IRRIGATION AND POVERTY ALLEVIATION: PRO-POOR INTERVENTION STRATEGIES IN IRRIGATED AGRICULTURE IN ASIA

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ABSTRACT

Irrigation is an essential part of the package of technologies, institutions and policies that underpins increased agricultural output in Asia. Past experience shows that this package, although broadly beneficial to societies, has not yet fully succeeded in banishing poverty. So in the context of UN millennium development goal of halving world poverty by the year 2015, are there ways of making the package more pro-poor in the future? In 2001-2002, the Author, at the International Water Management Institute (IWMI), in collaboration with national partners in Asia launched a major multi-country study that set out to answer this question. The study explored the links between irrigation and poverty alleviation in six Asian countries (India, Pakistan, Bangladesh, China, Vietnam and Indonesia, with the aim to determine realistic options for increasing returns to poor farmers in the low-productivity irrigated areas within the context of improving the overall performance and sustainability of the established irrigation systems. This unique mega study is based on primary data collected from over 5400 rural households covering 26 irrigation systems, supplemented with reliable secondary data and review of global topical literature on the subject. It develops a framework for pro-poor interventions in irrigated agriculture and offers a model for designing future pro-poor projects in irrigated agriculture. This paper provides a succinct summary of the synthesized results, conclusions and lessons learnt from this major multi-country study. The summary of the lessons, pro-poor options and the guidelines presented in this paper could be useful for the government policy makers and planners, donors, NGOs, researchers and other stakeholders involved in irrigation and rural poverty alleviation efforts in developing Asia and elsewhere.

Key words: irrigation; rural poverty alleviation; irrigated agriculture; pro-poor interventions; Bangladesh; China; India; Indonesia; Pakistan; Vietnam; Asia

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INTRODUCTION

There is no doubt that the Green Revolution transformed the lives and livelihoods of millions of Asia's people. Between 1970 and 2000, annual cereal production in the region more than doubled to nearly 800 million tons, with most countries achieving self-sufficiency in staple food grains. The threat of famine, never far away during the 1960s, receded over a period when the region's human population increased by roughly 60 percent. Rural incomes rose, city food prices fell—and the economy prospered. But the rest is decidedly *not* history. Despite the achievements of the Green Revolution, poverty persists in Asia, which today contains the highest absolute numbers of poor—more poor people even than in sub-Saharan Africa. Poverty is particularly deeply entrenched in South Asia, which is home to 44 percent of the world's poor.

The Green Revolution in Asia could not have happened without massive flows of water—irrigation water—to bring the best out of the new crop varieties and other inputs that were also made available to farmers. Nor would it have been possible without massive flows of investment capital to build new irrigation schemes and expand existing ones as well as to fund the provision of other infrastructure and services to rural areas, including research and extension. Today, the use of both surface water and groundwater remains essential to Asian agriculture: 40 percent of the region's cropland is irrigated. Hundreds of millions of rural people across the continent depend on irrigation—including large and medium-scale canal systems—to earn a living from farming.

Irrigation, then, is an essential part of the package of technologies, institutions and policies that underpins increased agricultural output in Asia. Past experience shows that this package, although broadly beneficial to society, has not yet fully succeeded in banishing poverty. So, in the context of the UN millennium goal of halving world poverty by the year 2015, are there ways of making the package more pro-poor in the future?

In 2001, the author (formerly at the International Water Management Institute, Colombo) in collaboration with national partners, launched a major study that set out to answer this question. Funded by the Asian Development Bank (ADB), the project explored the links between irrigation and poverty alleviation in six Asian countries. The objective was to determine realistic options for increasing returns to poor farmers in the low-productivity irrigated areas within the context of improving the overall performance and sustainability of the established irrigation schemes. The study examined the evidence regarding the effects of irrigation—and particularly its interaction with other components of the package—as a basis for drawing out lessons for policymakers, donor agencies and researchers.

The six countries included in the study were deliberately selected to encompass different policy, social and economic settings. Three countries in rapidly growing but inequitable South Asia—India, Pakistan and Bangladesh—formed a contrast with two in East and Southeast Asia—China and Vietnam—where economic development has proceeded more fairly and with a third, Indonesia, in which irrigation development has been part of a large government-funded transmigration scheme. China, in particular, is a case in which irrigation and agriculture have developed in the context of a long-term national program to eradicate poverty. The six countries also present contrasting models

of the transfer of irrigation management from public agencies to farmer groups or private hands.

The study, which is based on primary data and a review of global literature covering more than 200 studies, was the most thorough of its kind ever carried out. Over 5,400 households in 26 irrigation systems took part in surveys during 2001 and 2002. The 227 professionals who worked on the study interviewed a cross section of irrigation stakeholders, from farmers to local and national policymakers and practitioners. Fourteen workshops with over 800 participants were held to plan the research and discuss its findings. By virtue of its scope, its widely applicable results and the strength of its multidisciplinary approach, the study provides a model for the design of future pro-poor projects.

The paper provides a generic framework for understanding and designing pro-poor interventions in irrigated agriculture covering a wide range of issues including benefits and dis-benefits (adverse impacts or externality costs) of irrigation; irrigation-poverty linkages; factors influencing performance of irrigated systems and their poverty linkages; irrigation management reforms, irrigation service charging for improved cost recovery, irrigation application and resource conserving technologies—and their implications for the poor. From the study findings and conclusions, the following broad lessons are identified for the consideration of government policymakers, representatives of donor and development agencies, and others charged with reducing poverty in irrigated agriculture, (see Hussain 2005 for detail).

Irrigation reduces poverty across all study systems. One of the main conclusions of the study is that irrigation does indeed significantly reduce poverty as measured by household income. Poverty outside of irrigation systems in nearby nonirrigated settings is much higher (almost twice) than that within irrigation systems. However, poverty is still high in irrigation systems, averaging 34 percent. There are significant inter- and intra-country differences in poverty incidence in irrigation systems. Poverty is much higher in South Asian systems (particularly in Pakistani systems) than in Southeast Asian and Chinese systems. Inter-system differences in poverty are also much higher in the former than in the latter systems.

Indirect benefits of irrigation at the local and broader economy level can be much larger than the direct crop productivity benefits of irrigation. Canal irrigation generates a variety of direct and indirect benefits at the local and broader levels (increased crop productivity, employment, wages, household incomes and expenditures, increased food supplies/food security/food affordability due to lower prices, increased induced investments in agricultural and non-agricultural sectors, groundwater development and recharge), but the benefits vary greatly across settings. The indirect benefits of irrigation at the local and broader levels, including multiplier benefits, can be much larger than the direct local-level productivity benefits. Further, medium- and large-scale canal irrigation systems attract private-sector investments in irrigated agriculture, including in groundwater irrigation, and other related sectors. These benefits can help reduce poverty.

Irrigation reduces more poverty under certain conditions. The pro-poor impact of irrigation differs significantly from one setting to another. The extent of benefits to the poor depends on factors such as land and water distribution, the quality of irrigation and infrastructural management, the availability of inputs and support services, and water

and agricultural policies. Irrigation can also be anti-poor in situations where adverse social, health and environmental dis-benefits/costs of irrigation outweigh the benefits the poor receive from irrigation. These anti-poor outcomes of irrigation reflect failure of policy, planning and management and can be avoided or minimized through effective interventions. Irrigation investments, whether in new development or in the improvement of existing systems, should not always be assumed to reduce poverty in a significant way. In fact, irrigation can be *strongly pro-poor, neutral or even anti-poor* depending on the above factors. In South Asia, several influencing factors, notably land equity and irrigation governance and management arrangements, have been unfavorable. So, despite large investments in infrastructure and related inputs and services, the poverty-related impacts of irrigation in that subregion has been mixed—and certainly not as good as in China and Vietnam. Overall, South Asia has only partially benefited, in terms of realizing poverty-reducing impacts of past irrigation investments, and there are significant opportunities for increasing benefits of irrigation to the poor.

Apart from irrigation, land, roads and education are important for poverty reduction. Evidence from our extensive review of recent studies suggests that no single intervention is sufficient for effective poverty alleviation. Irrigation is one of the important interventions for poverty alleviation along with land, education and roads infrastructure. Poverty-reducing impacts of irrigation are large when these and other complementary elements such as market systems are in place.

There is more poverty in some areas and among some social groups than in others. Despite the overall poverty-reducing nature of irrigation, income poverty persists in most irrigation systems, particularly in South Asia. Poverty levels are highest in marginal areas, downstream sites (the "tail"), and areas where canal water is in short supply and the quality of groundwater is poor. In South Asian systems studied, poverty is generally higher at downstream/tail reaches, particularly in areas where access to canal water is least, groundwater is of poor quality and alternative sources of livelihoods are more limited. In these systems, poverty is lower at the middle reaches than at the tail reaches. However, in Chinese and Vietnamese systems, head-tail differences in poverty are not as pronounced as in South Asian systems. In the latter systems, poverty tends to afflict the agriculture-dependent landless, female-headed households, as well as households whose farms have low productivity. Income poverty, which may be either chronic or seasonal, tends to be high in areas where irrigation systems perform poorly. These findings suggest that there is scope for targeting support to the poor in South Asian systems.

Equity and security in access and rights to resources matter for larger poverty impacts. Inequity and insecurity in access and rights to land and water are bad for both productivity and poverty. Where land and water equity exists, irrigation in itself is pro-poor (as in Chinese and Vietnamese systems).

As much as there is gender discrimination, there is also discrimination of minorities and groups along caste and ethnic lines in irrigation. There are strong linkages between irrigation, gender, diversity and poverty issues. In South Asian systems, poverty is generally higher among female-headed and low-caste/ethnic minority households. From a socioeconomic standpoint, they are important stakeholders. However, their participation in irrigation management is very low, and their involvement in irrigation decision making is important not only to address existing gender and diversity

discrimination issues, but also to enhance benefits of irrigation investment to the poor men and women. The improved understanding of both gender and diversity issues is important for designing effective pro-poor interventions.

While irrigation management reforms of recent years in South Asia have generated some benefits, significant benefits to the poor are not visible. In South Asia, institutional reforms in the irrigation sector are moving at snail's pace and only on a limited scale (e.g., mostly at the tertiary "canal" level but not much at higher levels).

In many cases, these changes are proceeding without the prior elimination of basic constraints that have so far prevented poor people from fully enjoying the benefits of earlier irrigation investments. Irrigation governance reforms will help the poor only if they are carried out as part of a broader set of pro-poor changes— changes that address issues such as fair sharing of resources and higher agricultural productivity and profitability. There are indications, though, that the irrigation-sector reforms where implemented have improved infrastructural maintenance, made water distribution fairer, and boosted agricultural production and productivity. However, measurable significant benefits to the poor are not yet visible. The overall conclusion from the country studies is that while the ongoing reforms being promoted, particularly in South Asia, such as irrigation management transfer and participatory irrigation management, have generated some benefits including for the poor, they have been implemented only partially, with no explicit pro-poor elements, and are not sufficient for improving system performance and benefits to the poor in a significant way.

In South Asia, unless irrigation reforms are sharpened with a pro-poor focus, the poor may be bypassed. Irrigation reforms are likely to generate significant benefits for the poor where land and water are less inequitably distributed; users are socioeconomically less heterogeneous; benefits of irrigation to farmers are significant and irrigated agriculture is profitable; there are accountability mechanisms and incentives in place for improving service delivery; cost of irrigation to users is linked to service delivery; and irrigation performance is linked not only to broader-level growth benefits but also to benefits to the poor. In South Asian countries, where most of these conditions are only partially met, unless irrigation reforms are sharpened with a clear pro-poor focus through necessary changes in polices and institutions, the poor are likely to be bypassed, as in the past.

Some of the Key messages

- It is generally perceived that there is a trade-off between equity/poverty and productivity. This study suggests that this is not necessarily so. High level of inequities in land and water are bad both for productivity and poverty. Irrigation has larger poverty reducing impacts where land and water are more equitably distributed.
- Irrigation benefits are often seen mainly in terms of crop productivity improvements. However, the study suggests that crop productivity is only one of many irrigation direct and indirect benefits (such as benefits related to employment, wages, prices, consumption, food security, incomes, benefits from multiple uses of water, irrigation induced investments in agricultural and non-agricultural sectors, benefits from canal water induced groundwater development and recharge) classified as type 1-5 in this study. Indirect benefits of irrigation can be larger than direct benefits when these other benefits are also accounted for.
- It is often assumed that targeting of poverty and support to the poor in canal systems is difficult. The project findings suggest that poverty varies significantly across systems and locations within systems, particularly in South Asian systems, and geographical targeting of poverty across and within systems can be done.
- Low irrigation service charge policy is often justified on account of poverty and is assumed to benefit the poor. The study suggests that in settings with greater inequities in land and water distribution, as in India, Pakistan and Bangladesh, low level of irrigation charge does not necessarily benefits the poor, and it could be disadvantageous to the poor where low charges lead to under-spending on O&M works and the system performance suffers. Further, application of a single level of irrigation service charge across areas and systems could lead to situations where the poor end up subsidizing the non-poor.

The study suggests that:

- Irrigation interventions can be designed to re-distribute benefits in favor of the poor.
- For irrigation investments to be pro-poor, the criteria should be not only hectares developed/rehabilitated, but also the number of households/farms/persons benefited; and not only the aggregate productivity benefits but also the types of benefits and the share of the poor in total benefits.
- In making new investments (either in new development or improvements of existing systems) and in designing irrigation interventions and irrigation impact assessments/evaluations, it is important to incorporate a) poverty alleviation criteria as defined in this project (i.e. strongly pro-poor, pro-poor, neutral or anti-poor), b) generic typology of direct and indirect benefits and dis-benefits (type 1 to 5), c) typology of beneficiaries/affectees and d) a tri-level framework (micro, meso and macro levels) for identifying constraints and opportunities for enhancing benefits of investments/interventions to the poor.

In addition to offering a comprehensive framework for identifying and designing pro-poor interventions, the study provides a menu of pro-poor intervention options and a detailed set of specific actions and guidelines.

Effective institutions for management, incentives to managers and service providers, decentralized financing, and effective arrangements for monitoring and accountability matter for irrigation performance. Irrigation systems managed by public agencies tend to perform poorly. The underlying causes are inadequate funding, lack of incentives for good management, and weak monitoring and accountability mechanisms. Further, lack of clear and secure water rights and allocation rules and corruption-related problems adversely affect performance of irrigation systems and their poverty-reducing impacts. On the financial side, irrigation charges to users in South Asia are often too low or improperly structured, collection costs are too high, and the fees collected from users are not actually channeled back into local system operations and maintenance. Moreover, the low level of irrigation service charges applied uniformly to all socioeconomic groups of farmers often disadvantage the poor, particularly in systems characterized by high inequity in land and water distribution. There are indications, though, that performance is improving in irrigation systems where management functions have been transferred to local user groups and private service providers.

Benefits and costs to the poor, and long-term sustainability of irrigation software and hardware should matter in the calculus of irrigation investments. Irrigation investments have typically centered on the creation of physical facilities and institutions and on their economic performance in terms of aggregate costs and benefits, with little or no attention to specific benefits and costs to the poor. In most situations in South Asia, almost no attention has been paid to the longer-term sustainability of the new infrastructure and organizations created, and to enhancing their benefits to the poor on a long-term basis.

Larger poverty impacts can be realized by integrating investments in irrigation infrastructure, management and service delivery. Evidence from both other recent studies and ours shows that the poverty-reducing impacts of irrigation-related interventions are larger when they are implemented in an integrated framework [(e.g., integrated approaches for—managing surface water and groundwater; developing systems that allow multiple uses of irrigation water, and for new investments in improving irrigation infrastructure, irrigation management, and service provision in agriculture (provision of inputs, technologies, information, finance, marketing)].

Chinese experiences in resource distribution, institutional, management and technological interventions offer important learning opportunities for South Asia. As a whole, South Asia has much to learn from experiences in land and water distribution, institutional, management and technological interventions, in Southeast and East Asia, particularly China. In these latter regions, irrigation management and other support services are more incentive-based and relatively more equitable, and the agriculture productivity and the benefits of irrigation are higher as a result. China and Vietnam have adopted a "distribute first" approach to land and irrigation water, and rural development as a whole. South Asia, in contrast, has adopted a "grow first" policy in which distributional issues have largely been ignored. As a result, irrigation has not benefited the poor people nearly as much as it could have in this subregion. In the South Asian countries studied, there is a considerable scope for reducing poverty through land, water, productivity and related policy- and management-level interventions.

Based on these conclusions and lessons, the study develops a range of options, detailed specific measures and a set of guidelines for addressing the identified key issues and for

moving forward with pro-poor interventions. In India, Pakistan and Bangladesh, the first and the basic step is to create an enabling environment for correcting existing resource inequities for poverty reduction—through development and strengthening of policies, laws and strategies (specifically related to poverty reduction, land, agriculture and the water sector) and linking these policies under a consistent framework. This should aim at creating permanent assets for the poor by developing and strengthening of land and water rights in a pro-poor mode (as proposed in this study). The following are some of the key suggestions for making irrigation investments in new development or improvement/ rehabilitation of existing systems pro-poor. Unless specified, these are applicable to all countries studied.

Make irrigation investments pro-poor

- select policy- and project-level interventions based on poverty impacts, including gender and diversity impacts, using a "pro-poor" criterion as suggested in the generic typology of interventions developed in this study (i.e., strongly pro-poor, pro-poor, neutral, anti-poor);
- make poverty impact assessments as the first step in designing, implementing, monitoring and evaluating projects and interventions;
- use the generic typology developed in this study to incorporate all forms of direct and indirect benefits and dis-benefits/costs of irrigation in policy and project development (see *Hussain 2005* for details on typology of irrigation benefits and dis-benefits);
- make irrigated agricultural investment packages for hardware and software development more comprehensive by integrating investments in infrastructure, management and service delivery in agriculture, with emphasis on integrated approaches and public-private partnerships;
- prioritize geographical areas and socioeconomic groups for irrigation investments and targeting support to the poor;
- recognize that both gender as well as diversity aspects are critical not only to addressing discrimination issues but also to enhancing benefits of irrigation investments especially to the poor.

Re-distribute irrigation benefits to the poor through policy and institutional reforms

- adopt a sequenced approach in irrigation reforms using a muti-level framework (micro-meso and macro levels) offered by the study, and prioritize geographical locations for reform interventions with separate models designed according to local conditions.
- in implementing irrigation institutional reforms, distinguish between *irrigation as a "resource" and as a "service"*—as the former concept requires some form of public-sector intervention in the management of a resource (as it has both positive and negative externalities associated with it), and the latter requires emphasis on

delivery of quality services. Adopt pro-poor approaches to managing resource and service delivery with pro-poor institutions, financing and service-delivery arrangements through participatory approaches as proposed in this study.

- for addressing difficult issues in land and water equity and rights in South Asian countries studied, start with modest measures (see Hussain, 2005 for details on proposed measures)**.**
- promote other pro-poor measures that leads to redistribution of irrigation benefits to the poor:
  - promote differential irrigation service charging across systems and locations,
  - recover initial capital cost or replacement cost from advantaged areas and large farmers,
  - ensure compensation to the poor smallholders for failure of service providers to deliver water to them,
  - promote labor- intensive methods of construction and rehabilitation of irrigation for increased employment for the poor;
  - promote labor-intensive methods of production in new or rehabilitated systems,
  - involve the poor in irrigation O&M activities, monitoring and supervisory roles and in irrigation service charge assessment, collection and spending activities.

    Ongoing reforms provide an important entry point for promoting these proposed pro-poor measures, by incorporating them into the new irrigation/water policies and laws, guidelines to irrigation managers and service providers, and in new rules, regulations and laws being established for WUAs and higher canal-level organizations.
- promote decentralized financial autonomy of irrigation service, with an irrigation charging system designed to meet the dual objectives of improved cost recovery and increased benefits to the poor, with a strong regulatory backup. Introduce differential irrigation service charging across locations, and irrigation systems and relate them to system O&M costs, benefits derived from irrigation use and poverty situation—with due attention to aspects such as institutional arrangements, service charge level, charge structure, assessment, collection and spending. The study identifies twelve essential components of charging and offers options for designing a charging system to achieving the desired objectives (see Hussain 2005 for details).

Establish effective institutions for monitoring and enhancing benefits to the poor

- make new institutional arrangements for monitoring and enhancing benefits of irrigated agricultural investments to the poor by creating effective institutions - establish an independent organization/body for developing, implementing and monitoring pro-poor interventions in irrigated agriculture and for enhancing

benefits to the poor men and women of investments in land and water-resources development especially in India, Pakistan and Bangladesh.

- promote pro-poor approaches to enhancing the value of water, including diversification of crop and farm enterprises for increased employment opportunities and higher returns to farming; and promote improved production methods, micro-irrigation, and resource conserving technologies.

Develop knowledge-base on poverty and promote learning alliances and partnerships

- strengthen the local-level knowledge base on poverty - the knowledge base on poverty at small geographical scales (such as the subdistrict or irrigation-system level) is weak and sometimes flawed. It needs to be strengthened. Donors, in partnership with national agencies and NGOs, could help create poverty maps and indicators for use at local scales.
- promote adaptive learning and action research. Support and facilitate cross-country exchanges of experiences, knowledge and learning, especially across China and South Asian countries.
- facilitate development of partnerships among public agencies, the private sector, NGOs and poor communities for improving access of the poor to resources and service delivery in agriculture.

We trust that the study lessons and the proposed pro-poor intervention options and guidelines offered in the paper would be useful to the government policymakers and planners, donors, NGOs, researchers and other stakeholders involved in poverty-alleviation efforts in developing Asia and elsewhere.