type, season, and source of water (e.g. pumped or surface) may be taken into account.[5] Additionally there may be special discounts or exemptions granted for crop failure or typhoon damage, or occasionally for such steps as the creation of a water user organization.

All of these adjustments attempt to distribute the charges levied more equitably among users. But as far as rational resource allocation among farmers is concerned, they assume restraint rather than providing it. There is nothing in any of these pricing contingencies which deters an individual farmer, acting rationally in his own self-interest, from taking as much water as he chooses, regardless of his need or that of neighboring farmers. Quite the contrary, having "contracted" to pay for water for 2 hectares of wheat during the dry season, it is perfectly rational for the farmer to attempt to obtain as much water as he can (without causing waterlogging damage) for that crop.

In actuality, almost all common pricing mechanisms implicitly assume that the irrigation bureaucracy will administratively allocate water to the cultivators in accordance with the contingencies determining the fee. The ultimate example of this approach is the Warabundi system of Northwestern India. But

---

[5]ESCAP, 1981 reveals several other bases for assessing water-related fees, none of which contradict the argument being presented here.

here, in the classic case, there is no room whatsoever for the incentive action of water pricing, since the rotation, once determined, is inviolate*.

With the possible exception of the Indian Punjab, however, irrigation agencies seldom have the ability to control water to a degree even approaching the one hypothesized here. The far more common circumstance is for effective irrigation agency control to cease at some point well above the individual farm turnout. Within the community of users formed by this *de facto* transfer of control, water allocation patterns are generally governed far more by social relationships than by economic ones. Thus neither hypothetical economic incentives or administrative controls are effective at the tertiary level where water allocation among individual farmers takes place.

The upshot of all of this is that it is virtually impossible to construct a plausible scenario wherein the price that is set for irrigation water has some incentive effect on water use decisions at the tertiary or "on-farm" level without postulating significant changes in the way that water is generally measured

---

*The area where this type of water pricing scheme could have an incentive impact, assuming fees were high enough to be considered in the farmer's decision-making, is in the choice of crop, although the argument is seldom cast in those terms.

and delivered or in the way that farmers and the irrigation agency are organized and interact with each other[7].

O&M Budgets and Performance

The second major connection I would like to examine is the one between the regular (non-developmental) budget provided to an irrigation agency and the agency's effectiveness in keeping the irrigation systems in its charge in good repair and highly productive. Unfortunately, this is another area where I fear we have a dearth of empirical data to support our conjectures. A study of irrigation agency budget allocations relative to various measures of managerial performance (possibly lagged) would be an extremely interesting one.

In the absence of this kind of information, we can but speculate. Given the stunning divergence between what irrigation agencies say (and perhaps think) they do to manage systems, and what empirical studies have shown to happen in practice, however, it is reasonable to assume that larger budgetary outlays to irrigation agencies from the central treasury would not result in

---

[7]This, of course, assumes that farmers do feel some obligation to pay whatever fees are levied, which may be the case but often is not. If this obligation is not compelling, the entire discussion is moot.

commensurate improvements in system performance[@]. It is likely, instead, that agencies would simply undertake "more of the same" and multiply actions that are often out of touch with field reality and demonstrably ineffective.

This is not to say that budgetary allocations are now adequate, for they clearly are not and must be increased if system performance is to improve. Rather, it is to argue that "structural" changes will usually be necessary if increased allocations are to be used effectively to improve system performance. These generally go beyond the commonplace remedy of more staff training and include (a) a clear-sighted look at how the systems are actually operating now, (b) a commitment to improved system performance and an incentive structure that supports that commitment, and (c) a recognition that agency control, in fact, often stops short of the nominal "transfer point" and that functional articulation with the farmer-managed end of the system is essential for effective overall management.

What To Do

Rather than flailing away again at the questions of how much higher we should raise irrigation fees and how we can get farmers

---

[@]It is arguable that increased budgets would have a stronger impact on levels of maintenance than improvements in operations. Because routine maintenance has a more indirect relationship with performance than does system operations, it is somewhat more difficult to deal with but is still very deserving of empirical study.

to bear a larger share of the costs, it is time to take a more pragmatic and comprehensive approach to this issue. Such an approach has two fundamental thrusts, one of which involves devolution of certain responsibilities to farmers and the second a rethinking of our attempts to recover recurrent costs, including the reasons we do so and the methods we employ.

Beforehand, it is interesting to note two cases of major changes in the costs of providing O&M services. In Pakistan, Chaudhry (1985) reports the government subsidy to O&M services in Sind and the Punjab has nearly doubled, in real terms, in the 4 years between 1979/80 to 1983/84. Much of the increase is attributed to the increased expense of operating and maintaining public tubewells.

More generally, there is a strong tendency to extend governments' nominal responsibility for O&M ever further down into the system in response to perceived shortcomings in farmers' performance of these duties. Thus, in some states in India, the government's responsibility for water control and maintenance has recently gone from the 40 hectare level to the 8 hectare level and finally to the 2 hectare level.* This shift, if implemented seriously and in a widespread way, would hopelessly overextend the involved

---

*Interestingly, this has been, in large measure, a response to pressure from external donors.

agencies and increase recurrent cost burdens to crushing proportions.

Devolve Responsibility[10]

In sharp contrast to this tendency toward increasing (nominal) central control, it seems far more sensible to explore the possibilities for a reduction in direct central authority. If one considers that the number of control points in a large irrigation system increases in rough geometric fashion as one moves down through the system, it becomes quickly apparent that the costs involved in extending control downward will compound very rapidly. Conversely, the benefits of moving irrigation department control up by one level (e.g. from the "minor" to the "distributary"), in terms of cost savings to the irrigation agency, are equally substantial. It is worthwhile to remember that there are vastly more farmers practicing irrigation management than there are civil servants.

The first part of a sound solution strategy involves devolving responsibility and control to farmers, to the maximum extent possible. As put by Coward and Uphoff (1985) in their excellent discussion of this topic, this involves "reducing certain direct costs to government by collaborative arrangements with water

---

[10]This section draws heavily on Coward and Uphoff (1985), though ideas have been recast to some extent.

users so that the latter mobilize more of their own resources to implement specified O&M activities."

That this is a reasonable objective is demonstrated by three separate bodies of evidence, they argue. First, there are many irrigation systems that farmers successfully manage and maintain with little or no government assistance. These are usually small systems but some cover thousands of hectares. Second, there are also examples of farmer groups assuming a substantial role in O&M activities within large government-administered irrigation systems. Third, there are several innovative programs underway in Asia which increase farmer involvement in O&M activities. Preliminary indications from several of these programs are extremely encouraging, although problems remain to be solved.

It is critically important to distinguish this recommended devolution from past programs where "responsibilities" have simply been assigned to farmers or farmers' groups, whether or not there were any farmers' groups and whether or not (usually not) there was any perceived advantage in the deal from the farmers point of view. It is imperative, if devolution is to be successful, that the program be based on a balanced package of benefits that is attractive to both farmers and irrigation agency officials.

Equally important is the need to treat the question of which responsibilities should be turned over to farmers as an empirical one and not simply accept the traditional "above and below the turnout" demarcation. Evidence assembled by Chambers (1984) suggests that farmers have both strong interests and useful contributions to make above the turnout. This determination has major implications relating both to how attractive the devolution will be to farmers and to the level of cost savings to the irrigation agency that will result. Likewise, both maintenance and operations must be included in the farmers' sphere of responsibility if the arrangement is to be acceptable and effective.

One extremely attractive aspect of a genuine two-tiered approach to irrigation system management--one involving both the government irrigation agency and organized farmers--is that it would permit the employment of irrigation fees as a tool for achieving more efficient allocation of the water resource, an effect that is virtually impossible to realize under current organizational modes. It would do this by permitting the irrigators' group to act as a bulk purchaser of measured volumes of water from the irrigation agency, which it would then retail to its members. In doing this, it would function in a role similar to that of irrigation districts or ditch companies in the American West.

Rethink Cost Recovery

Chaudhry (1985) in his discussion of irrigation water pricing policy in Pakistan, identifies three major objectives that can be addressed through pricing decisions. He defines these as efficiency--allocation of irrigation water according to equi-marginal principals, equity--reduction of the income distribution gap among different socioeconomic groups, and financial--recovery of (capital and) operational costs of the irrigation system. In practice, he acknowledges, it is difficult to reach all three objectives at the same time.

Arguments made earlier demonstrate the irrelevance of pricing to this first objective under methods of water measurement and delivery prevailing throughout virtually all of the developing world. A rational and pragmatic approach to the recurrent cost question over the short run would thus abandon rhetoric that attributes significant "efficiency" benefits to pricing decisions. Doing this simplifies the task of developing appropriate cost recovery policies and clarifies our thinking on the problem.

Equity considerations are less easy to dismiss so summarily. One the one hand, there are conceivable ways to address them with pricing decisions. On the other, such measures have not proven particularly effective in the past. Differential pricing schemes

for the head and tail of systems, for example, could have an impact on income distribution among farmers served by the system. Implementing such a system, however, would tend to legitimize and institutionalize a system of unequal access to water within the irrigation scheme, which is certainly not a desirable longer-range outcome.

Moreover, water pricing is not a particularly powerful tool for achieving equity ends--not nearly so effective as land or tenurial reform, for example. Thus, although some interesting experiments are underway, some involving the assignment of water shares on bases other than land ownership, these are probably not generally applicable measures for large public irrigation systems at the present time.

It is the third objective, the financial one, that seems to be the most powerful, the most timely, and the most promising one to pursue at the present time. This is true for several reasons.

A number of Asian countries, e.g. Thailand, the Philippines, Pakistan, Sri Lanka, are expressing serious concern about the recurrent cost burdens they currently bear and some have already taken steps to reduce them.

More intensive management regimes, needed to maintain

present rates of growth in agricultural production as the land frontier closes, will push these burdens still higher.

There are promising approaches available for addressing financial problems which have potential for gaining the favor of all three major participant groups--host country governments, farmers, and donor agencies.

There are potentially strong indirect linkages between revenue generation measures on the one hand and improved system performance on the other.

The immediate objective under such a strategy thus becomes bringing revenues and O&M expenditures more into line with one another. This can be done both by reducing the costs of O&M services--devolving responsibility for some O&M tasks to farmers and farmers' associations and rationalizing the tasks actually performed by irrigation agency personnel--and by increasing the budgets of the irrigation agencies. Pursuing these objectives simultaneously would probably be the most effective approach. An appropriate policy approach would involve a phased plan and a timetable for doing this.

But raising operating budgets is not an easy task. Accepting the strong recommendation in the Carruthers report (1985) that direct beneficiaries bear system O&M costs wherever possible,

this task becomes, in part, one of increasing the revenues raised by the levy of irrigation fees.

It seems clear that in a great many cases, fees charged to farmers can and should be raised. It is equally clear, though, that simply raising fees in not the whole solution. A number of fundamental problems would remain to thwart most of the good that such a step could do.[11]

First, fee levels are not revenue levels. It is total collections that actually pay for O&M services and changes in collection rates, often low anyway, are likely to be inversely related to changes in fee levels.

Second, revenue collected and paid to the national treasury has no particular affinity for the agency which "generated" it. It may find its way back to support O&M, but it may not.

Third, if the irrigation agency is the collection agent and revenue is retained by the national treasury, there is little incentive for aggressive collection efforts. Quite the contrary, collection responsibilities will be regarded as a burdensome diversion from "real" duties.

---

[11]Many of these points were suggested by Carruthers (1985) and Easter (1985).

Fourth, costs of collection must be considered, since net, not gross, revenue is the legitimate yield of the process.

Fifth, the irrigation agency is still at the mercy of the political budget-setting process, where O&M functions are often extremely vulnerable during any belt-tightening exercise.

Lastly, and perhaps most importantly, simply raising fees does not take advantage of the potential for linking users directly with the service-provider in a way that generates accountability--perhaps the most valuable attribute of an irrigation management system.

Some examples will help to illustrate each of these points.

Fees and revenues. (a) In the largest irrigation system in the Philippines, the Upper Pampanga River Integrated Irrigation System (UPRIIS), it was estimated in the late seventies that collection of 70% of the service fees due was necessary to cover O&M costs. Actual collections were only about half of that level. In part this resulted from a precipitous plunge in collection rates, from 64% to 27%, following a sharp increase in fee levels in 1975 (Cabanilla, 1984). (b) In Nepal, where water charge assessments are well below the level need to cover

adequate system O&M, actual collections are insignificant (Shrestha and Shrestha, 1984). (c) In Bihar in India, actual collection percentages have declined from around 28% in 1977-78 to only about 17% in 1981-82 (Prasad and Rao. 1985). (d) In Morocco, about 43% of amounts due are currently being collected (IBRD, 1986). Although there are exceptions to this pattern, it is a depressingly familiar one across much of the world.

Revenues and budgets. The interesting cases here are the exceptions to the general pattern of irrigation revenues disappearing into general national accounts. The Philippines offers an example. There the National Irrigation Administration (NIA) was constituted as a government-chartered corporation in 1964 and was charged with recovery of O&M costs and reimbursement of construction costs over a 25-year period. Revenues collected from farmers flow to a general account not specifically earmarked for O&M, but are retained within the agency. For major systems, no real attempt has been made to recover capital costs, however, the obligation to recover O&M costs has been taken seriously. And while collection percentages are not always high, they do comprise perhaps the single most important measure of system performance in the eyes of NIA personnel--affecting performance evaluations of technicians, water delivery priorities to villages, and ratings received by entire districts and systems (Svendsen and Lopez, 1980).

In Sri Lanka, where fees have been low or non-existent, a dramatic shift in policy has recently taken place. In 1984, an annual fee of Rs. 100 per acre of paddy land was imposed in major irrigation systems. This fee is planned to rise in annual increments until it reaches double that amount in 1989. During this inception phase, the difference between the estimated O&M cost of Rs. 200 per acre and the amount charged farmers in a given year will be made up by the government[12].

The most interesting feature of this arrangement is that the amounts raised from farmers, as well as supplementary government contributions, are to remain with the scheme in which they are collected and are to be earmarked specifically for operation and maintenance of that scheme. Furthermore, farmers are to have a voice in deciding how these funds are spent.

This is an exciting and innovative approach which eliminates some of the fundamental liabilities of traditional systems of O&M cost recovery. It also capitalizes on an observation by Small (1982) that farmers are more likely to pay specific fees for specific purposes than general water fees. Early results are mixed and, while collections are significantly higher that the less-than-two-percent rate prevailing prior to 1984, only two districts had collection rates greater thar 15% during the first year of the

---

[12]However, the amount of the government contribution not spent at the end of the year will return to the government's general revenue fund (Easter, 1985).

new approach (Easter, 1985), and it is too early to tell how effective the program ultimately will be.

Perhaps the most promising version of this approach is found when it is combined with a system of strong farmer water user organizations. The large Gal Oya system in the southeastern part of Sri Lanka has recently been the site of an innovative and highly successful program of farmer organization. Irrigator associations of 15-25 farmers each have been constituted and a four-tiered structure of farmer organizations set up covering over 25,000 acres (Uphoff, 1985). These associations have taken on major responsibility for allocating water both among their members and among associations. They have also gained unprecedented representation on the District Agricultural Council--a powerful group that sets and coordinates agricultural policy for the district. Uphoff (1985) reports that in the Gal Oya area, collections under the new policy have now risen to 80%--the highest in the country. Moreover, budgets and plans for spending these receipts are being review by farmers' representatives. If such performance continues, this combination of organized farmer groups and decentralized handling of funds earmarked specifically for O&M could provide an important and attractive model for replication elsewhere.

Incentives for collection. This issue is really a corollary of the preceding one. Logic suggests it is unrealistic to expect

irrigation department employees, whose primary responsibility is to operate and maintain irrigation systems, to be diligent in collecting money from farmers for the national treasury. Peabody (1985) has concluded, following his participation in the earlier mentioned review of cost recovery programs led by Carruthers, that poor collection rates are more a function of irrigation departments' unwillingness to collect than of farmers' unwillingness to pay.

Costs of collection. Little data is available addressing this question, since an issue has not typically been framed in these terms. Scattered estimates of collection costs exist, however. Malhotra (1982) indicates that an unacceptable one-tenth of the total water revenue in agriculturally-rich Haryana state in India is being spend on the field establishment engaged in preparation of the water bill. This presumably does not include the actual costs of collection.

An even more striking picture is presented by Prasad and Rao (1985). Using figures for the Indian state of Bihar, they show that costs of collecting irrigation fees in that state, as a percentage of actual collections, increased from an already substantial 46% in 1977/78 to 84% in 1981/82. The net contribution of irrigation revenues to meeting O&M costs is thus virtually nil.

Another case from the Philippines emphasizes the importance of this factor. In an attempt to increase collections, policy was modified in 1978 to permit collection of fees in kind. This in effect borrowed a page from the book of one of the most successful collection agents in the rural Philippines--the village money-lender--by allowing the collection of fees in palay (paddy) in farmers' fields immediately following the harvest. This measure, while contributing to significantly increased collections, was later largely abandoned because of the costs and problems associated with handling large quantities of grain. The practice of indexing the amount of fees paid in cash to measures of palay, in force since 1975, remains, however, and has provided an automatic and politically acceptable means of increasing fees over time.[13]

Budget cutting. It is almost axiomatic that funding for operations and maintenance are early casualties during times of financial stringency. This has happened recently in Peru and the Dominican Republic (Carruthers, et al., 1985).

A more extreme case is that of the National Irrigation Administration in the Philippines. While NIA has always had a mandate to recover costs from irrigators, in 1980, in the midst of serious national economic and financial problems, O&M

---

[13]Although the real retail price of rice has declined by more than 40% since 1973 (Ferguson, 1986), irrigation fees, in nominal terms have increased.

subsidies from the national treasury were stopped altogether. The fact that around 90% of the total O&M cost is now made up of salaries and wages indicates that negligible amounts are being spent on equipment operation, essential for effective O&M (Sison and Guino, 1983). In the case of the Philippines, however, the results have not been entirely negative.

Accountability. Because NIA has been concerned with cost recovery since its inception and has experimented with a variety of methods for increasing its collections, it was in a position to respond in some positive ways to the financial stringency forced upon it. This response has followed the two fundamental approaches advocated in this paper--reducing costs (in part by devolving responsibility to farmers' associations) and increasing fee collections.

In attempting to reduce operating costs, NIA's strategy has included transferring complete responsibility for the smaller nationally-owned systems (those under 1000 hectares) to farmers, handing over responsibility for tertiary-level O&M to Farmers' Irrigator Associations (FIAs), and contracting out of maintenance responsibilities for larger laterals and main canals to FIAs on a fee basis (Carruthers et al., 1985). All of this has allowed NIA to reduce field staff levels.

Other cost cutting measures have also been undertaken. In one system in Laguna province visited by the author in 1984, pumps purchased under an ADB credit and installed to augment water already delivered to the system by gravity flow have been idle since their installation several years previous. NIA engineers indicate that operating the pumps would increase the average cost of water delivered in the system to a level well beyond what could be recovered from the users. They indicated also that staff members have been transferred out of their system to bring operating costs into line with revenues.

These measures have had a demonstrable effect. On a nation-wide basis, operating expenditures, which had risen from 107 M pesos in 1978 to 245 M pesos in 1981, had fallen back to 182 M pesos by 1983 (Carruthers et al., 1985).

The second thrust, that of increasing revenues from irrigation fee collections, has also relied heavily on the FIAs--in this case to serve as collection agents. Systems of collection incentives have been established to rebate a portion of the fees collected to the collecting FIA, with the fraction of the rebate increasing as the FIA's collection efficiency increases.

NIA also recognizes connections between collections and the quality of irrigation service provided to farmers, the physical condition of its systems, and the level of contact and amiability

of the relationships between its personnel and farmers. Implications of this recognition are stress on system rehabilitation, a concern with farmer satisfaction, and an emphasis on more extensive contact between system officials and farmers. The impact of these measures on collection percentages is not clear at this time, although individual components of the approach have been shown to be effective in other situations.

Given the central role of the FIAs in both thrusts, it is important to realize that programs have been underway in the Philippines since 1975, aimed at learning to organize farmers into viable and self-reliant irrigator associations. Early efforts were carried out in small community-owned schemes and this work is among the most successful attempted anywhere in Asia. Efforts were later extended to larger national schemes with some modifications and with more mixed results. Work on both programs continues.

It would be a mistake to expect immediate results from a program such as this. In the Philippines, important elements have come together is a timely and fortuitous way, some of which began many years before the country's current financial difficulties began. Over the middle-range future, the prospect of establishing O&M on a self-sustaining basis is promising. It is an experience that bears close monitoring as it unfolds, both for its own sake and

for the lessons it may have to offer other countries in the region and beyond.

Conclusion

An approach to the problem of satisfying the recurring obligations of irrigation system O&M has been outlined. It is empirical rather than deductive in nature and emphasizes system "performance" as a standard for judging our efforts. A fundamental problem is that we understand only poorly how such factors as rehabilitation, system operation, and maintenance affect system performance. Research is called for here. Still, if we are to justify, to farmers, to the planning ministry, or to the lending official the expenditures of increasing amounts of operating expense money, we must try to make such a case.

In the traditional chain of assumptions connecting increased irrigation fees to improved system performance, one prominent link appears to be broken and another unreliable. The first is the linkage between fee levels and their incentive effect on farmers to produce an efficient allocation of irrigation water. Given current patterns and practices of water delivery throughout the developing world, a convincing case for such a linkage simply cannot be made.

The second link is the one relating increased funding for a government irrigation agency and improved O&M (and improved system performance). There is reason to doubt the effectiveness of this relationship in many cases, and it is, at best, an unproven one. The implication is that while augmenting revenue flows to an irrigation organization, we must, at the same time, also analyze its functions and roles with respect to their effectiveness in increasing system output and extending its lifetime.

There are two fundamental approaches to the problem of imbalance between irrigation agency revenues and the costs of adequate O&M. These are (a) to reduce costs and (b) to raise revenues. For greatest effect, both should be undertaken together.

To accomplish the first of these, some form of farmer organization will be necessary in most cases. In the case of the second, simply increasing fees in not enough. It is necessary also to consider collection efficiencies and costs, the path that revenues take in reaching the irrigation agency, the presence or absence of supplemental subsidies from the national treasury, and a number of other factors.

If there is a simple vision of an ideal case, it might look a bit like a public utility for irrigation water. It would see itself as providing an irrigation service, would generate most of the

revenue it needs directly from its users (in this case, probably user groups) and bear some accountability to the public in general and to its user groups in particular. We may be a long way from such a vision in most cases. However, in one country, the Philippines, a promising start had been made down just such a road before the recent economic and political difficulties. If will be interesting to see if that journey is now resumed.

References

Asian Development Bank. 1985. Technical assistance for a regional study on irrigation service fees. ADB, Manila.

Cabanilla, Liborio S. 1984. Study of operation and maintenance problems in irrigation: the Philippine case. Case study prepared for the Office of Technical Resources, Bureau for Asia and Near East, USAID, Washington, DC 20523.

Carruthers, Ian D., et al. 1985. Irrigation pricing and management. U. S. Agency for International Development, Washington, DC, 20523.

Chambers, Robert. 1984. Farmers above the outlet: irrigators and canal management in South Asia. Draft Paper. Institute of Development Studies, Sussex.

Chaudhry, M. Aslam. 1985. An evaluation of existing irrigation water pricing policy in Pakistan. PRC Engineering/Checchi, Islamabad.

Coward, E. Walter Jr. and Norman Uphoff. 1985. O&M costs in irrigation: reappraising government and farmer responsibilities and rights. Paper prepared for the USAID/Asia Bureau Regional

Conference for Agricultural and Rural Development Officers, 22-26 April, Los Banos, Philippines.

Easter, K. William. 1985. Recurring cost of irrigation in Asia: operation and maintenance. Bureau for Asia and Near East, U. S. Agency for International Development, Washington, DC, 20523.

Economic and Social Commission for Asia and the Pacific. 1981. Proceedings of the expert group meeting on water pricing, 13-19 May 1980, Bangkok. United Nations, New York.

Engineering Consultants Ltd. and Development Planning Consultants Ltd. 1985. Study of recurrent cost problems in irrigation systems: Sri Lanka. Case study prepared for the Office of Technical Resources, Bureau for Asia and Near East, USAID, Washington, DC 20523.

Ferguson, Carol. 1986. Intensification of Philippine gravity irrigation: infrastructure costs and facilities in government systems, and modeling NIA water allocation and distribution. Paper presented at the Forum on Irrigation Systems Research and Applications, Cornell University, Ithaca, NY 14853. 13-15 May.

IBRD. 1986. Report and recommendation of the president of the International Bank for Reconstruction and Development to the executive directors on a proposed loan in an amount equivalent to

US$46.0 million to the Kingdom of Morocco for a large scale irrigation improvement project. IBRD, Washington.

Irrigation Age. 1986. Russell gears up for water limitations, higher costs. 20(6):8-9.

Malhotra, S. P. 1982. The warabandi system and its infrastructure. Central Board of Irrigation and Power publication no. 157. New Delhi.

Overseas Development Inst. 1985. Irrigation management network paper 11e. Agric. Admin. Unit, ODI, London.

Peabody, N. S. P. 1985. Debriefing at AID/Washington on Irrigation Pricing and Management study conducted by Devres, Inc. 22 October.

Prasad, Kamala and P. K. Rao. 1985. On irrigation pricing in India. Mimeo. Harvard University, Cambridge, MA.

Rao, P. K. 1984. On cost recovery and irrigation water pricing. Irrigation management network paper 10f. Agric. Admin. Unit, ODI, London.

Roberts, Michael. 1980. Traditional customs and irrigation development in Sri Lanka. In: E. W. Coward (ed.). Irrigation

and agricultural development in Asia. Cornell Univ. Press, Ithaca, NY, 14853.

Shrestha, T. B., S. K. Shkya, and M. M. Shrestha. 1984. Study of operation and maintenance problems in Nepalese irrigation projects. Case study prepared for the Office of Technical Resources, Bureau for Asia and Near East, USAID, Washington, DC, 20523.

Sison, J. and R. Guino. 1983. An assessment of costs and performance of various types of irrigation systems in the Philippines. Paper prepared for IFPRI. Quoted in Cabanilla, 1984.

Small, L. E. 1982. Investment decisions for the development and utilization of irrigation resources in Southeast Asia, Report No. 26. A/D/C, New York. Quoted in Prasad and Rao, 1985.

Svendsen, M. and E. Lopez. 1980. Six rotational areas in the Penaranda River Irrigation System. Technical Report no. 2 on the determinants of developing country irrigation project problems. Cornell University, Ithaca, NY.

U.S. General Accounting Office. 1983. Irrigation assistance to developing countries should require stronger commitments to operation and maintenance. GAO, Washington, DC.

Uphoff, Norman. 1985. Executive summary for trip report on farmer organization program in Gal Oya, Sri Lanka: July-August 1985. Rural Development Committee, Cornell Univ., Ithaca, NY. Mimeo.