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Water Pricing in Agricultural Sector Charging Mechanisms and Implementation

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Introduction

In the Mediterranean countries Governments has begun changing longstanding agricultural policies. New policies will allow farmers to sell more freely to open markets and to permit commodity prices received by farmers to move toward free-market levels. The policies will reduce or eliminate an important mechanism by which the government has collected "tax" revenues from the farm sector. Among other implications, these major policy shifts raise questions about the appropriate means of financing the operation and maintenance of the main irrigation system. Cost-sharing mechanisms for directly charging farmers have been proposed as a revenue source to help pay for system maintenance.

Public policy on a complex and controversial issue such as irrigation cost recovery mechanisms requires balancing of multiple, competing goals. Several social goals have been suggested for appraising public policy on water resource systems (Mass and Anderson, 1978; Bohm and Russell, 1985; Stone, 1988). These major criteria include economic efficiency, fairness, i.e. , treating like individuals in a similar manner, correcting imbalances in the distribution of income and wealth, and individual choice. Long-term sustainability of the system is an explicit goal of water policy, although economists might argue that this can be appropriately subsumed under economic efficiency. Lesser-order goals include minimal administrative costs, orderly conflict resolution, and local autonomy and control.

Considerations of economic efficiency and equity focus attention on recovery of irrigation costs. Pricing can ration scarce resources such as water and minimize economic wastage. Economic efficiency is attained when the incremental charge (price) equals marginal or incremental cost.

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The water user will only apply units of the resource as long as the incremental gain exceeds incremental costs. Economic waste occurs when water users apply more water than is economically efficient. (Precise marginal cost pricing requires volumetric measurement of water which is difficult to achieve under most canal irrigation systems. Furthermore, equitable cost distribution is sometimes defined as one in which no group in society subsidizes any other. Full cost recovery from water users can be termed equitable in that sense .

Focusing attention on capturing benefits -rather than recovering costs- seems appropriate to some analysts. However, this approach would likely force irrigators to pay more than their fair share. Such a policy would be inequitable and would also provide a disincentive to farmers to maximize productivity and profitability. Specific estimates of economic benefits do have an important role in assessing cost recovery mechanisms. Net returns (profits) to water for farmers cannot be less than charges without creating a negative net income situation and removing incentives to produce at all.

Constraint Identification

The term constraints will refer to general obstacles or problems, rather than absolutely binding or limitations or prohibitions.

Development of cost-sharing programs may include: technical, social, administrative, political and legal, and economical constraints. Placing an issue in a certain category is somewhat arbitrary; some issues fall into more than one specific category. The different kinds of constraints are outlined as follows:

Technical constraints - Technical issues are often important obstacles to adopting cost recovery mechanisms. A primary technical problern is the accurate measurement of water received by each of the many farmers served by the systern. Devices and personnel for precise measurement of water deliveries are often lacking, particularly if the situation calls for volumetric measurement to each plot. Another obstacle is identification of specific parcels of land receiving water and therefore obligated to share in the repayment program. In many localities throughout the world, maps purporting to show lands receiving water are inaccurate, and frequently show planned irrigated area instead of actual irrigated area. Another complication is how to treat lands which receive canal water only part of the year (while perhaps otherwise receiving only self-supplied groundwater or no water at all) or only at times when water supplies are in relatively generous supply.

Technical constraints of this sort can usually be overcome and are rarely absolutely binding. The technology to measure water or identify lands receiving water is well-known. However, technical constraints can usually be overcome only through considerable expenditure of resources. Technical constraints of the kind described above, therefore, can often be more fruitfully understood as cost constraints.

Social Constraints - As the term is used here, social constraints refer mainly to farmer attitudes on paying for water and on group action in managing the water supply.

There are religious and political considerations on paying for water. The religious issue, in many arid countries, stems from the Islamic prescription against paying for water, "a substance provided by God for all to share". Many are concerned that any proposal for collecting fees related to irrigation water supply would violate Islamic teachings. However, it is important to emphasize that this attitude does not necessarily include an offícial objection to paying an Irrigation Service Fee (ISF) for the resources and services required to capture, store, and deliver water. Policies which implement a cost recovery program are more likely to be successful if they make a careful, precise distinction between the water resource itself and the extensive services of capital, management, and labor necessary to supply irrigation water.

Political attitude which has received little or no previous discussion is that many farmers perceive themselves as a mere instrument, as opposed to a provider of public resources. In this view, the farmer, by employing water resources, provides a public benefit in the form of helping to provide a plentiful, inexpensive, and secure food supply to the nation. The farmer contributes the hard work necessary to produce food and fiber and takes the risks associated with fluctuations in climate, levels of disease, and crop prices. From this perspective, it is not the farmer but the food and fiber consumers who should pay the costs of water supply and assume the risks of cost overruns and unanticipated external costs associated with public irrigation systems.

In this view, the farmers, the public, and the government are in a partnership, and the goverment's part of the bargain is to provide the water.

In sharp contrast, the growing worldwide impetus for cost recovery programs arises from the increasing emphasis on decentralized economic and political institutions -even in the agricultural sector- and from the corresponding principle that water should be treated as an economic

commodity. In this view, the irrigation water supply sector should be organized under decentralized market principles, and society is best served when water price reflects the full costs of its supply. Thus the direct beneficiaries -the water users- should bear not only the full costs of delivering the water, but should also be responsible for the risks of cost overruns and unanticipated external costs.

Another attitude providing an obstacle or constraint to cost recovery is the belief that payment need be made only if full value is received. Many farmers believe they are obligated to pay only if the other party to the arrangement (i.e., the government) delivers as much water as needed at the time required. This attitude has the practical effect of giving water users leverage in negotiations with authorities.

Water users associations (WUAs) have been suggested for playing a potentially important role in cost recovery. WUAs could serve as a collectìon organization and encourage farmers to participate in on-farm water management. There is a literature on the possibility of self-sustaining WUAS. Sociologists (e.g., Freeman, 1989) and analysts of public administration (e.g., Ostrom, 1992; Gerards, 1992) bave formulated principles for designing sustainable water users organizations. However, there are skeptics (e.g., Young, 1992) who call attention to problems with organizing WUAs and the great difficulty in practice of achieving and sustaining effective collective organizations of farmers. While not disputing the possibility of sustainable WUAS, skeptics emphasize conflicting interests between head-enders and tail-enders, and inadeguate information and varying social power and status on tertiary watercourses. These conditions make successful collective action much more difficult and costly in time and effort than is generally recognized. However, still WUAs who successfully demonstrated management capacity could be offered a rebate on water charges to encourage self-management.

A final social constraint is the regressive (adverse) implication of water charges for the distribution of income and wealth in developing Mediterranean countries. (A regressive policy favors the wealthy at the expense of the poor.) A large proportion of farmers are small landholders who fall on the lower end of the income scale. Setting aside the fact that many farmers are not necessarily poor, paying for water from the general treasury rather than from cost recovery is a simple mechanism for redistributing income to an important sector of the population.

Administrative constraints - involve the concern that the charging mechanism be both simple and transparent. When there are a variety of mechanisms-e.g., if charges vary by region or according to whether

specific programs (such as closed drainage or on-farm delivery system improvements) have been locally implemented -the simplicity constraint may be violated. On the other hand, betterment levies to capture drainage or on-farm improvements have been applied to date only to limited areas. Therefore, spreading these costs to the nation's farmers as a whole would be seen as unfair to those not yet receiving these special services.

Administrative mechanisms for imposing and collecting charges should be transparent. Farmers should easily understand the reasons for the charge, how it may vary between sectors or areas of the country, and how its level is initially set and changed over time.

It is important that fees collected stay within the water supply system. lf OM&R costs are successfully recovered from water users, the revenues might go to the Finance Ministry, which may judge that the funds have more value elsewhere in the government budget than the Ministry of Irrigation. lf this happens, then the program will have failed in its goal to improve the system, and subsequent irrigation service fee collections will likely dwindle.

Political and legal constraints - Political and legal constraints derive from the social attitudes described above. Rural and farm-based members make up a signifícant proportion of the national Parliarnent. From considerations of principle (to say nothing of its financial self-interest), this bloc is likely to strongly resist any movement toward shifting any of the cost of the irrigation system away from the public treasury and toward the farmers.

The most significant legal problem is how to identify exactly who is responsible for payment from each parcel of land (i.e., owners or tenants). Parliament is considering a change in the laws on this subject. lf adopted, the legislation would have a major effect on how costs are distributed between owners and tenants (and from the analyst's perspective, how ability to pay is determined). Another legal concern relates to making the charge volumetric to ration a scarce water resource. With such a mechanism, the charge must be levied upon the decision maker who chooses how much water to apply.

Economic constraints - take several significant forms. The major economic constraint is farmers' ability to pay. Ability to pay sets an upper bound on the costs which can be recovered from farmers. It is usually defined by net profit from crop production. Profits, in turn, depend on a number of considerations, including the productivity of soils on the specific plots, the managerial capability of farmers, the types of crops produced, the size of the farm, the quantity of inputs and resources

employed in crop production, and market (or government-mandated) prices of crops and productive inputs. Productivity and profitability can vary widely among farms and farmers in the same region, and between the regions of the nation. An important consideration in establishing a cost recovery scheme in determining which, if any, of these factors should be taken into account.

An economic consideration which will be important for gaining political acceptance of newly instituted cost recovery mechanisms on presently irrigated lands is the possible perception of an adverse impact on the wealth of owners of irrigated lands. Other factors being equal, a new water charge would reduce annual income. Market values for land tend to be based on the capitalized (i.e., present-discounted) value of the annual income stream. Increased costs from an irrigation service fee would not only have an immediate, adverse effect on net income, but an even more significant effect on the market value of lands. This partly explains the strong objections landowners have to new government taxes or charges. Of course, if those in the land market expect to gain more benefits from system maintenance than they stand to lose ftom the increase in costs, then their income and wealth will increase, and they will much less likely object to new fees.

Other considerations which might be classified as economic constraints are costs which derive from the technical constraints discussed above. Among these are the costs of identifying beneficiaries and measuring the water actually received. Another important economic consideration, sometimes classified as administrative, is the cost of actually collecting from benefíciaries, including but not limited to clerical services, record keeping, and the extra expense of collecting from those who miss payment deadlines. Mechanisms for resolving conflicts among water users and between water users and the Irrigation Department, such as informal tribunals or formal water courts, also require costly resources.

Suggested Charging Mechanisms

Preliminary Remarks

Costs may be recovered directly from those who receive the water, or indirectly from increases in government revenue associated with an irrigation project (such as by increased tax revenues from agribusiness, export taxes, etc.). The discussion here will focus on direct cost recovery mechanisms.

It is useful to consider two dimensions of revenue collection structure when reviewing charging mechanisms. One dimension is the overall administrative and organizational structure employed in water delivery and revenue collection. The second dimension refers to the specific mechanism by which irrigation costs are recovered from farmers.

Options for Administrative/Organizational Structure

Probably the most frequently adopted approach to administering cost recovery is to pass the job to an official tax collection agency, such as the revenue section of the national ministry of finance. These organizations have the experience, personnel, and procedures for revenue collection. Tax collection agencies are sometimes recommended as the low-cost method, because no new bureaucratic structure and associated personnel and operating budget is needed.

Policies which rely on central tax collection agencies to recover irrigation system costs have been criticized because they may return only a part of the revenues collected and/or an inadeguate amount of funds to the irrigation agency for long-term system maintenance. According to this perspective, the Ministry of Irrigation will have little incentive to assure maximum collection rates because its budget has little relation to the amount collected from farmers. Conversely, the finance Ministry, receiving little income from irrigation service fees, tends to give little funding back to the Irrigation Department. Some critics of the typical amministrative structure blame a significant portion of the problem of inadeguate irrigation system management and declining infrastructure on this point (Easter, 1990; Small and Carruthers, 1991). These analysts hypothesize instead that an autonomous irrigation authority, which would neither receive funds from nor pay revenues to the central government, would have a better understanding of the fínancial needs for maintaining and upgrading the irrigation system. Moreover, such an authority could have the incentive to raise sufficient revenue and spend them effectively.

Options for Specific Charging Mechanisnis

Two broad categories of charging mechanisms may be considered. One approach focuses on land area served, while the other measures volume of water.

Area-based charges - One broad category of water charges are based on the land area served by the system. Three distinct types of charges can be

distinguished. Each would collect revenue for irrigation cost recovery by an addition to the existing land tax.

One method charges according to the amount of lands that are actually both cultivable and served by the irrigation system. This approach is usually called a flat land charge. A flat land tax probably is the easiest type of system to administer, since the collection agency needs only to know the irrigable, cultivable area belonging to each owner, regardless of annual or seasonal variations in cropping practices.

A second type of area-based charge would impose a fixed charge on the actual areas cropped in each of two or three seasons of the water year. In this case, a flat charge would be imposed on each individual crop that receives irrigation water during the year. This approach, which might be called a partial crop-based land charge, requires more administrative and regulatory effort from the revenue collection autorithy, i.e., periodic visits to each landholding.

The third type of charge varies for each of the crops grown according to typical or required water use levels for each crop. Long-season crops such as rice or sugar cane that require large amounts of water would be charged much more than beans or wheat. Two drawbacks have been reported from this approach. One (Bowen and Young, 1986; Small and Carruthers, 1991) is that because of the high fixed cost structure of farming, there is a little response to crop charges. The second problem has to do with incorrect reporting of actual crops by employees responsible for collecting the charge. For examqle, in return for gratuities, employees might underreport rice areas planted with rice and overreport bean-growing areas.

Volumetric charges - Charging by volume of water requires an ability to measure water deliveries with reasonable accuracy. The more precision in water measurement, the greater the resulting administrative costs.

One issue is the location at which the measurement is taken. The measurement can be made an outlet to the tertiary conveyance channel for a group of farmers, or at the outlet and the individual turnout. In the former case, the farmers must somehow divide up charges among themselves; in the latter case, the charging mechanism does it for them.

A rather exact approach is to charge each "delivery" to a specific plot. The charge would depend on the area of the plot and assume that each delivery represents a similar volume of water. This might be called the delivery charge approach. The charge would likely be set according to the typical head and flow rates at the farmer's receiving point.

A second variation on the volumetric theme would be a charge based on the time during which water is received for each delivery. This might be called the delivery time method.

An exact approach to volumetric measures would actually attempt to measure water delivered to each farm, and charge accordingly. Some sort of measuring flume or similar device would be necessary and an observer or automated instrument would have to record the time and rate of flow for each delivery.

Full volumetric pricing presents both political and economic obstacles (Bowen and Young, 1986). The political constraints, discussed above, stem from the religious and political objections to charging farmers for water.

Flat area charges combined with water delivery quotas - A type of middle ground approach could be suggested which draws on the simplicity of the flat rate approach, while avoiding at least some of the political and economic disadvantages of volumetric pricing (Bowen and Young). This approach, already practiced in parts of the western United States, would collect the desired level of revenues for cost recovery by means of a flat land charge. The allocative efficiency problem would be dealt with by creating annual or seasonal water delivery quotas (or “entitlements"), which would encourage farmers to make the most economical use of the water by selecting crops appropriate to their soils, climate, markets and water supply situation.

A more sophisticated version, long practiced in parts of the western United States, makes the entitlements marketable, so that those expecting high profitability from growing high water-using crops could buy entitlements from those who preferred less water-intensive crops. The quotas might be exchangeable on a temporary basis (rental) or by permanent sale. The advantage would be that water could move to its highest and best uses. The disadvantages would be the religious issue noted above, and the necessary administrative structure and record-keeping to protect interests of both those a part of the transaction (assuring only the exacts entitlements are transferred) and parties not in the transaction (from some of their water being inadvertently sold.)

Steps Required for Implementation

If the charging mechanism is to serve only the single goal of recovering from direct benefíciaries the costs of an economically justified main system improvement program, the solution appears to be simple: a flat land tax can be designed to collect the appropriate amount of revenue and the

collection task assigned to the Finance Ministry. This will be equitable, in the sense that each irrigated area in each region will bear an equivalent financial burden. Further, this is a low-cost method of recovering costs, even if, as is likely, the revenue agency imposes some collection fees.

However, if the charging policy is to satisfy further goals, particularly that of economic efficiency, some form of delivery quota approach or even a form of volumetric charge must be given serious consideration.

General Steps

A specific plan must be chosen to implement a cost recovery system. However, it will be necessary before choosing a plan to estimate with more exactitude the ability of farmers to pay throughout the various regions of the country.

Once a plan is selected, a number of administrative and political tasks must be completed. These include: obtaining general Parliamentary approval and enacting the specific legal provisions necessary for implementation.

If the Finance Ministry is to collect the revenues, a formal agreement with that Ministry will be needed to remit an appropriate share of the proceeds.

Specifíc Steps for Implementation

This section discusses several topics that should be incorporated into any plan for implementing a cost recovery system.

What role might water users associations play in implementing a cost recovery program?-WUAs can serve at least four functions in improving water management in a large sale system. One function is to provide a collective organization to maintain the on-farm small irrigated canals. A second role might be to provide a collective mechanism to divide or allocate the water among individual water users and their fields. A third is to aid in collecting revenues from farmers to pay for the system. A fourth purpose is to represent the farmers' needs and interests to the irrigation authority.

Some advantages and disadvantages of relying upon WUAs for revenue collection, on-farm irrigation system maintenance, and water allocation were mentioned above. If the government policy becomes one of relying on WUAs for assistance in cost recovery, a policy which establishes WUAs on each and every water distributer canals on-farm must be implemented.

Making payment contingent on actually receiving full water entitlements - As water supplies become more and more constrained because of drought, growing upstream diversions, or increased demands from municipal and industrial sectors and new land reclamation, some water users might not always receive their full entitlement. In addition, local farmers may not receive water due to general or partial system failure. In such cases, payment could be reduced accordingly. Such an approach is being tested in a pilot project in Indonesia (Gerards, 1992). In such a case, some mechanism must be adopted to avoid periodic serious shortfalls in OM&R operations due to occasional reductions of revenue collections. This could take the form of a special fund set aside from revenues and drawn on as necessary, or agreement with the Finance Ministry to make up such shortfalls.

Should interest on capital costs be included in the irrigation service fee?

This question is not easy to answer. However the decision to be taken by the decision makers will vary from one country to other according to the socio-economic prevailing conditions and the ability of the farmer to pay such additional cost.

In any case it is generally assumed that interest on durable capital items is an includable cost, hence, to ignore interest costs is at odds with the fact that governments pay interest on loans to improve the system or forego return on capital which might be productively invested elsewhere.

Gradual phase-in of water charges

Implementation of a water charging system will be controversial and unpopular. A gradual phasing-in of the full charge might soften the negative impact. Some countries -like Indonesia- is using a five-year phasing in program, starting at 20 percent of the desired level, and increasing an additional 20 percent each subsequent year. Waiving irrigation service fees for five years was the practice in the United States for newly constructed projects in which farmers were obligated to pay for land development costs and on farm delivery system.

In spite of the advantages of such approach, yet, a potential drawback in the case of on-farm rehabilitation and up-grading expenditures is the possibility that on-farm improvements would visibly depreciate by the end of allowable years, and farmers might lose the incentive to make full-payment.

Keeping up with inflation

The common tendency of economics to experience inflation in general prices level poses a problem for implementing irrigation service fees. While a fixed level of charges can initially raise a satisfactory level of revenue, inflation can evolve the real purchasing power of fee collections. An obvious choice is pegging the charges to increase each year at the same rate as a suitable index of prices received for agricultural commodities.

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