

INSTITUTIONAL AND FINANCIAL REFORMS IN IRRIGATION IN INDIA: NEED FOR SYNCHRONIZATION

Mamata Swain¹

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Abstract

While bringing about institutional change in the governance structure of irrigation by democratising and decentralising its management by transferring some management functions to Water Users' Associations (WUAs), it is important that the devolution of financial power should also be ensured to enable them to carry out the handed over responsibilities of operation and maintenance of irrigation system. In view of the severe resource constraint faced by the government, cost recovery should be the main consideration governing water rate determination. In the fixation, assessment, billing and collection of water charges there must be administrative decentralisation.

India is predominantly an agrarian economy. Nearly 58 per cent of its population depend on agriculture to earn their livelihood. The health of the Indian economy crucially depends on agricultural development. Therefore, from the inception of planning since 1951 and during subsequent five year plans, spanning over more than five decades huge investments have been made in irrigation projects to increase agricultural productivity, ensure food security and eradicate rural poverty. Though the contribution of irrigation in ushering in green revolution during mid-sixties and making India self-sufficient in food grain production is greatly recognised, the overall performance of irrigation sector is highly criticised because of many lacunae in planning, design, operation and maintenance, modernisation and financing of the system.

The irrigation sector is confronted with many problems, such as deteriorating physical structures, poor maintenance, low cost recovery, under-utilization of created potential, tail-end water deprivation, inequity in water distribution, uncontrolled water delivery, siltation, water logging, soil salinity, disintegration of indigenous irrigation institutions, and, above all, poor quality of irrigation service. In spite of massive investments made in irrigation projects, the physical and financial performances of the irrigation sector are quite dismal. The yield-increasing potential of irrigation is rarely achieved. The estimated benefit-cost ratio and the internal rate of return are seldom realized. With respect to the financial performance, leaving aside the capital costs of irrigation projects, even revenue receipts from the sale of water hardly covers the recurrent operation and maintenance expenses due to high subsidies in water charges and low collection efficiency (Svendsen and Gulati, 1995; Swain, 1998). Thus, the irrigation sector is not able to generate resources internally for carrying out the operation and maintenance of the irrigation structures.

On the other hand, since the 1990s, under the new economic policy and structural adjustment program, there has been a general resource crunch and fiscal compression. The state budgetary allocation for the irrigation sector has been squeezed. Moreover, nearly 70

¹Japan Foundation Fellow, Graduate School of Life and Environmental Sciences, University of Tsukuba, 305-8572 Japan, Associate Professor of Economics, Nabakrushna Choudhury Centre for Development Studies (An Indian Council Social Science Research Center), Bhubaneswar, Orissa, India 751013, E-mail:mama_swain@hotmail.com, Phone: +91-9337109300 (M), +91-0674-2301094 (O), Fax: +91-0674-2300471.

per cent of the operation and maintenance budget is spent on employee salaries and establishment expenditures, leaving an insignificant amount for the works component and for actual repair and maintenance of the infrastructure (Swain, 1998). Thus, due to lack of funds there has been inadequate preventive and regular maintenance of irrigation structures. As a result, the conditions of the irrigation structures have deteriorated significantly, causing system inefficiency and poor-quality irrigation service. This poses a threat to the sustainability of the created irrigation structures.

As there is general resource crunch, the irrigation agency needs to secure funds internally by raising water rates to provide improved irrigation service. But the farmers insist that they would pay the increased water rate only if there were improvements in the quality of the irrigation service. Thus, the irrigation sector is confronted with a vicious circle and a deadlock situation. As an escape from this impasse, most of the state governments in India have undertaken profound institutional and financial reform measures in the irrigation sector during the last two decades (Vaidyanathan, 1994; Svendsen and Gulati, 1995; Mitra, 1996; Swain and Das, 1999; Kar and Swain, 2000).

Two major planks of the reform efforts are decentralization of irrigation management by turning over operation and maintenance of tertiary segment of irrigation systems to Water Users' Associations (WUAs) and economic pricing of water to recover the supply cost and manage demand with the prime objectives of improving efficiency in water use, ensuring equitable distribution of water among water users and sustainability of the system.

Prior to the 1980s, irrigation was mainly considered a technical enterprise aimed at construction of physical structures, such as dams, reservoirs, weirs, barrages, and canals. The management part of the system was grossly neglected. It is now increasingly recognized that the mere provision of an irrigation facility does not ensure enhanced agricultural production. The effect of irrigation on productivity is critically dependent on the way water is applied and used. The quality of an irrigation service in terms of adequacy, timeliness, equity, dependability, and convenience in its supply greatly affects the yield from irrigation commands. With modern agricultural technology, proper water management holds the key to increased agricultural productivity.

To establish such an improved water delivery system and for optimal use of scarce water, new trends advocate much more active participation of the water users in all aspects of water resources development and management, which includes planning, design, construction, operation, maintenance, on-farm development, rehabilitation, modernization, water distribution, financing, resource mobilization, collection of water rates, monitoring, and evaluation (Wade, 1987; Chambers, 1988; Baland and Platteau, 1996; Meinzen-Dick et al., 1997; Vaidyanathan, 1999).

As a matter of fact, in India during the early 1990s, participatory irrigation management (PIM) through irrigation management transfer (IMT) to farmers was officially recognized as the most appropriate mechanism to bring about efficient utilization of irrigation water, its equitable distribution, and sustainable irrigation service. No doubt the concept of PIM is based on laudable ideologies, such as democratization, decentralization, debureaucratization, and, above all, the empowerment of water users who are the ultimate beneficiaries of the irrigation system. During the last decade, most of the major states of India, such as Andhra Pradesh, Madhya Pradesh, Gujarat, Maharashtra, Karnataka, Tamil Nadu, Bihar, West Bengal, and Orissa, have undertaken systematic institutional and organizational changes to increase farmers' participation in

irrigation management either under externally assisted economic restructuring programs, such as the Water Resources Consolidation Project funded by the World Bank, European Commission aid for minor irrigation projects, the agricultural intensification program with assistance from the Japan Bank for International Cooperation, PIM in lift irrigation projects funded by the Department for International Development (UK), or through state government initiatives. These states are putting emphasis on decentralizing water management by encouraging the farmers to form Water Users Associations (WUAs) to take over the responsibility of operation and maintenance of downstream parts of the irrigation system, distribution of water among water users, and collection of water rates.

However, a critical analysis of the reform process of irrigation sector in India unveils that though institutional restructuring encompassing devolution of irrigation management responsibility to farmers is undertaken with a high spirit, the financial reforms of irrigation which need to be undertaken with the same vigour with hand in hand institutional reforms is not given due attention. Political populism overrides economic rationality. One of the most important pre-conditions for sustainability of WUAs once they are formed is that they should be financially viable by raising funds from various sources. In many states in India, in the case of minor flow and lift irrigation projects, the WUAs are now empowered to fix and collect water rates and they operate and maintain the systems with the revenue collected from water users. In the case of major and medium canal irrigation projects in few projects such financial autonomy has been granted.

In this context this paper attempts to critically analyze the issues relating to water pricing which need to be given due attention while restructuring irrigation institution. The issues are as follows:

- (i) Who has to fix the water rate? Whether state government should fix a uniform water rate for all projects or the concerned WUA should be given the power to determine the rate?
- (ii) What should be the norms or criteria to fix water rates? Who will fix the norms?
- (iii) Which pricing principle should be followed in fixing water rate?
- (iv) What should be the method of water pricing? Whether water is to be priced according to area irrigated or actual volume of water used or output achieved from the use of water?
- (v) Whether WUAs need to be entrusted with the responsibility of water rate collection? Will it improve water rate collection?
- (vi) Is there any need to regulate water rate fixation to ensure rational pricing of irrigation water?
- (vii) If the farmers do not pay water rates to WUAs, what punitive measures can be taken against them by the WUA?

As irrigation comes under the domain of state being included in the state list of Indian constitution; the rules, regulations and acts pertaining to irrigation differ from state to state. Also, water rates are fixed by the concerned state government and thus vary from state to state. In this paper I am addressing the above issues in the context of India with special reference to Orissa, a pioneering state in implementing IMT programme under state patronage with strong political will of the party in power.

NEED FOR FINANCIAL REFORMS

If we analyse the practice of irrigation financing in India, it is clearly visible that due to capital intensive nature of canal irrigation projects and long payback period coupled with difficulty to recover the project cost from innumerable small poor farmers, the irrigation projects (major and medium) have remained mostly state owned, state funded and are departmentally managed by government bureaucracy in the traditional top-down approach. It is well known that the water rates are fixed more on the basis of political considerations than on economic criteria. Water charges are highly subsidised to woo the rural electorate. Leave aside the capital cost of the projects, the revenue receipts from sale of water hardly cover the recurring expenditure on operation and maintenance of irrigation structures.

However, during the last two decades, because of resource crunch and financial constraint, the budgetary support to irrigation sector has been drastically reduced and emphasis is placed on internal generation of resources by increasing water rates. In 1992 the International Conference on Water and the Environment in Dublin issued four guiding principles, one of which was that water has an economic value in all its competing uses and should be recognised as an economic good. A consensus has emerged that irrigation water should be priced based on economic principles and the undue high subsidy given to irrigation sector should be withdrawn in phases. The financial performance of irrigation sector should be improved to ensure sustainability of the irrigation system (Winpenny, 2003).

In recent years, reform in irrigation water pricing has become necessary due to the following reasons

- (i) high subsidy in provision of irrigation service and the consequent financial burden on state exchequer has become unsustainable due to financial crisis faced by the government;
- (ii) realisation of scarcity value of water and increasing demand for water for other uses like domestic use, industry and environmental needs as a result of increase in population, urbanisation and industrialisation;
- (iii) to encourage prudent use of water without waste through demand management;
- (iv) internal generation of resources to improve quality of irrigation service;
- (v) to take into account environmental externality effects like water pollution and water logging and water salinity and to reduce water use to tackle such effects;
- (vi) the implementation of general economic reforms towards reduced public involvement in commercial activities.

It is increasingly recognised that sustainable financing for irrigation systems will require increase in water rates, removal of subsidy, improved cost recovery from water users and increased management efficiency through farmers' participation. Therefore, in the context of institutional restructuring and irrigation management transfer to water users, there are several intricate issues relating to water pricing reforms, which need to be addressed with much care and precaution. The pertinent issues are discussed in the following sections.

WATER RATE STRUCTURE

In most states of India water rates are charged on the basis of area irrigated differentiated by season and crops grown. Some exceptions are there. In Assam and North Eastern states no irrigation charges are levied directly or indirectly. In some regions of states like Andhra Pradesh and Tamil Nadu water charges are integrated with land revenue by charging wet lands at a higher rate than dry lands. Water rates for paddy and wheat in flow irrigation projects in major producing states are shown in Table 1. An inter-state comparison of water rates reveals in case

of paddy it is the lowest in West Bengal and highest in Gujarat. For wheat the water rate is the lowest in Manipur and highest in Assam.

In case of Orissa water rate is assessed on the basis of area irrigated and types of crops grown. The present practice is to levy a water rate on a per hectare basis for the kharif crop and rabi crops. Kharif crop is levied with a compulsory basic water rate on the basis of class of allocation (the total depth of water) that each project is designed to supply (Table 2). The basic water rate has to be paid whether the water is used or not. The rabi rate is not compulsory and it is paid only if a crop is irrigated.

For the staple cereal crop kharif paddy, the water charge for class-I irrigation has been substantially enhanced (nearly two and half times) from Rs.39.54 per ha in 1981 to Rs.100 per ha in 1998 and again raised to Rs.250 in 2002 (Table 2). The water charges for different rabi crops as revised from time to time are shown in Table 3. The water rates are fixed according to the water requirement of crops. Water rate is very high for water intensive crops like ganja, betel leaf and saru. The per hectare water rate varies from the minimum of Rs.28 for low water consumptive crops like mung and Rs. 60 for pulses, til and mustard to the maximum of Rs.840 for high water intensive crops like saru and betel leaf.

In most of the Indian states it is observed that the revision of water rate has been infrequent, hesitant and quite modest in comparison to the increase in cost of provision of irrigation service and also increase in irrigation benefits due to substantial increase in support prices of crops. The Irrigation Commission (1972) has recommended for reviewing and adjusting water rates every 5 years. However, no states in India have followed the practice of revising water rates every five years. In Orissa, the water charges had not been revised since 1981. After a period of about 17 years, in 1998, water rates have been increased enormously i.e. nearly two and half times. As increase in water rate is a sensitive matter and will most likely invite the wrath of the rural electorate, the party in power always avoids to address such issue. Thus water rates are determined on the basis of political considerations rather than from the viewpoint of economic necessity.

The point to be noted is that as water rate is assessed on the basis of area irrigated, the payment that a farmer has to make has no relationship to the actual quantity of water used. Therefore, the farmers have no incentives to economise in water use, which results in excess use and wastage of water. Moreover, low price of water does not reflect its scarcity value to the water users and hence not encourages conservation of water.

ASSESSMENT AND COLLECTION OF WATER CHARGES

Assessment and collection of water charges in Orissa is undertaken by the officers of the Revenue Department on area basis. The Tahasildar is responsible for the annual assessment and collection of water charges and works under the control of the Collector for the district. The Tahasildar after jointly agreeing with the Water Resources Department on certification of the area irrigated collects water charges accordingly. The amount of water charges collected from the water users by the Revenue Department goes to the general revenue or state treasury. Thus, water is supplied by the Water Resources Department, water charges are collected by the Revenue Department and whatever is collected goes to the state treasury. Therefore, the Irrigation agency does not feel itself accountable to the farmers, as it is not receiving the payments for providing the service. Further, the revenue yields from water charges are not earmarked for irrigation development. It is advocated that the whole or substantial part of the

receipts from each irrigation system should be earmarked for operation and maintenance of that system. There should be partial financial autonomy.

It is observed that the revenue receipts from sale of water are far less than the cost of providing irrigation service. In Orissa it is estimated that the total annual cost of irrigation projects, including interest is around Rs.686 million (GOO, 1993). But the matter for concern is that the income from irrigation projects in terms of annual revenue receipts from sale of water comes to a meagre sum i.e. around Rs.50 million. Thus, the drain on the state treasury because of the present subsidised water rate policy is to the tune of Rs.636 million per year. Such financial burden on the state exchequer is not actually sustainable in the long run.

Moreover, there is a wide gap between the amount of water charges assessed or demand raised and the actual amount collected. About more than 40 per cent of assessments issued is remaining as arrears. Most important reasons for non-payment of water rates usually adduced by the farmers are inability of the farmers to pay, unwillingness to pay and faulty assessment (Pant, 1981). Also, it is observed that mostly the large and influential farmers evade payment on different pretexts. The collection process of water charges from water users is beset with difficulties due to several reasons as follows (GOO, 1993):

- the person collecting water charges hails from a different department and is not certain whether an area was supplied with water or not;
- problems in water supply with regard to timeliness, adequacy, reliability and predictability resulting in gross discrepancy between the standards of service provided and that promised;
- little perceived benefit by farmers especially in tail ends;
- arguments with landowners over whether basic water rate should apply when water is received indirectly from uncontrolled canal leakages etc;
- absence of any direct link between the charges, the quantity of water received and the entitlement to receive water;
- irrigation causing adverse effects like waterlogging, salinity and crop loss.
- no penalties for water users who do not pay water charges
- no link between water charges collected and funds allotted to a project

The sad picture of collection of water charges falling short of the assessments issued and the resultant piling up of arrears is also visible in other states of India (Vaidyanathan,1992). Moreover the high cost of collecting water rates from thousands of farmers is a matter for concern. An extreme case is Bihar, where the cost of collection exceeds the amount of water charges collected. Further, in all the states, the amount of water charges collected hardly covers the operation and maintenance expenses of irrigation projects.

IMT AND PRICING REFORMS

In the context of institutional restructuring of irrigation sector in India, some cosmetic changes have been made in irrigation financing modality. The water rates have been increased but not enforced properly. The water rates are assessed on the basis of area irrigated and not on the basis of quantity of water supplied. In major and medium surface canal irrigation systems the water rates are fixed by the Irrigation Department and not by the WUA. The prime objective is to recover the O&M cost of irrigation from water users.

On the other hand, in most of the countries where Irrigation Management Transfer has been implemented like Portugal, Turkey and Philippines, the water rates are fixed by the WUAs. Farmers are charged a two-part tariff. The first part is meant to recover the O&M costs of irrigation schemes and is based on individual farm acreages receiving irrigation service. The second component is meant to reimburse the State over a fifty year period for the capital costs invested in projects. The first part is retained by the WUAs for incurring O&M expenditures and the second portion is paid to the parent irrigation investment agency towards capital cost.

In Orissa, in the case of major and medium canal irrigation projects, the power to fix water rate has not so far been vested in the WUAs. While delineating the functions of Pani Panchayats (PPs), the Orissa Pani Panchayat Act, 2002 envisages that in the case of major and medium canal irrigation projects the Pani Panchayat (PP) will assist the Revenue department in the preparation of demand and collection of water rates. However if the government prescribes and the farmers' organisation decides, the PPs can levy and collect water rate. In Orissa as on 15 June 2007, irrigation management has been turned over to 1204 Pani Panchayats covering 5.3 lakh ha canal command area. But, they have not been given the power to fix and collect water rate.

However, in the case of Minor Irrigation (Flow) projects and lift irrigation projects the farmers' organisation/Pani Panchayat has been empowered to fix and collect water rate and retain it for O&M expenses. The farmers' organisation shall fix the water rate, which may cover energy charges, costs of maintenance and repair, charges to improve the system and cost of replacement.

If the WUA is empowered to fix water rate, the water rate will vary depending on climate, water scarcity, cropping pattern, output prices, ability to pay and affordability and many other factors. Also, it is observed that in case of minor irrigation projects where the WUAs are fixing and collecting water rates, many problems are cropping up in assessment, billing, collection and utilisation of funds raised from water rates. This is happening more frequently where the office bearers of WUAs are corrupt and enjoy unchallenged power belonging to rural elite class. In many turned over lift irrigation systems, it is observed that the farmers are reluctant to use water as they apprehend that water rate will be increased by the WUA. Therefore, regulation of water rates is necessary by putting enough checks and balances in place. It is suggested that a regulatory body like Orissa Water Rate Regulatory Commission should be established to provide guidelines, norms, criteria to fix water rates as has been done for power sector by setting up Orissa Electricity Regulatory Commission. On the basis of the criteria prescribed by the regulatory body the WUAs will be required to fix/revise their water rates from time to time. There should be hearing from water users if they have any grievances.

In the Orissa Pani Panchayat Act, if a farmer does not pay water rate, he will cease to become a member of WUA. The WUA will prepare a list of defaulters and furnish the list to the revenue officer for recovery of water rates under Orissa Public Demands recovery Act. It is expected that if the WUAs collect water charges, there would be improvement in collection due to peer pressure and fear of social sanctions. In many turned over irrigation systems, there has been improvement in collection of water rates.

WATER RATE DETERMINATION

While fixing water rates, factors affecting both demand for and supply of irrigation water should be taken into consideration. The costs incurred in supplying water is as important from the point of view of the supplier of the service/irrigation agency, the benefits derived from the use of irrigation water is equally a matter of prime concern for users of water/farmers. Now there is increasing emphasis on cost recovery from water users to provide improved and sustainable irrigation service. The irrigation project cost has two components: fixed or capital cost and variable or O&M cost. The annual cost of providing irrigation consists of three elements: (a) operation and maintenance expenses (O&M); (b) depreciation and (c) interest on capital invested. There is diversity of opinion as regards which components should be taken into account to fix the water rates.

The National water Policy adopted in 1987 envisaged that water rates should cover annual maintenance and operation charges and part of the fixed cost. Recent National Water Policy 2002 emphasizes the physical as well as financial sustainability of existing irrigation systems. It stipulates that water charges should cover at least operation and maintenance costs of providing the service initially and a part of the capital costs subsequently. However, it prescribes subsidy to the disadvantaged and poorer sections of society, which should be transparent and reach the targeted population.

The Vaidyanathan committee (1992) appointed by the planning commission is of the opinion that full-cost recovery cannot be sought without improving quality of irrigation. Therefore, in the first phase the aim should be to at least cover O&M costs and 1 per cent interest on capital employed. On an India-wide basis this would mean a five-fold increase in water charges and would present about 6 per cent of the gross value of irrigated production.

The Vaidyanathan Committee recommendations were further studied by the Group of Officers set up by the Planning Commission in October, 1992. The Group in its report in December, 1994 recommended that the irrigation water rates should cover the full annual operation and maintenance cost in phases in next 5 years period. Irrigation being the State subject, the recommendations of the Group along with the report of the Vaidyanathan Committee was sent in February 1995 to all the States/UTs for further action. The States have started taking action on the recommendations of the Vaidyanathan Committee. The States which have recently revised their water rates are: Andhra Pradesh (January 1997), Bihar (November 1995), Haryana (September 1995), and Maharashtra (July 1994) and Orissa (1998).

If we examine the cost recovery aspect of irrigation projects in Orissa, the picture is alarming. In Orissa in 1993-94 the funds to be made available for operation and maintenance of irrigation assets was around Rs.263 million. In 1991-92 revenue collection from all water rates totalled Rs.49 million from demand of Rs.96 million. Thus, only 20 per cent of present O & M cost is borne by the beneficiaries of the irrigation projects. Thus state managed irrigation systems have become financially unsustainable. Therefore, Government of Orissa is undertaking profound reform measures to restructure the irrigation sector to improve both physical and financial performance.

Now coming to the demand for irrigation water, from the point of view of water users it is not the cost of providing irrigation service but the benefits that accrue from use of irrigation water need to be taken into consideration to determine water rates. In this regard the Irrigation Commission (1972) envisages that water rates should be fixed at around 5 per cent of gross

income for food crops and 12 per cent for cash crops. At present, the actual gross receipts per hectare of area irrigated by major and medium projects is barely 2 per cent of the estimated gross output per hectare of irrigated area. In Orissa farmers are paying only 0.4% to 0.7% of value of production. The incremental benefits due to use of irrigation water is considerably greater than the payments that the farmers make to get irrigation service. Thus farmers enjoy significant economic rent, which need to be tapped for improving irrigation service or extending irrigation facility. Thus there is enough scope to increase water rates without causing any discouragement to the farmers.

SUBSIDY IN WATER CHARGES

Many economists argue in favour of high subsidy in irrigation charges. The premise of such argument is that irrigation has substantial positive externality effects on the rest of the economy through enhanced crop production, increased food supply, lowered food prices, increased food security and also many other forward and backward linkage effects causing overall prosperity in the whole economy. Therefore, it is argued that in the interest of the entire populace, irrigation water should be subsidised and the cost of provision of irrigation should be met from state revenue from general tax payers' money. Again, it is argued that the beneficiaries of irrigation projects are mostly the poor peasants and if water is charged on the basis of cost of provision, the poor farmers will not be able to pay high water charges. Many also argue that the cost of irrigation facility is covered in the land price while purchasing the land.

However, the above arguments are somewhat inapplicable as the water users are not necessarily the poorest of the poor. If we subsidise water rates, given the poor state of government finances it will not be possible to extend the irrigation facility to the poorest farmers in the dry land areas and also the operation and upkeep of the canal will suffer due to paucity of funds resulting in poor irrigation system performance and lower production. Therefore, the farmers who are already benefiting from public investments in irrigation should bear the cost of the services that they receive.

Coming to the efficiency aspect of water use, if water is made available at a highly subsidised rate, the farmers will not be aware of the scarcity value of water and will misuse it resulting in wastage of precious water. If farmers are charged economic price of water, they will be conscious of using water efficiently by maximising yield per unit volume of water. Thus, an upward revision in the level and structure of water rates is necessary from the point of view of both efficiency and equity.

But increasing water rates is a very critical and sensitive issue, for which the political party in power avoids to raise water rate and the problem snowballs from one government to another in succession. As a matter of fact this problem can be resolved by simultaneously improving quality of irrigation service and effecting increase in water rates. The water users will be willing to pay more for irrigation services (Vaidyanathan, 1992), provided

- (a) they are assured of a better quality of service in terms of timeliness, adequacy, reliability and predictability in water delivery and the rates are linked to this;
- (b) they are convinced that the allocation rules/procedures are fair and enforced in a non-discriminatory manner irrespective of the farm size or farmer class and location of the farm in high reach, middle reach or tail end of the canal;
- (c) they are not asked to bear the burden of high costs resulting from inefficiency and waste in the government; and
- (d) the systems demonstrate a greater concern for keeping costs down.

In the light of the above considerations, while thinking of curtailing subsidy and increasing water rates, the Government should take adequate measures to improve irrigation service and to keep a check on costs. Moreover, government may think of cross subsidising the use of water for irrigation while charging higher water prices for industrial uses, where returns/profits are also higher.

Furthermore, while increasing water rates, its possible repercussions on water use need to be assessed carefully. Farmers may respond to price increases in various ways, which include: (i) changes in cropping patterns;(ii) reductions in the amount of irrigated land; (iii) improvements in on-farm water management practices; (iv) changes in irrigation technologies; and (v) abandonment of irrigation altogether. While increasing water rate, all the possible effects on water use efficiency and farm income should be taken into account. However if wastage of water is taking place due to lack of supply control, water price as an instrument to control water use and manage water demand is of less significance.

Now there is a world-wide consensus based on experience and experimentation that the quality of irrigation service can be improved by democratising and decentralising irrigation management through turning over the irrigation management responsibility to WUAs at appropriate level. This will create a sense of belongingness among water users and instead of thinking irrigation structures as government property; they will consider it as a common pool resource and will be concerned about its proper upkeep and sustainability. In fact, if the system of water rate fixation becomes transparent and it is fixed in consultation with water users in a democratic process, the farmers will be interested to pay the high water rates, provided there is improvement in irrigation service. In Australia an open and transparent public process and a high level of public involvement have been important in enabling the water agency to increase water prices towards full cost recovery.

In Japan irrigation development is demand driven and based on beneficiary pays principle. The proposal of constructing an irrigation project comes from the water users through the establishment of a Land Improvement District (LID) with a clear commitment by the prospective/potential water users that they are willing to pay the water rates as decided to receive irrigation service. Therefore, before commencing of the project at the appraisal stage the financial viability of the project is ensured by obtaining signatures of the prospective water users that they would pay the estimated water rate. Also, construction subsidy and loans are made available to the LIDs from the government and financing institutions, but farmers' contributions are clearly specified. In India it is the Government's irrigation project and farmers participate, but in Japan the Government participates in Farmers' project. This should be practised in India. Irrigation development should be need based as perceived by the farmers and their willingness to pay towards cost of provision of irrigation service should be ensured by obtaining their signatures before construction of the project.

PRINCIPLES OF PRICING IRRIGATION WATER

In pricing water the internal generation of resources through payments by water users should not be considered as an end in itself, but is only important in so far as it improves irrigation performance. Therefore, certain principles are to be followed while fixing water rates in a rationalised way. Widely accepted principles of pricing irrigation are (OECD, 1987)

- (i) Allocative efficiency
- (ii) Equity
- (iii) Financial Requirements

- (iv) Environmental Sustainability
- (v) Consumer Acceptability
- (vi) Administrative Costs

Water should be priced in such a manner so as to facilitate efficient utilisation of water, equitable distribution of income, recovery of costs of irrigation, sustainable use of water resources, consumer acceptability and reduction of administrative costs of assessing, billing and collecting water charges from water users. However, these objectives of water pricing should be judiciously combined by according due importance to each objective for devising a rationalised water price structure (Swain;1998, 1999). As Orissa is characterised by chronic and mass poverty, while fixing water rates to recover the O&M costs, the water agency should appreciate that in fact many poor farmers would not be able to pay the increased water rates. The high water rates will not be acceptable to the poor farmers. Therefore there should be subsidy for poor farmers. However, subsidies should be targeted, transparent and, where they are intended to ease the transition should be tapering.

METHODS OF PRICING IRRIGATION WATER

Keeping the above mentioned objectives or principles of water pricing in fore front, an appropriate method of irrigation pricing needs to be adopted that would facilitate efficient, equitable and sustainable use of water resources. Water users are no more considered as beneficiaries of a public irrigation system, rather they are the clients or customers of irrigation agency and in order to receive the service, they are required to pay user charges. Different types of user charges for irrigation service can mainly be grouped into three categories according to the factors that affect the size of the charge. These are (i) area based fees, (ii) quantity based prices and (iii) output based fees (Small and Carruthers, 1991).

(i) Area Based Fees:

Area based fees are assessed on the basis of area irrigated and fees per unit area may be differentiated with respect to the cropping season and the types of crop grown or both. Area based fees are observed in many developing countries like India, Pakistan and Philippines. In this case as water rate is assessed on the basis of area irrigated, throughout the cropping season, fee for water is a fixed cost of production regardless of actual quantity of water used by the farmer. The marginal cost of water to the farmer is zero. As a result, water charges will have no effect on quantity of water that farmers attempt to use. Thus, water users will have no incentive to economise in water use. This will result in excess use of water and wastage of a scarce resource.

(ii) Quantity Based prices:

In the case of quantity based water prices farmers are required to pay water fees on the basis of actual quantity or volume of water used by them. Proxies for volume such as duration of time water is delivered, number of watering and the size offtake or depth over a weir may be considered. In this pricing method, the amount of water charges to be paid by the farmer depends on his decision about the amount of water to use. This causes the cost of water to become a variable rather than a fixed cost of production, thereby creating a financial incentive for the individual farmer to use less water than he would when the charge for water is a fixed cost. From the viewpoint of equity increasing block rate pricing is sometimes adopted to discourage excess use of water, as the farmer has to pay at a higher water rate, if he uses more water.

(iii) Output-based Fees:

In this system payments are affected by the level of production achieved at the end of the crop season. In regions where the entire irrigated area is devoted to a single crop, payments could be based on a percentage of total production. This type of fee structure is sometimes found in private irrigation systems. This approach has the advantage of giving the irrigation agency an incentive to provide high quality irrigation services. This method of pricing irrigation has been reported in Viet Nam.

An assessment of different direct pricing methods reveals that irrigation water pricing is the most efficient method of charging irrigation water, as it provides incentives to economise in water use. But in case of India in general and Orissa in particular, in surface irrigation systems serving large number of small farms pricing of irrigation water volumetrically is likely to be prohibitively expensive. In particular the cost of implementing farm level water pricing for systems in which rice is the dominant crop, with water frequently flowing more or less continuously to many farm turnouts is likely to be very high. Capital cost of measuring equipments and the cost of its installation and maintenance is significant. Further, the protection of measuring equipments will be difficult. Also there is additional cost in administration, reporting, billing and collection procedures. Thus in Orissa, the establishment of reliable system of water measurement to individual farm is likely to prove technically difficult, administratively unmanageable, and economically costly. Therefore, it is questionable whether the economic gains from introduction of volumetric water pricing will exceed the economic costs. The feasibility of introducing volumetric water delivery and collection of water charges quantitatively is to be assessed carefully.

It is felt that water pricing is likely to be feasible only if groups of farmers forming Water Users' Association (WUA) at the level of tertiary canals can be supplied water volumetrically and served with a single consolidated bill. There will be bulk sale or "wholesaling" of water by the irrigation agency operating the main system to the Water Users' Association (WUA), with the latter responsible for the subsequent distribution and "retailing" of the water to the individual farmers. It will be the responsibility of the WUA to collect water rates from the farmers. Thus in the imposition and collection of water charges there must be administrative decentralisation by delegating powers to farmers' association.

China has reportedly experimented with water wholesaling approach. Also, in Mexico, Philippines, Indonesia, Sri Lanka, South Korea, Portugal, Turkey the water users having land within minor/sub-minor of a canal are forming Water Users' Organisation and taking up the responsibility of operation, maintenance of the system; distribution of water to member farmers and collection of water charges. In India in states like Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu, Orissa and Bihar attempts are under way to institutionalise Pani Panchayats or Water Users' Associations for handing over the down stream parts of irrigation systems to them for their operation and maintenance. Recently as many as 10 major states of India have enacted Pani Panchayat Acts or amended the irrigation acts to promote farmers' management of irrigation systems. In due course the Pani Panchayats will be empowered to collect water rates from water users within their jurisdiction. As irrigation systems will be managed by the water users, it would obviously lead to improvement in operation and maintenance of the system. This will hearten the farmers to pay enhanced water charges. With a blend of persuasion and penalty measures the WUA can improve water rate collection.

SUGGESTIONS

In the light of the above discussion the following suggestions are made for restructuring water charging system in India in general and Orissa in particular to improve irrigation system performance.

Water pricing reforms should supplement and complement the institutional restructuring process in irrigation management. It is emphasized that an integrated and holistic approach is necessary to reform the irrigation sector. The financial reforms and crafting of new institutions like WUAs or Pani Panchayats and turning over irrigation management to such farmers' organisations should be undertaken side by side with the objective to ensure efficient, equitable and sustainable water use.

In charging irrigation water the 'user pays' principle should be followed. The farmers are using the irrigation infrastructure to increase agricultural productivity and farm income. Therefore, they are required to pay for getting the service. In view of the severe resource constraint faced by the government, cost recovery should be the main consideration governing water rate determination. Water rate should be fixed at a level so as to cover at least O&M expenses of irrigation. From the point of view of both efficiency and equity current highly subsidised water rates in most of the states in India should be increased in phases by taking into account the consumer acceptability and ability to pay of the farmers. When farmers are convinced of getting substantial benefits from using irrigation, a two-part tariff structure may be applied. A fixed sum for getting the irrigation service at a flat rate on per hectare basis towards capital cost of the project to be recovered in 100 years from water users and then a variable charge according to area actually irrigated and types of crops grown to cover O&M expenses may be adopted. The first part may be reimbursed to the parent irrigation agency and the second part may be retained by the WUA for operation, maintenance and repair of the project.

As regards methodology of water pricing, theoretically charging irrigation water volumetrically according to the actual quantity of water used is considered to be the best method of water pricing as it promotes allocative efficiency by providing incentive to economise in water use. But in the institutional context of India in general and Orissa in particular, in the case of gravity irrigation system serving a large number of small farmers, volumetric irrigation pricing is technically infeasible, administratively unmanageable and economically prohibitively expensive. Therefore, the current practice of charging water according to area irrigated differentiated by crops grown and season may continue.

With regard to the principles followed in fixing water rates, the allocative efficiency objective should be accorded the utmost importance. The pricing policy should improve irrigation performance by encouraging optimum utilisation of water. Other objectives, which should be given due attention are meeting financial requirement of irrigation agency, consumer acceptability, minimisation of administrative costs and promoting environmental efficiency. The equity objective may be taken care of by extending subsidy to the poor and the disadvantaged farmers, whose income is below poverty line. The subsidy component should be transparent and well targeted to the resource-poor farmers only.

For improving irrigation system performance a necessary precondition is that irrigation agency should have sufficient financial autonomy. This will result in greater accountability of the irrigation agency to the water users and will also encourage water users' involvement and participation in irrigation water management. The collection of water charges should be

transferred from the Revenue Department to the Department of Water Resources and amount collected must be earmarked for O&M of the concerned project.

In the assessment, billing and collection of water charges there must be administrative decentralisation. The Water Resources Department will make bulk sale of water to the WUAs. The WUAs will distribute water among the members according to their entitlements. The responsibility of collection of water charges from individual water users will rest on the WUA. Through appropriate persuasion, pressure and penalty measures the collection of water charges can be improved. The WUA will retain a part of the collected water charges as a commission for collection work. In due course the WUAs may be empowered to fix or determine water rates based on cost considerations. However, there should be an independent and competent regulating authority to oversee water rate fixation procedure and to provide guidelines and norms on the basis of which water rates will be determined.

A public information and awareness campaign on costs and benefits of irrigation needs to be taken up. Publication of disaggregated projectwise data on irrigation service costs and its different components and benefits of irrigation should be published. The information should be shared with the general public and customers, particularly farmers of the command area. The WUAs should be involved in decisions on determination of irrigation water charges and other water services management and expenditures. This will help in diffusing the farmers' strong resistance and opposition to increase water rates.

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Table 1
Water Rates for Paddy and Wheat in Major Producing States
Utilising Flow Irrigation in India
(May 2004) (Rs/ha)

States/UTs	Paddy			Wheat		
	Year Enforced	Maximum	Minimum	Year Enforced	Maximum	Minimum
Andhra Pradesh	1996	494.00	247.00	-	-	-
Assam	2000	751.00	281.24	2000	562.50	562.50
Bihar	-	247.00	108.68	2001	185.25	138.20
Gujarat	2001	825.00#	701.00#	2001	240.00##	200.00##
Haryana	2000	148.20	148.20	2000	123.50	111.15
Jharkhand	2001	217.36	108.68	2001	185.25	138.32
Jammu & Kishmer	2000	49.40	49.40	2000	24.70	24.70
Karnataka	2000	247.10	247.10	2000	148.25	148.25
Kerala	1974	99.00	37.00	-	-	-
Madhya Pradesh	1999	494.00	200.00	1999	200.07	200.07
Maharashtra	2001	180.00##	180.00##	2001	360.00##	360.00##
Manipur	1977	75.00	37.50	1977	37.50	37.50
Rajasthan	1999	197.60	49.40	1999	148.20	64.22
Tamil Nadu	1987	49.42	37.07	-	-	-
Uttar Pradesh	1995	287.00	40.00	1995	287.00	128.00
Uttaranchal	1995	143.00	143.00	1995	143.00	143.00
West Bengal	1977	37.05				

Note : # : Increase in Water Rates @ 25% per Annum.

: Increase in Water Rates @ 15% per Annum.

Source : Central Water Commission

Table -2
Compulsory Basic Water Rate in Orissa

Sl. No.	Class of Irrigation	Depth of Supply (in inches)	Irrigation Rate for Flow Irrigation in Rs. Per Hectare					
			61-62 03	68-69	75-76	81-82	98-99	2002-03
1.	Class I	28"	19.77	9.88	19.77	39.54	100.00	250.00
2.	Class II	23"	14.83	7.41	14.83	29.65	75.00	188.00
3.	Class III	18"	9.88	4.94	9.88	19.77	50.00	125.00
4.	Class IV	9"	4.94	2.47	4.94	9.88	25.00	63.00

Source: Department of Water Resources, Govt. of Orissa.

Table - 3
Rabi Water Rates in Orissa
(in Rs. Per Hectare)

Sl. No.	Crop	1968-69	73-74	74-75	81-82	98-99	2002-03
1	Paddy	19.77	39.54	59.30	88.96	225.00	450.00
2	Tobacco	37.07	37.07	55.60	83.40	210.00	420.00
3	Potato	24.71	24.71	37.07	55.60	140.00	280.00
4	Vegetables	19.77	19.77	29.65	44.48	115.00	230.00
5	Onion	24.71	24.71	37.07	54.36	140.00	280.00
6	Wheat	4.94	14.83	22.24	32.12	85.00	170.00
7	Maize	12.36	12.36	18.53	27.80	70.00	140.00
8	Mung	2.47	2.47	3.71	5.56	14.00	28.00
9	Groundnut	12.36	12.36	18.53	27.80	85.00	170.00
10	Orchards	29.65	29.65	44.48	66.72	167.00	334.00
11	Sugarcane	34.59	44.48	66.72	100.08	250.00	500.00
12	Jute	7.41	7.41	11.12	16.68	42.00	84.00
13	Fodder	12.36	12.36	18.53	27.80	85.00	170.00
14	Pulses	4.94	4.94	7.41	11.12	30.00	60.00
15	Cotton	24.71	24.71	37.07	55.60	140.00	280.00
16	Til (Oilseeds)	4.94	4.94	7.41	11.12	30.00	60.00
17	Betel Leaf	74.13	74.13	111.20	166.79	420.00	840.00
18	Arhar	12.36	12.36	18.53	27.80	85.00	170.00
19	Sunhemp	17.30	17.30	25.95	38.91	100.00	200.00
20	Chilly	12.36	12.36	18.53	27.80	85.00	170.00
21	Saru	74.13	74.13	111.20	166.79	420.00	840.00
22	Ragi	6.18	6.18	9.27	13.99	35.00	70.00
23	Mustard	2.47	4.94	7.41	11.12	30.00	60.00
24	Ganja		123.55	123.55	185.33	465.00	930.00

Source: Department of Water Resources, Govt. of Orissa.

