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Have Low Irrigation Service Charges Disadvantaged the Poor?[1]

Intizar Hussain

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Intizar Hussain[2]

International Water Management Institute (IWMI),
Colombo, Sri Lanka

[2]All correspondence to Intizar Hussain (i.hussain@cgiar.org), Senior Economist, International Water Management Institute (IWMI), Colombo, Sri Lanka.

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Abstract

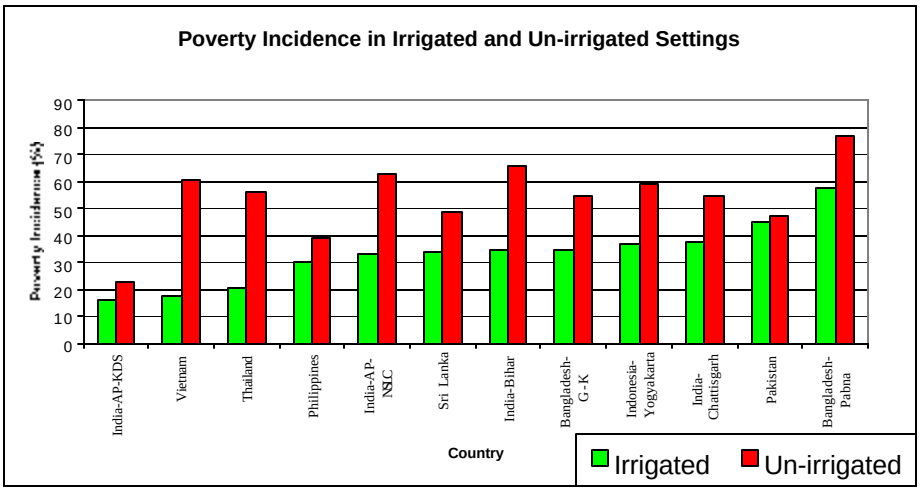
This paper examines the implications of irrigation service charge policies for the poor in developing Asian countries. The basic question answered in the paper is 'Have low irrigation service charges disadvantaged the poor?'. The paper also demonstrates the implications of alternate structures of water charging for the poor. The empirical evidence presented in the paper is mainly based on primary data collected through household level surveys from 5408 households in 26 medium and large scale irrigation systems in six countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam. In the studied systems, irrigation charge varies from US$ 1 to US$ 67 per ha, and the collection rate varies from 5 percent to 99 percent. In general, irrigation charge level and the collection rate is lower in the studied systems in South Asian countries than those in China, Indonesia and Vietnam. In settings, where irrigation charge is higher, irrigation service delivery and performance of the systems is better, productivity is higher and the poverty incidence is low, and vice versa. Overall system performance, and revenue collection and overall cost recovery is better in those systems where there are decentralized institutional arrangements for irrigation management. The study suggests that under conditions of low irrigation charges, funding for the sector is often low and maintenance of the systems is neglected; there is a lack of incentives for service providers and the users to improve on service delivery, and there are no incentives for users to improve on water use efficiency, and low charge policy worsens income distribution especially in those settings where there is greater degree of inequity in land and water distribution (as in most South Asian systems), as large part of benefits of subsidies to irrigation sector goes to larger landholders. Further, it is indicated that in relation to irrigation charge policy, not only the level of irrigation charge is important, structure of charge, and the collection and spending mechanisms and associated institutional arrangements have strong implications for the poor. The study suggests that poor service delivery and low irrigation charges create vicious circle of poor irrigation performance. These factors reduce poors's access to water, and result in reduced anti-poverty impacts of irrigation. Detailed analysis of data from irrigation systems in Pakistan suggests that the present charging policy is pro-large farmers; flat rate policy would be more equitable and differential rate policy would be pro-poor. The analysis indicates that differential rate policy, as suggested in the paper, would result in irrigation revenue increases by 27.7 percent, and this option would result in annual re-distribution of Rs 1362 million, with significant amount redistributed in favor of the poor small farmers – a win-win situation in terms of cost recovery and benefits to the poor. Overall, the study findings imply that low level of charges applied uniformly to all socio-economic groups of farmers is disadvantageous to the poor, as it adversely affects the system performance. The study makes some suggestions on what needs to be done to improve the situation.

Key words: Irrigation, Irrigation Service Charge, Water Pricing, Charging, Equity, Poverty, Water and the Poor, Developing Countries, Asia, and Pakistan

Background

In recent years, there have been discussions in the national and international forums on the role of irrigation in poverty alleviation in developing Asia. These have led to considerable works on examining the linkages between access to irrigation and poverty alleviation at the household, community and macro economy levels (see for example Saleth *et al.* 2003). Irrigation has been regarded as an effective weapon again rural poverty. Hussain and Hanjra (2003, 2004) and Hussain and Wijerathne (2004a) provide empirical evidence from a number of developing Asian countries on the impacts of irrigation on poverty. In most settings, poverty is 20-30 percent less in irrigated areas compared to that in non-irrigated areas (Figure 1). Their studies establish that irrigation contributes to poverty alleviation, and poverty reducing benefits of irrigation are realized through improvements in: agricultural productivity and overall production, employment and wages, incomes, consumption, food security and other social aspects. These benefits tend to be interrelated and tend to reinforce the impacts of each other. With these benefits, irrigation water is linked to poverty alleviation both directly and indirectly. Direct impacts are realized through improved welfare of those having access to land, water and other production inputs. Indirect impacts are realized through expansion in economic activities in both agricultural and agricultural dependent non-agricultural sectors through backward and forward linkages, resulting in improved economic growth which contributes to poverty alleviation.

Figure 1. Poverty in Irrigated and Non-irrigated Areas in Selected Asian Countries.



Sources:
Vietnam (1996): Ut, Hossain and Janaiah 2000 (sample was drawn from 8 villages in six districts in four provinces, two each from north and south Vietnam, representing four distinct agro-ecosystems – flood prone areas in Mekong river delta, rainfed low land in Southern region, densely settled lowlands in red river delta, and upland in the northern mountainous region) ; Philippines (1997): Hossain, Gascon and Marciano 2000 (sample was drawn from 4 villages, from two provinces in Luzon and one province in Panay Island (Laguna, Central Luzon and Iloilo provinces) representing distinct ago-ecosystems); Thailand (1998): Isvilanonda, Ahmed and Hossain 2000 (sample was drawn from 6 villages, 3 each from Suphan Buri in central plain and Khon Kaen in the north-east region) ; India- Bihar (1996): Thakur *et al.* 2000 (sample was drawn from 16 villages in 8 districts in four agro-climatic regions of the state) India- Chattisgarh (1996): Janaiah, Bose and Agarwal 2000 (sample was drawn from 6 villages in two distinct regions in Raipur district); Bangladesh- G.K (Ganges Kobadak) (2002): Ahmad *et al.* 2003; Bangladesh- Pabna (2002): Ahmad *et al.* 2003; India-AP (Nagar Juna Sagar, Andhra Pradesh) (2002): Sivimohan *et al.* 2003; India- AP (Krishnia Delta System, Andhra Pradesh) (2002): Sivimohan *et al.* 2003; Pakistan (Upper Indus Basin) (2001): Hussain *et al.* 2002 ; Sri Lanka (Udawalawe Left Bank system) (2001), Hussain *et al.* 2002. Indonesia- Yogyakarta (2002): Arif *et al.* 2003

While there is ample evidence to suggest that irrigation contributes to poverty alleviation, however, the anti-poverty impacts of irrigation vary greatly across systems and locations within systems. Comparison of poverty across irrigated and rainfed settings, as shown in Figure 1, indicates that impact of irrigation on poverty differs across locations. Further, rigorous comparative poverty and irrigation impact analyses within irrigation systems by Hussain and Wijerathne (2004, forthcoming) suggest that poverty varies from 6 percent to 77 percent in 26 irrigation systems in six Asian countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam. These studies suggest that investments in irrigation may not always be poverty reducing in any significant way, and the magnitude of anti-poverty impacts of irrigation depends on five determining factors. These include: (a) condition of irrigation infrastructure and its management, (b) irrigation water allocation and distribution policies, procedures and practices, (c) irrigation and production technologies, cropping patterns and crop diversification, and (d) support measures (e.g. information, input and output marketing), and (e) (in) equity in land distribution. These studies provide empirical evidence that incidence and severity of poverty is significantly high in those settings where land and irrigation water distribution is inequitable, irrigation infrastructure is poorly managed, and farmers access to production enhancing technologies, and support measures is very limited.

The first three of the above-mentioned factors directly relate to irrigation service delivery and overall irrigation management performance, which are key determinants of availability and access to irrigation water. Improved performance (in terms of water use efficiency, productivity, equity and sustainability) , which is an outcome of the effective management, improves benefits of irrigation and contributes to reducing poverty. On the other hand, poor performance reduces the benefits of irrigation and negates the anti-poverty impacts of irrigation or in certain situations it creates poverty. Clear evidence is emerging from these recent and on-going studies in Asian irrigation systems that irrigation performance has significant relationship with poverty alleviation (see Hussain and Wijerathne 2004, forthcoming).

Poor service delivery in irrigation, an outcome of poor management of irrigation and irrigation infrastructure, is the fundamental cause of the poor performance of irrigation. Underlying factors leading to poor service delivery and overall poor performance include: (1) lack of appropriate and effective institutional arrangements and or their effective implementation (including appropriate policies, laws, regulations, and management organizations), including clarity in rights and responsibilities, appropriate incentive strictures and effective accountability mechanisms, and (2) inadequate funding available and under-spending in the sector – an outcome of low cost recovery resulting from low level of irrigation charge, inappropriate charging structures and poor collection rates. These factors are interrelated and reinforce the impact of each other. Inadequate funding is the root cause of the other factors.

Traditionally, medium and large scale canal irrigation systems have been managed and operated by the public agencies, and the public sector have been providing large amount of

subsidies to rehabilitate, maintain and manage these systems. Revenues collected through water charges from users (usually in the form of 'water tax') constituted only a small part of total available funding and spending due to low level of irrigation charges and poor collection rates. While there is growing pressure (both internal and external) to reduce subsidies to the sector, in most situations the sector continues to depend on financial allocations from the public sector. The fundamental reason for continuing financial dependence of irrigation sector on budgetary allocations from the public agencies sector and the lack of financial autonomy of the sector is continued low irrigation service charge policy and lack of effective institutional arrangements. Low level of irrigation charges are often justified on account of the following four concerns:

(a) *affordability and willingness to pay*, due to relatively higher incidence of poverty and food insecurity, it is often assumed that most small and poor farmers cannot afford to pay (and may not be willing to pay) for irrigation, therefore, charges should be set at low levels,

(b) *political sensitivity*, raising water charges is generally considered to be politically difficult,

(c) *positive externalities of irrigation impacts*, given that benefits of irrigation extend to society as a whole, therefore, consumers (in addition to producers) of agricultural produce should also contribute or in other words, sector should continue receiving public sector subsidies, and

(d) *public good nature of irrigation water*, irrigation water is continued to be viewed as public good, implying that the public sector role, including financing of the sector, should continue .

These concerns continue to dominate perceptions of those who support low irrigation charges. On the other hand, some argue for higher irrigation charges and for financial independence of the sector. The supporters of higher charges sometime argue that low charges may in fact be disadvantageous to the poor. There are arguments and counter arguments on the issue, and there is no consensus on whether irrigation charges should be kept low or increased to the reasonable level to cover full or part of O&M and service delivery costs. This paper, based on empirical evidence from a number of irrigation systems in six countries, attempts to clarify on some of these aspects.

Purpose and the Basic Proposition

In the context of above discussion, this paper attempts to examine the implications of irrigation service charge policies for the poor, covering its three major aspects: level of irrigation charges, structure of irrigation charges (in terms of differentiation in charges between seasons, crop types, farm size, etc), and charge collection and spending mechanisms. The fundamental question answered here is 'Have low irrigation service charges disadvantaged the poor?'. The paper also demonstrates the implications of alternate structures of water charges for the poor.

The following points summarize the major grounds and the basic theoretical reasons often put forward on why and how low charge policy adversely affects irrigation performance and service delivery and how it could be disadvantageous to the poor. Low irrigation service charges leads to:

a) *Inadequate funding and neglect of maintenance*: Revenues and funds available for irrigation management are low, and the sector have to depend on financial allocations from the public sector which are often inadequate to carry our necessary operations, maintenance and management. Consequently maintenance is neglected, infrastructure condition deteriorates, overall availability and access to water is reduced;

b) *Lack of Incentives to improve on service delivery*: Managers and service providers, receiving large part of funds from central agencies/treasury, have little or no incentives to spend funds efficiently, and deliver high quality services; users paying low charges feel they have little entitlement, and there are little incentives for them to demand for improvements in service delivery; and accountability linkages in terms of spending and service delivery between managers, service providers and users remain weak. As a result, irrigation service delivery continues to be poor and system performance in terms of water use efficiency and productivity remains low. Poor irrigation performance reduces access to water, particularly of the poor, with adverse impacts on their livelihoods. In other words, poor service delivery and low irrigation charge create vicious circle of poor irrigation performance, and reduces anti-poverty impacts of irrigation (see World Bank (1999), Hussain and Biltonen, 2002 for details)

c) *Lack of incentives to use water efficiently*: When irrigation charges are low, there are no incentives for users to use water efficiently and avoid wasteful use of water, resulting in reduced overall availability and access to water. When access to water is free or at very little cost to the users, non-poor, the powerful and those having locational advantage tend to grab more than their due share (especially in settings where rights are not clearly defined and enforced), not only they use it in unsustainable manner, they deprive others,

particularly the poor and the weaker. On the contrary, where water charges are high, farmers use water carefully and benefit from each drop of water. For example, in most Chinese systems, as will be shown in the paper, irrigation charge is fairly high, water is used relatively effectively and the productivity per drop of water is also very high.

d) *Low charge policy worsens income disparity*: In settings where there is greater inequity in distribution of land and water (as in most South Asian systems), low charge policy applied uniformly to all socio-economic groups worsens income and resource disparity between the poor and the non-poor as large part of the benefits of subsidise to the sector goes to large landholders.

e) *Other aspects*: Low charge policy and financial dependence on public sector agencies may also affect collection and spending efficiencies. It should be noted that, for irrigation service charge policy, not only the level of irrigation charge is important, the structure of charge, and the collection and spending mechanisms and associated institutional arrangements are also equally important in terms of implications for the poor.

In the next sections, we examine whether some of the reasons are supported with data. Empirical evidence presented in this paper is mainly based on primary data, supplemented with data from secondary sources. Primary data were collected through household level surveys, during 2001-2002 agricultural year, from 5408 households in 26 medium and large irrigation systems in six countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam. These are among the top few countries where substantial investments have been made in the development of large and medium scale canal irrigation systems, where irrigated agriculture provides livelihoods to hundreds of millions of rural people. These countries together account for over 51 percent of global net irrigated area and over 73 percent of net irrigated areas in Asia, with most of this area located in China, India and Pakistan. The selected irrigation systems vary in terms of size, canal water supplies, groundwater use, condition of irrigation infrastructure, irrigation management patterns, crop productivity, level of crop diversification, land quality and size of landholdings (for more details on locations and characteristics of the selected systems and for data collection procedures, see Hussain and Wijerathne 2004b)

Key Points from the Past Work

To the best of author's knowledge, there are no studies examining the linkages between low irrigation charge and poverty and offering detailed analyses of the implication of low charge policy for the poor. However, there is a vast amount of literature available on general issues related water charging and pricing. No attempt is made here to review the available literature, but rater key points and main conclusions from some the recent related studies are summarized here. Readers interested in more elaborative discussions may refer to Tsur and Dinar (1995), and Hussain and Wijerathne (2004, forthcoming) and for comprehensive review of the past work on water charging and pricing issues may refer to Johansson (2000) and Johansson *et al.* (2002).

1. Small et al. (1989) in their review of literature and case studies in Indonesia, Nepal, Philippines and India conclude that: a). providing appropriate incentives to agencies responsible is important for cost effective management of irrigation. Financially autonomous agencies, raising their revenues from farmers' payments of irrigation service fees have greater incentive to provide good irrigation service compared to financially dependent agencies that receive their revenues from the national treasury. Also, decentralized financial autonomy creates financial accountability linkages between irrigation managers and users; b). most financing mechanisms used in the case study countries did not provide incentives for efficient use of water. The main direct financing method involved irrigation service fee charged based on flat rate per unit of area, sometime differentiated for crop type and cropping intensity. The area based fees, rather than promoting efficient water use, generally provide incentives for overuse of water by those farmers able to obtain it. Efficiency of water use is related to effectiveness of agencies' control over distribution of supply to farmers, rather than the control over the demand for water through pricing mechanisms; c) under conditions of reasonable irrigation service fee, the incremental benefits derived by farmers from irrigation are adequate for them to pay the full O&M cost while retaining significant increase in net incomes due to irrigation. d) the quality of irrigation system operation and management is affected not only by the amount of resources made available to operate and maintain systems, but by the institutional arrangements under which they are provided.

2. The Expert Consultation on Irrigation Water Charges (ECIWC 1986) states, (as reported in Bos and Walters 1990 that) " Water charges policies are unlikely to have any significant impact on the efficiency with which individual farmers use water except in those extreme cases where at the same time: water is scarce, the irrigation systems deliver water on demand basis (response to ad hoc requests), and water deliveries are measured" Further, even if charges are levied on volumetric basis and farmers can control the

quantity of water delivered, low charges will not have any significant influence on efficiency.

3. Bos and Walters, 1990 in their global survey of farmers (covering 8.9 million ha globally) examined the relationships between irrigation charges and irrigation efficiencies. They conclude that: a) no significant influence of the structure of water charges on irrigation efficiencies, and efficiencies were not high where charges were levied by volume, because charges were too low to have significant impact (charges in almost all projects were under 10 percent of net farm income); and b) irrespective of the structure of water charges, there was a trend towards higher efficiencies with higher charges;

4. Perry (2001) argues that lower water rates will have no impact on demand, and higher rates that will influence demand will be too high to be politically acceptable and will result in substantial profits to supplying agency. For example, the likely charge needed to cover O&M costs would be \$0.003-0.005 per m^3, while the charge required to substantially affect demand would be much higher \$0.02-0.05 per m^3. Therefore, a charge designed to recover O&M costs will have minimal efficiency impacts, and charge that will affect efficiency will be too high to be politically feasible. He suggests that: (1) many of the assumed advantages of water pricing can be achieved through physical rationing of water, which is easier to implement, more transparent and more readily adjusted to local considerations such as groundwater conditions and salt management; and (2) set water charges to recover full O&M costs to ensure financial sustainability of irrigation systems. The study does not provide any analysis of equity implications of recovering full O&M costs.

As mentioned earlier, empirical studies on equity dimensions of water pricing/charging[3] are rare. In the available literature, there have been arguments for and against water

[3]In the literature on natural resources, particularly water resources, terms water price, water charge, water fee and water tax are often (incorrectly) used interchangeably. In a strict sense, price is a value of a commodity determined by market forces. It is a payment for a commodity or service of business character and the individual can escape the price by not purchasing the commodity or service. On the other hand, fee and charge (which mean to the same thing) are compulsory contributions or payments made by a person to cover a part or all of the expenses involved in some action or provision of service by the public authority which while creating a common benefit, also renders a specific benefit or service to a person. Fee and charge is intended to cover a part or all of the cost of the service rendered and is never more than the cost of the service. Tax is a general compulsory payment levied upon persons to cover the expenses incurred in conferring common benefits upon users of a commodity or service. It is a compulsory levy and is meant for general purpose of state revenue raising. An individual cannot expect any specific service rendered to him by state in return for the tax paid by him. Broadly speaking, price is for goods of pure private nature, charge or fee are generally for goods with both public and private characteristics, and tax is for goods of pure public nature. More appropriate term for irrigation service may be fee or charge rather than price or tax (for details see Hussain and Wijerathne, 2004b, forthcoming)

pricing/charging in relation to equity. For example, sometime it is argued that consumers benefit from agricultural investments through lower food prices and so should be expected to share in covering the costs (Sampath 1992). Some even argue against water charges of any kind in less developed countries, as higher income farmers often do not pay (Easter and Welsch 1986). On the other hand, it has also been suggested that water charging/pricing may be used as effective means to re-distribute incomes especially where there are equity concerns among heterogeneous water users and sectors, and that water charging/pricing may play a role in influencing income distribution between irrigation districts (Brill, Hochman and Zilberman 1997) as well as between farming and non-farming sectors (Diao and Roe 1998).

Irrigation Charging in Developing Asia – The Context

In this section, we discuss irrigation charging systems presently in practice based on data and information collected from 26 irrigation systems in Bangladesh, China, India, Indonesia, Vietnam and Pakistan. Systems studied in the South Asian countries (Bangladesh, India and Pakistan) are characterized by high degree of inequity in land and water distribution, with highest inequity in Pakistan. For example, in Pakistan 75 percent of sample households owned around 40 percent of land, and 25 percent owned 60 percent of land. Average Gini coefficient for land across selected systems in Pakistan varied from 0.31 to 0.56, with average value estimated at 0.49. While average per household landholding size in Bangladesh is relatively small, its distribution is fairly inequitable. For example, in Ganges-Kobadak system, lower 71 percent of sample households owned 25 percent of land, middle 27 percent owned 32 percent of land, and large 2 percent owned 43 percent of total land area. Similarly, in Indonesian systems, though average land size per household is much smaller, there is an element of inequity in its distribution. On the other hand, land distribution in Chinese and Vietnamese systems is fairly equitable (basically reflecting equitable land policy followed in these countries, for details see Hussain and Wijerathne, 2004a, forthcoming), though average land size per household is much smaller than that in South Asian countries. Agricultural productivity per ha is the highest in the Chinese systems and the lowest in Pakistani systems.

In all the systems studied, except those which have been transferred or where irrigation is managed in more participatory mode (where in most cases water charges are jointly determined and assessed by the agency and WUAs), water charges are set administratively by the central or provincial/state governments. Irrigation charges are set at low levels, which reflect neither the cost of supplying water nor the value/benefits derived from water use. Present level of irrigation charges, particularly in the South Asian systems, are too low to have any influence on farmers

cropping decisions or water use efficiency. In these systems, water charges are not linked to the level of service, charges are levied irrespective of the amount of irrigation water received, and irrespective of the quality and reliability of irrigation supplies. In all the agency managed systems, water charging, collection and spending is highly centralized. In these systems, revenues generated through water charges do not even cover the required O&M cost of the systems, and have to depend on public sector subsidies. In those systems, where landholdings are inequitably distributed, as in the South Asian systems, large part of benefits of subsidies to the irrigation sector goes to large landholders. In the transferred systems or where there are decentralized institutional arrangements for irrigation management and service delivery, charge collection and spending mechanisms are decentralized and overall performance is better than that of agency managed systems.

In the studied systems in Bangladesh, India and Pakistan, irrigation charging system is fairly similar. The level and structure of irrigation charges is determined by the state/provincial governments. Irrigation charges at the farm level are levied based on area cultivated/cropped, crop type, crop condition, and season (Rabi/Kharif). In each season, irrigation charge assessment at the filed level is undertaken by irrigation/revenue department officials. Even in most of the transferred systems (in Andhra Pradesh, Madhya Pradesh, Hakra-4 in Pakistani Punjab) irrigation charges are determined by public authorities while assessment and collection is either jointly undertaken by government officials and WUAs or in some cases by WUAs (as in Hakra-4 R). Within a state or province, irrigation charges are levied uniformly across canal commands, irrespective of the amount of water delivered to a canal command. For example, in Lalian and Khadir systems in Punjab, Pakistan, average amount of canal water applied per ha for wheat during rabi season is 1458 m^3, and 465m^3 , respectively, (with significant head to tail variations), however, seasonal crop water charge is uniform in both systems. Groundwater contributes 55 percent and 89 percent of total water applied per ha, in the above two systems, respectively (see Hussain *et al.* 2003), and those who supplement canal water with groundwater are fully liable for canal water charges. Variations in canal water allocations are not clearly reflected in the charging structure. At present, irrigation charges are remitted to the government and there is no direct link between funds collected and funds spent on operations and maintenance. Overall irrigation charges are low, both because of low level of charge or poor collection rate, and the governments in these countries provide subsidies.

In Indonesia, multiple criteria are used in determining irrigation charges at the tertiary level including cropped/irrigated area, crop type, crop productivity, location, level of service and users' capacity to pay, especially in transferred systems (with more decentralized institutional arrangements), Variations in canal water allocations are implicitly accounted for in charging systems. Farmers using more water by irrigating more area or by growing water intensive crops or achieving higher productivity pay more, introducing an element of equity in irrigation charging systems. Additional criterion of farmers' capacity to pay introduces poverty concerns into the

charging system, with the poor farmers paying relatively less than the non-poor farmers. Under multiple criteria based charging system (as in the transferred systems) structure of charging is such that charges are linked to water supplied/used, and it accounts for poverty concerns. The key issue for cost recovery in these systems is the level of irrigation charges.

In the Chinese and Vietnamese systems studied, irrigation charges are directly or indirectly linked to the irrigation service, and water supplied/used. In the studied systems in Vietnam, irrigation is charged based on the level of output produced, charges vary across systems, and are differentiated by the level of service, that is, households receiving partial irrigation service pay less, IDMCs and cooperative sign water delivery and water fee contracts, and charging and spending is partially decentralized. In the Chinese systems, level and structure of irrigation charges is determined by the local water resources bureaus under the guidelines from the provincial governments. At the field level, irrigation charge is based on area irrigated and in some cases time period to irrigate the fields. Irrigation charge appears to be related to the cost of O&M and overall cost of supplying water. Under these systems, irrigation charges, regardless of whether based on size of landholdings or cropping intensities, tends to be relatively equitable. In these systems, what is important for cost recovery is the level of irrigation charges.

As shown in Table 1, in the south Asian systems studied, the level of irrigation charge varies from US$4.6/ha to US$22/ha. While the charge level is the highest in Bangladeshi systems, collection rate is very low (5-15 percent). Irrigation charges in the Indian systems have recently been increased to US$ 10/ha (which constitute 1.6 to 4.3 percent of gross value of product), with collection rate varying significantly across systems from 21 percent to 81 percent. In Pakistani systems, irrigation charges vary from US$4.6/ha to US$10.6/ha (constituting 1.7 to 3.9 percent of gross value of product), and overall collection rate is higher (80-99 percent) than that in Bangladeshi and Indian systems. In Indonesia, water charges vary from US$1/ha to US$20/ha, and collection rate is fairly high, especially in the transferred systems. On the other hand, irrigation charges in China and Vietnam are much higher than those in Indonesia and South Asian systems. In China, irrigation charges vary from US$26 to US$67/ha (1.8 to 5.2 percent of gross value of product), with average collection rate of 80 percent. Similarly in Vietnam, where irrigation is charged based on crop output, the charge level is fairly high at US$58 to US$61/ha, (constituting 4.6 and 6.3 percent of gross value of product), and overall collection rate is also high (85 to 99 percent).

Irrigation Charge, Irrigation Performance and Poverty

The basic premise here is that when irrigation charges are low, maintenance of irrigation systems is neglected, infrastructure is not properly managed, performance of the systems is adversely affected, availability and access to water is reduced especially at the tailends, and the poor are

affected the most. However, the magnitude of adverse impacts on the poor varies depending on the distribution structure of land and water resources. In those settings, where there is relatively greater inequity in land and water (as in south Asian systems described above), low irrigation charges and lower than required operation and maintenance (O&M) of the systems and the resulting poor performance of the systems affect the poor and the weaker more than the non-poor and the powerful. Under these settings, not only the level of irrigation charges is important, the structure of irrigation charges has strong implications for the poor, as will be shown in the next section.

As shown in Figure 2, in those systems where irrigation charges are low, overall performance of the systems in terms of water use efficiency and productivity per ha is low. For example, water use efficiency (defined as the ratio of crop water requirements and total inflow into the canal system) in Pakistan systems vary from as low as 28 percent to 71 percent. As shown in Figure 2, crop productivity in these systems is low. In general, in the low performing systems where agricultural productivity is low, the incidence of poverty is high. On the other hand, where systems are well managed and overall performance is high, the incidence of poverty is also very low. Of course, poverty is the outcome of many complex factors. Agricultural productivity is one of the key determinants of poverty, and this is particularly so in those settings where households and communities depend for their livelihoods on agriculture. Low level of irrigation charges, leading to overall poor system performance, reduces the anti-poverty impacts of irrigation.

Table 1. Salient Features and Water Charging in Selected Irrigation Systems.

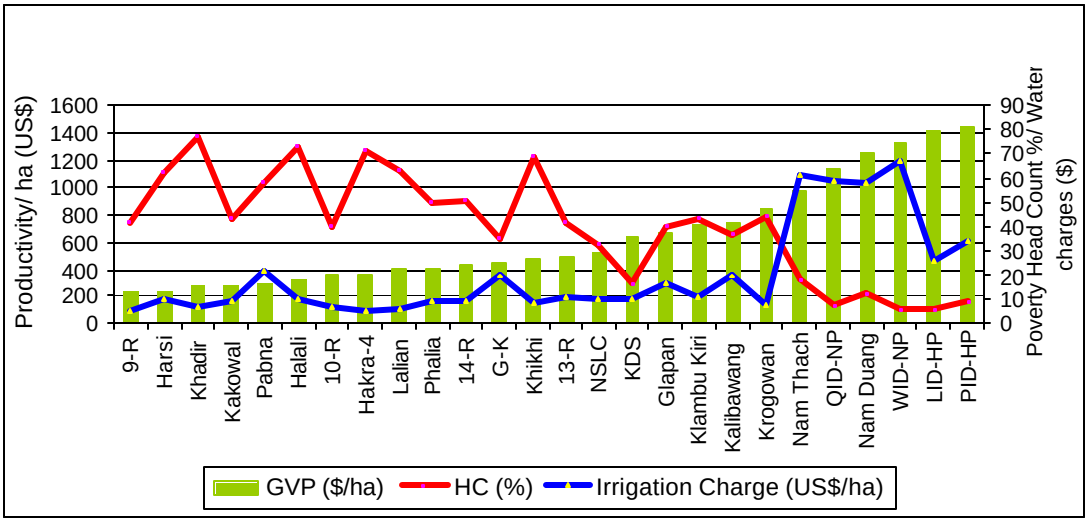
Country	System name	Location	Management Type	Productivity (US$/ha)	Water Charge set by	Annual Water Charge per hectare (US$)	Water Charge as percent of GVP	Collec-tion Rate (percent)
Bangladesh	G-K	South-western Bangladesh	Agency	448	CG	20	4.46	5-15
	Pabna	West-central Bangladesh	Agency	293	CG	22	7.51	9
India	NSLC	Andhra Pradesh/Krishnia River-Upstream	Transferred	524	SG	10	1.91	40-50
	KDS	Andhra Pradesh/Krishnia River-Downstream	Transferred	637	SG	10	1.57	82
	Halali	Madhya Pradesh	Transferred	323	SG	10	3.09	33
	Harsi	Madhya Pradesh	Transferred	231	SG	10	4.33	21
Pakistan	9-R	Upper Jehlum Canal	Agency	230	PG	4.6	2.94	99
	10-R	Upper Jehlum Canal	Agency	360	PG	6.9)	2.09	99
	13-R	Upper Jehlum Canal	Agency	500	PG	10.6	2.06	80
	14-R	Upper Jehlum Canal	Agency	430	PG	8.8	2.41	80
	Kakowal	Upper Jehlum Canal	Agency	282	PG	9.3	3.51	80
	Phalia	Upper Jehlum Canal	Agency	413	PG	8.8	2.31	80
	Lalian	Lower Jehlum Canal	Agency	404	PG	5.6	2.84	87
	Khadir	Lower Jehlum Canal	Agency	276	PG	6.9	3.90	87
	Khikhi	Lower Chenab Canal	Agency	481	PG	7.9	1.66	94
	Hakra-4	Hakra System	Transferred	362	PG	4.6	1.72	91
China	WID-NP	Ningxia Province-Northwestern China (upper YRB)	Village cooperatives	1319	PG	67	5.08	80
	QID-NP	Ningxia Province-Northwestern China (upper YRB)	Village cooperatives	1141	PG	59	5.17	80
	PID-HP	Henan Province-Eastern China (Lower YRB)	Village cooperatives	1444	PG	34	2.35	80
	LID-HP	Henan Province-Eastern China (Lower YRB)	Village cooperatives	1417	PG	26	1.83	80
Vietnam	Nam Duang	Red River Delta	Village cooperatives, IDMCs	1250	PPC	58*	4.6	85-95
	Nam Thach Han	North Central Region	Village cooperatives, IDMCs	974	PPC	61*	6.3	99
Indonesia	Klambu Kiri	Central Java	Agency	729	WUAs	6-11	0.8 to 1	-
	Glapan	Central Java	Agency	665	WUAs	4-16	0.8 to 4.3	-
	Kalibawang	Yogyakarta	Transferred	749	WUAs	13-20	0.6 to 2.2	95
	Krogowanan	Central Java	Transferred	851	WUAs	1-7	0.2 to 0.6	-

Notes: IDMCs: Irrigation and Drainage Management Companies.

G-K = Ganges Kobadak; NSLC = Nagarjuna Sagar Left Bank Canal; KDS = Krishna Delta Systems; WID-NP = Weining Irrigation District in Ningxia province; QID-NP = Qingtongxia irrigation district in Ningxia Province; PID-HP = People's Victory Irrigation District in Henan province; LID-HP = Liuyuankou Irrigation District in Henan province. CG = Central Government, SG = State Government, PG =Provincial Government, WUA= ,Water User Association, PPC =Province People's Committee; * these figures are based on cost of full irrigation (fee for partial irrigation is lower). Average rice yield per ha (for both spring and summer crops) for Nam Duang (ND) and Nam Thach Han (NTH) systems are 8766 kg and 9241 kg, and average fee for full irrigation for ND is 209kg/ha for spring and 194kg/ha for summer (total 404 kg/year), and for NTH average fee for full irrigation is 290 kg/ha per season

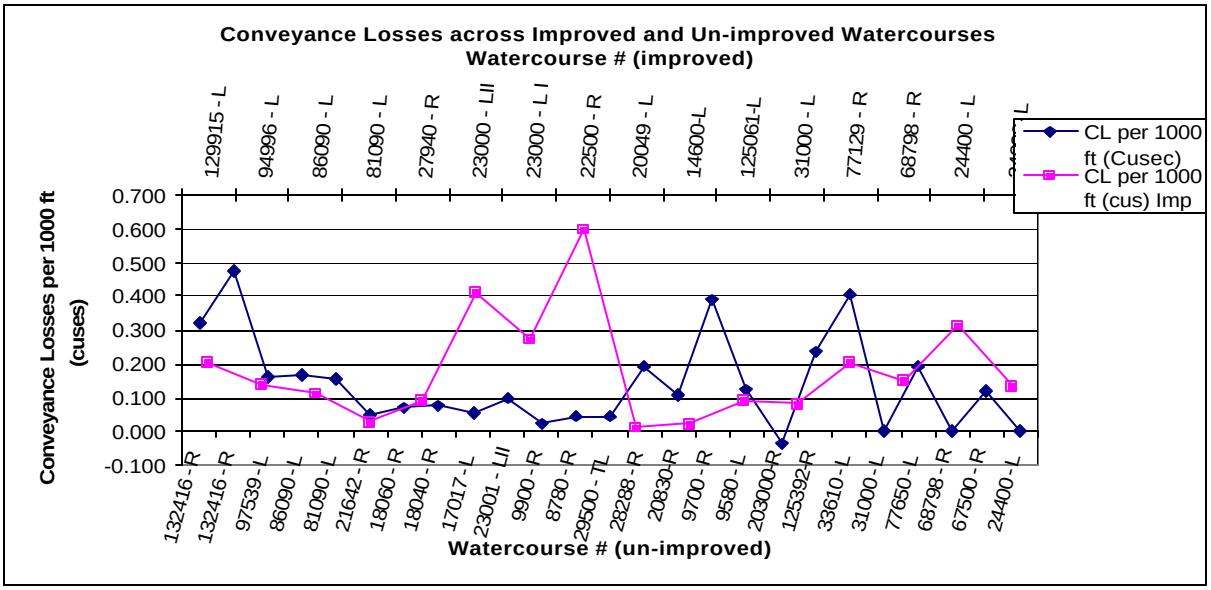
(total 580 kg/ha/year). Estimated average local price for paddy is VD2270/kg for ND and VD1672/kg for NTH systems. Using these values, average annual fee per ha is VD917135 for ND and VD969700 for NTH.

Figure 2. Productivity/ha, Poverty (%) and irrigation Charge (US$/ha)



Similar picture emerges when performance is analyzed in terms of water use efficiency. Figure 3 compares conveyance efficiency across improved and un-improved irrigation infrastructure/ water courses in the studied systems in Pakistan. Infrastructure was improved to increase conveyance and overall water use efficiency. However, as a result of neglect of proper maintenance, the performance of infrastructure has deteriorated overtime. In most cases, there are no significant differences in conveyance losses across improved and un-improved watercourses. Lack of the required funds, and the neglected maintenance are the main causes of this outcome. What this implies is that new investments in improving irrigation infrastructure may be ineffective in the absence of regular maintenance, that may result from paucity of the required funds.

Figure 3. Conveyance Efficiency in Improved (lined) and Un-improved Watercourses.



Ill-managed irrigation infrastructure and profligate use of water not only reduces overall water availability and its access to farmers, it leads to problems of land degradation such as salinity and waterlogging. In Pakistan, for example, the estimates indicate that 20 to 24 percent of irrigated land (3.4 to 4.4 million ha) are affected from these problems. Productivity reduction impacts of these problems vary from 25 percent to 60 percent. Similar estimates for India range from 5.5 million to 13 million ha. In Uttar Pradesh, a 50 percent decline has been reported in crop yields over eight years due to salinization and water logging (Joshi and Jha 1991).

Who suffers the most from this situation? — those who are not influential, those who are socio-economically weaker, and those who have locational disadvantage – the poor. Lalian distributary in Punjab, Pakistan, is typical case of distributaries in Pakistan, where these is a significant upstream-downstream inequity in water distribution, infrastructure is deteriorating, and performance is poor in several parts of the system, especially at the tailends. Available evidence (Table 2) shows that access to canal water at the tailends is the least, crop productivity is low and poverty is relatively high. Poor system performance and institutional deficiencies are among the main causes of these problems. Poverty situation at the tailends worsens especially in those systems or parts of the systems where there is no alternate source of good quality irrigation water (e.g. groundwater) or alternate source of income and employment.

Table 2. Upstream-downstream inequity in water, crop productivity and intensity of poverty (Lalian distributary, Punjab, Pakistan).

Item/location	Head	Middle	Tail
Access to canal Water (m^3/ha)	1500	2745	345
Access to total water (m^3/ha)	3345	4049	2491
Productivity (wheat - kg/ha)	4946	3917	3188
Poverty gap (%)	41	39	44

Source: Based on primary data 2001-2002.

It can be concluded from the above discussion that the poorly managed infrastructure and poor service delivery adversely impacts overall irrigation performance, reduces poors' access to water, resulting in overall lower productivity – all resulting in adverse impacts on the incomes, employment and overall livelihoods of the poor.

Irrigation Charging Policy and the Poor Small Farmers – Evidence from Pakistan

Now we provide an empirical evidence on the implications of the present irrigation charging policy (which is characterized by the low level of charge and biased charging structure) for various landholding categories and for the poor and non-poor farmers from Pakistan, where inequity in land distribution is the highest in the Asian region (Hussain, 2003). As mentioned earlier, irrigation water allocation/distribution in Pakistani systems is based on land size and irrigation charges are levied based on cropping intensity. Under warabandi system, all farmers in a particular location are entitled for equal allocation of water per ha of land, regardless of the land size. As shown in Table 3, average cropping intensity varies significantly across farm size categories, with highest cropping intensity of 181 percent on smallest farm size category and lowest cropping intensity of 115 percent on largest farm size category. There are only marginal differences in average cropping intensities across the poor and non-poor farmer groups in aggregate terms. However, disaggregated analysis shows that average cropping intensities for the poor small farmers are relatively less that for the non-poor small farmers.

Average annual irrigation charge per ha (area weighted) is Rs. 420/ha. Average per ha irrigation charge is inversely related to land size categories; landholders between 1 to 5 ha paying significantly more than the overall average , and those with greater than 10 ha paying less than the overall average. This is basically due to differences in cropping intensities, which are higher on smaller size farms due to greater use of labor and groundwater. As shown in column 4 of Table 3, average groundwater cost per ha is inversely related to farm size categories, smaller size farms using more groundwater and incurring higher costs and vice versa. Since under the present charging systems, crop area that is partially irrigated with canal water and partially with

groundwater, is fully liable for canal water charges, small farmers are penalized for making relatively greater use of groundwater. On average, poor farmers incur Rs. 56 more in total per ha cost of irrigation than the non-poor, due to greater use of groundwater and resulting higher overall cost (as will be shown, groundwater is around 9 times expensive than the canal water). Overall, cropping intensity based irrigation charging is pro-large landholders, and anti-small farmers and the poor who make greater use of groundwater to increase their cropping intensities.

Overall level of canal water charges remains low (this is despite recent increases in the level of charges), constituting only 2.5 percent of GVP. Due to less access to canal water, poor small farmers incur significantly higher cost per ha due to greater use of groundwater, which is around 9 times more expensive than the canal water. Average groundwater cost per ha constitute over 20 percent of GVP (compared to only 2.5 percent for canal water), and groundwater cost as a proportion of GVP decreases with increase in size of landholdings. The above analysis suggests that the major beneficiaries of the present charging system, both the level and the structure of charging (and of implicit subsidies to the irrigation sector) are large landholders and the non-poor farmers.

Table 3. Cropping Intensity, Water Charges for canal Water and Groundwater, and GVP by landholding size and for Poor and Non-poor Farmers.

Land size Category	Cropping intensity (%)	Average cost of canal water irrigation/ha/year (charge/ abiana) (Rs.)	Average cost of groundwater irrigation/ha/ year (Rs.)	Total cost of irrigation/ha/ Year (Rs.)	GVP/ha/ year (Rs.)	Annual canal water cost as % of GVP	Annual total water cost as % of GVP	Ratio of Groundwater cost to canal water cost
< 1 ha	181	440	4555	4995	19262	3.32	30.1	10.35
1.1 to <3 ha	156	439	4038	4477	21552	2.63	22.0	9.21
3.1 to <5 ha	148	432	3549	3980	22156	2.41	17.9	8.22
5.1to < 10 ha	133	385	3209	3594	22198	2.25	16.5	8.34
10 ha and above	115	367	2779	3146	25013	2.18	15.3	7.58
All	148	420	3707	4127	21909	2.53	20.2	8.83
Poor	145	404	3748	4152	19802	2.63	22.1	9.28
Non-Poor	152	439	3657	4096	24485	2.41	17.8	8.33

Source:
Based on filed level primary data (2001-2002) collected from a sample of 1224 households in 10 distributaries in Punjab, Pakistan.
Notes:
1. Farm cropping intensity is calculated as: (cropped area of $farm_j$ /total cultivated area of $farm_j$)
2. Annual canal water charge per hectare is calculated as :sum(crop area of $crop_i$ on $farm_j$*charge for $crop_i$ on $farm_j$)/total cropped area of $farm_j$.)
3. GVP is gross value of product per hectare calculated as: sum (crop area of $crop_i$ on $farm_j$*Yield of $crop_i$ on $farm_j$ *Price of $crop_i$ on $farm_j$) /total cropped area of $farm_j$.)
4. Poor are defined as those whose income is below the national poverty line of Rupees 730/capita per month.

Average land size of the poor and the non-poor is 2 ha and 5 ha, respectively. In general, there is a significant inverse relationship between poverty and land size i.e. majority of the poor are those who own and operate small landholdings.

It is clear from the above discussion that the present policy of low irrigation charge and biased charging structure favors the large landholders and the non-poor farmers. What are the

implications of the figures reported in Table 3 for all the poor marginal and small farmers at the province and the country level. Let us look at three policy scenarios, and their implications:

Scenario – 1: Present policy – no change in the structure and level of irrigation charges, charges are based on cropped areas and cropping intensities;

Scenario – 2: Flat rate policy – flat rate per unit of irrigated land based on land size, independent of crop type and cropping intensities, present average irrigation charge applied uniformly across all farm size categories; and

Scenario – 3: Differential rate policy – differential rate per unit of irrigated land based on land size, applied differentially across various farm size categories – progressive rate structure (similar to increasing block rate charging). Lower irrigation charge for the first two hectares, applied uniformly to all land size categories, and charge increases progressively with increase in size of holdings above 2 hectares, by Rs. 50 per ha for each successive category of land size, as shown in the following equations:

At the province level, under the present charging policy, small farmers in Punjab pay more than large farmers in proportion to the share of each group in total landholdings. That is, small farmers contribute more to total revenues in proportion to their share in total land (Table 4). The present policy clearly disfavors the poor marginal and small farmers. At the province level, option – 2 (flat rate charge at present level of average water rate) would result in annual gains for small farmers through reduced costs by Rs. 74.45 million, and cost to larger farmers would increase by Rs. 326.77 million, and total revenues will increase by 5.3 percent. Policy option -2 is better option than policy option -1 in terms of equity and revenues. Under policy option – 3, smaller farmers, as a result of reduced costs, would gain annually by Rs. 346.88 million, and larger farmers would contribute more towards costs by Rs. 529.76 million, and overall revenue would increase significantly by 21.8 percent. With policy option – 3, Rs. 876 million would be re-distributed with significant part in favor of poor small landholders in Punjab.

For Pakistan as a whole, option – 2 (flat rate charge at the present average rate) would result in annual gains for small farmers through reduced costs by Rs. 130.06 million, and cost to larger farmers would increase by Rs. 605.97 million, and annual total revenues will increase by 5.6 percent. Under option – 3, smaller farmers, as a result of reduced costs, would gain by Rs. 519.65 million, and larger farmers would contribute more towards costs by Rs. 842.45 million, and overall revenue would increase significantly by 22.7 percent. With policy option – 3, over Rs. 1362 million would be re-distributed with significant part in favor of poor small landholders in Pakistan. Option – 3 is better than both options – 1 & 2 from revenue and equity perspectives. Option – 2 is relatively equitable, option – 3 is pro-poor, as per ha irrigation charge to the poor

would be less than that to the non-poor, and would be significantly less than that for options – 1 & 2.

From the above analysis, it can be concluded that the existing irrigation charging policy in Pakistan favors larger landholders, and disfavors poor small farmers. Policy options 2, and particularly option 3 would result in redistribution of significant amount of funds each year, with significant amount in favor of poor small farmers. Policy change towards option 2 or 3 could be implemented with existing institutional arrangements in place, and as such does not involve any costs. Major benefits with such a policy change would include:(1) more funds available for O&M, with resulting improvements on O&M leading to increased efficiency in irrigation supply and improved system productivity; (2) benefits in terms of reduced costs to small and poor landholders; and more importantly, it would be a step forward to reversing existing inequities in water charges. What is needed is a clear understanding of the problem and strong political will to a policy change that improves irrigation management and is pro-poor.

Table 4: Implications of Alternate Irrigation Charging Policies for Small and Large Landholders in Pakistan

Punjab		**Basic data**	
Total number of farms up to 5 ha (Million), smaller farms		2.35	
Total number of farms above 5 ha (Million), larger farmers		0.61	
Total number of farms- all (Million)		2.96	
Total area of farms up to 5 ha (Million ha)		4.36	
Total area of farms above 5 ha (Million ha)		6.61	
Total area of farms –All (Million ha)		10.97	
Policy Implications	**Policy Option -1**	**Policy Option- 2**	**Policy Option -3**
Total revenue from smaller farms (Rs. Million)	1902.36	1832.81	1824.24
Total revenue from larger farms (Rs. Million)	2471.94	2774.67	3501.82
Total revenue from all farms (Rs. Million)	4374.3	4607.48	5326.06
Increase in smaller farmers income in Rs. Million (reduced total payments) with option -1 as base	-	74.45	346.88
Increase in large farmers contribution to costs in Rs. Million (increased total payments) with option -1 as base	-	326.77	529.76
Pakistan		**Basic Data**	
Total number of farms up to 5 ha (Million), smaller farms		4.10	
Total number of farms above 5 ha (Million), larger farms		0.97	
Total number of farms- all (Million)		5.07	
Total area of farms up to 5 ha (Million ha)		7.43	
Total area of farms above 5 ha (Million ha)		11.72	
Total area of farms –All (Million ha)		19.15	
Policy Implications	**Policy Option -1**	**Policy Option- 2**	**Policy Option -3**
Total revenue from smaller farms (Rs. Million)	3240.87	3122.09	3103.72
Total revenue from larger farms (Rs. Million)	4374.22	4920.76	6237.13
Total revenue from all farms (Rs. Million)	7615.09	8042.85	9340.85
Increase in smaller farmers income in Rs. Million (reduced total payments) with option -1 as base	-	130.06	519.65
Increase in large farmers contribution to costs in Rs. Million (increased total payments) with option -1 as base	-	605.97	842.45

Source: calculations based on landholdings data from Agricultural St atistics of Pakistan, Ministry of Food, Agriculture and Livestock, Islamabad (2000-2001), and figures from analysis in the paper.

Have Higher Irrigation Charges and Improved Service Delivery been Advantageous to the Poor?

It is clear from the above discussion that low level of irrigation charges and the biased charging structure have been disadvantageous to the poor marginal and small farmers both directly and indirectly. Now let us reverse the question and ask: have the higher level of irrigation charges applied uniformly to all farmers been advantageous to the poor small farmers?. Here the case of Hakra- 4R, Punjab, Pakistan, is in point. In Hakra- 4R, secondary and tertiary level management of the system have been transferred to farmer organization, and the systems are being managed through participation of farmer members and their elected representatives. Recent performance assessment of the system indicates that irrigation charges have been increased in the system, service delivery has improved, irrigation infrastructure condition and its management has also improved, overall performance of the systems (in terms of equity in water distribution, access to water by tailenders (where there is more poverty), cropped areas and cropped productivity) has also improved.

As shown in Table 5, after the transfer of management to farmer organization and improvement in service delivery, irrigation charges were increased, collection rate improved and total revenue collection increased by about Rs. 1 million. This resulted in more funds available for operation and maintenance of the system. Infrastructure of the distributary was improved, including adjustments of outlets, de-silting, strengthening of banks, and other repair work. Along with infrastructure management, irrigation water management/distribution was also improved. These factors led to increasing water delivery performance and overall system efficiency as shown in Table 5. Increased overall water availability and its improved access have resulted in increased crop area by around 6 percent from 25614 ha to 27115 ha. More importantly, distribution of water improved significantly with head-tail equity ratio of around 1. Among the distributaries studied, equity performance of Hakra - 4R was the highest (Head-tail equity ratio for other distributaries studied in Punjab ranged from 1.23 to 2.50, indicating significant inequity in water distribution). With improved service delivery, availability, reliability and access to water at the tailends have improved significantly. There is empirical evidence that there is more incidence of poverty at tailends of Hakra-4R, and the poor farmers have benefited from this improvement. During farm level surveys, 43 percent of poor small farmers at the tailends indicated that they have benefited from the improved service delivery and resulting improved system performance. Overall, 63 percent of farmers showed satisfaction in terms of receiving their due share of water. Other benefits included reduction in water theft (as indicated by 81 percent of the respondents), reduction in litigation cases related to irrigation water and rent seeking by irrigation officials.

Similar situation was observed in Kalibawang system in Yogyakarta where management at the secondary and tertiary level of the system was transferred in late 1990s to the water user

association. After transfer, the level of irrigation service charged increased, collection rate increased significantly, and overall service delivery and system performance was improved.

Table 5. Impacts of Improved Service Delivery in Hakra-4R, Punjab, Pakistan.

Indicator	1998 (before transfer)	2002 (after transfer)
Water charge (Rs/ha)	175	199
Total revenue collection (Million Rs.)	4.49	5.40
Water delivery performance*	0.91	1.04
Overall system efficiency**	0.47	0.52
Cropped area (ha)	25614	27115
Head-tail equity	Not available	1.09
Farmers Response		
- increased benefits at the head (%)		40
- increased benefits at the middle (%)		38
- increased benefits at the tailends (%)		43
- overall satisfaction (%)		41

*water delivery performance is defined as the ratio of actual to target volume of water delivered.
** overall system efficiency is defined as the ratio of annual crop water requirement and total inflow into the canal system (with 40 percent losses)

'Affordability and Willingness to Pay' Issue

As mentioned in the earlier part of the paper, sometimes concerns such as 'affordability and willingness to pay' of farmers are offered as justifications to keep irrigation charges at low levels. It is to be noted from data in Table 3 that: (a) small and poor farmers pay more in total per ha cost of irrigation than large and non-poor farmers, (b) in the absence of access to canal water, small and poor farmers make relatively greater use of groundwater (which they mostly buy), which is around 9 times expensive than canal water. On average, groundwater cost constitute over 20 percent of gross value of production (GVP) per hectare (compared to canal water that constitute only 2.5 percent of GVP per hectare. If small and poor farmers can afford (and are willing) to pay for the expensive groundwater, they can surely afford to pay for less expensive canal water provided they have access to canal water and overall service is satisfactory. Therefore, the argument of 'affordability and willingness to pay' is not valid. What is important in relation to farmers willingness to pay is the quality of service delivery.

Revenue Collection and Spending Mechanisms

While level and structure of irrigation charge is important, equally important is the collection rate and spending mechanisms. As shown in Table 1 earlier, irrigation charge collection rate varies from 5 percent to 99 percent in 26 systems studied, with lowest collection rate in Bangladeshi systems and the highest in Vietnam. Overall, collection rate is higher in the studied systems in

Southeast Asia and China, and lower in systems in South Asia. In general, collection rate and overall collection efficiency is high in those systems where service delivery and overall performance is satisfactory, and where there are decentralized institutional arrangements for spending of the collected revenues (as in transferred systems in Pakistan (Hakra-4R), Indonesia (Kalibawang and Krogowanan), Vietnam (village level cooperatives, and Irrigation and drainage management companies) and in Chinese systems (village level cooperatives). Collection efficiency is low in those systems, where collected revenues are remitted to the treasury and the system maintenance and management depend on public sector budgetary allocations. Under the decentralized institutional arrangements for collection and spending, water users have incentives to pay charges as they see that the amount paid is being spent for improving system performance, and also there is informal social pressure on them for payment of charges.

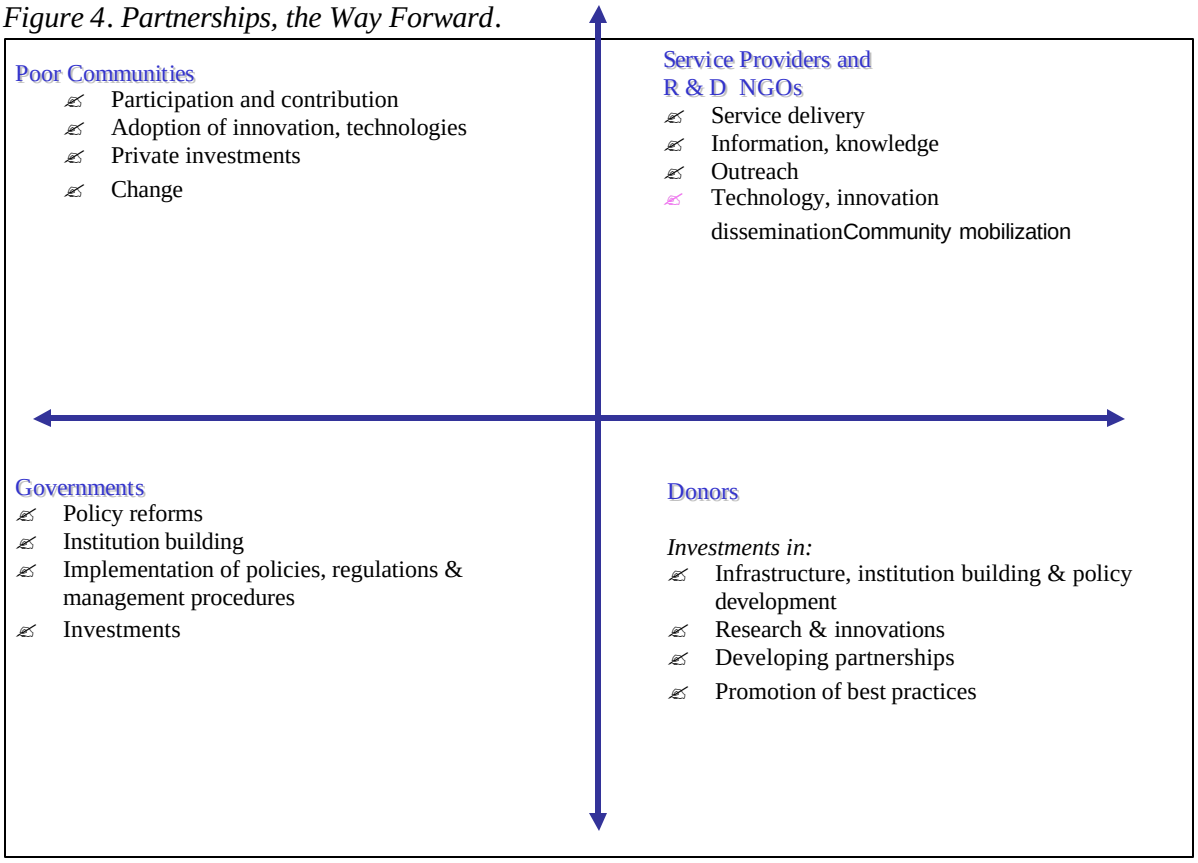
What Needs to be Done ?

The study demonstrates that irrigation is a significant determinant of poverty alleviation, and the anti-poverty impacts of irrigation, depends on, in addition to other factors, on the performance of irrigation systems – which is influenced by the availability of funding and spending mechanisms, and the effectiveness of institutional arrangements and incentive structures in place. In order to realize the enhanced anti-poverty impacts of irrigation, there is an urgent need to improve performance of the systems. The study suggests that: (a) availability of funding for the sector needs to be increased through increase in irrigation service charges to the level that fully covers the cost of irrigation service, with gradual move towards market based charging for irrigation.; (b) irrigation management institutions needs to made more decentralized and financially autonomous – in terms of setting irrigation charges, charge assessment, collection and spending – to create incentives and strengthen financial linkages between irrigation managers, service providers and the users; (c) poverty concerns need to be specifically recognized in irrigation in irrigation charging, and overall management policies, and the poor should have an equal voice in irrigation management organizations. Where necessary, irrigation charging structure may be made pro-poor through effective implementation of discriminatory/differential charging in favor of the poor; (d) irrigation charges should be linked to service delivery; (f) irrigation service providers should be required to meet certain standards in relation to irrigation system performance in terms of maintenance of irrigation infrastructure, water conveyance and use efficiency, productivity, equity and sustainability of the systems; (g) the public sector agencies should play roles as regulators (providing regulator back-up, and enforcement of rules and regulations), enabler and facilitator for effective implementation of performance improvement measures.

For all this to materialize, building effective partnerships among service providers, governments, communities, research and development organizations and donors are important.

Each one of these partners has its own comparative advantage. Figure 4 highlights some of the key areas where each partners can make contribution, with the objective of improving irrigation performance for immediate enhanced anti-poverty impacts of irrigation. For more details on the specific productivity enhancing pro-poor interventions, see Hussain and Hanjra (2003).

Figure 4. Partnerships, the Way Forward.



Summary, Conclusions and Implications

This paper examines the implications of irrigation service charge policies for the poor in developing Asian countries. The basic question answered in the paper is 'Have low irrigation service charges disadvantaged the poor?'. The paper also demonstrates the implications of alternate structures of water charges for the poor. The empirical evidence presented in the paper is mainly based on primary data collected through household level surveys from 5408 households in 26 medium and large scale irrigation systems in six countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam. The paper first establishes that irrigation contributes to poverty alleviation, and the anti-poverty impacts of irrigation vary across and within irrigation systems, and depend on a number of factors. Some of these factors relate to irrigation service delivery and irrigation management performance, and others relate to pattern of land distribution and access to non-water inputs and support measures. Further, the paper suggests that the poor irrigation performance reduces the benefits of irrigation and negates the anti-poverty impacts of irrigation. Poor service delivery in irrigation causes poor performance, and both are outcomes of lack of appropriate and effective institutional arrangements and incentive structures, and most importantly, inadequate funding and lower than the required spending in the sector resulting from low cost recovery and low level of irrigation charges. It is suggested that the poor service delivery and the low level of irrigation charges creates vicious circle of the poor irrigation performance, reducing anti-poverty impacts of irrigation.

In the studied systems, irrigation charge varies from US$ 1 to US$ 67 per ha, representing 0.2 to 7.5 percent of gross value of production per hectare, and the collection rate varies from 5 percent to 99 percent. In general irrigation charge level and the collection rate is lower in the studied systems in South Asian countries than those in China, Indonesia and Vietnam. The low level of charge, especially in agency managed systems in South Asian countries neither not reflects the value of water nor the full cost of supplying water. In these systems, the level of charge is too low to have any influence on the behavior of water users and the overall efficiency of water use.

In general, where irrigation charge level is higher, irrigation service delivery and performance of the systems is better, productivity level is relatively higher and poverty incidence is low, and vice versa. Overall system performance is better in the transferred systems compared to those of agency managed. In the South Asian agency managed systems, irrigation charging, collection and spending mechanisms are highly centralized and irrigation charges are not linked to the service delivery. Where there are decentralized institutional arrangements for irrigation management through involvement of farmer/user organization, and there is an element of financial autonomy, irrigation charges tend to be linked to irrigation service, charge collection and revenue spending are more decentralized and relatively efficient and overall performance is better than the agency managed centralized systems. Overall the findings indicate that in settings,

where appropriate institutional arrangements are in place, incentive structures have been built in management of irrigation, irrigation charges have been increased, service delivery and system performance has improved, the poor have benefited in a significant way.

The study findings indicate that in settings where landholdings are inequitably distributed, not only the level of irrigation charge is important, the structure of the charge has strong implications for the poor. Empirical evidence from irrigation systems in Pakistan, which are characterized by high level of inequity in land and water distribution, suggests that poor small farmers pay more in total per ha cost of irrigation than large non-poor farmers. In this situation, any attempt to raise irrigation charges would harm the poor farmers more than the non-poor farmers. The study analyzes the implications of three policy scenarios for the poor: present charging policy, flat rate policy and differential rate policy, and suggests that the present charging policy is pro-large farmers, flat rate policy would be more equitable and differential rate policy would be pro-poor. The analysis indicates that differential rate policy, as suggested in the paper, would result in revenue increases by 27.7 percent, and this option would result in annual re-distribution of Rs 1362 million, with significant amount redistributed in favor of the poor small farmers – a win-win situation in terms of cost recovery and benefits to the poor.

In sum, the study findings imply that low level of charges applied uniformly to all socio-economic groups of farmers is disadvantageous to the poor, as it adversely affects the system performance (low irrigation charge in this context is just like giving sugar to a diabetic patient). In settings where land and water distribution is highly inequitable, differential-charging systems may be introduced to directly benefit the poorest of the poor. Based on the analysis and the evidence presented, the study suggests there is a need to increase irrigation charges to the level that is adequate to cover the required costs for improving system performance. Revenue collection and spending mechanisms also needs to be improved. This would require appropriate and effective institutional arrangements, and incentive structures in overall management of irrigation systems. The key messages of this paper is that: (a) access to water makes a difference in terms of benefits to the poor; and (b) improved system performance and service delivery improves access to water; (c) system performance and service delivery improves when spending increases through increased payment for service from farmers, (d) the problems of poor service delivery and low irrigation charges needs to be addressed simultaneously. ***Irrigation water or the related service is no longer free or cheap, and when it is made free or cheap: a) it rarely reaches the poor, and b) it produces less.***

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