

Irrigation against Rural Poverty: An Overview of Issues and Pro-Poor Intervention Strategies in Irrigated Agriculture in Asia

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Summary

As the largest user of water, irrigated agriculture is under intense pressure to concede water to other, rapidly growing sectors. Subsidies for infrastructure are shrinking, the most accessible and cheapest water resources have been developed, and in an increasing number of river basins, all or most of the water resources have been committed. Demand for water for higher value uses—domestic, industrial and hydropower—is rising and there is growing pressure to allocate adequate water to environmental needs. A natural consequence of scarcity is conflict over water allocation, rights and entitlements among the various claimants. In the face of these problems, the irrigation sector must produce more food with less water. Achieving sustainable increases in the productivity of irrigated agriculture requires increased water use efficiency at farm and system levels, and integrated management of water resources in water basins. Aware of these issues, many Asian developing countries are preparing to reform their policies and institutional systems. ADB's emerging water policy is helping this process. There is an urgent need for policy research and science-based solutions to improve the productivity and sustainability of irrigated agriculture, to ensure water-food security for poor men and women, a critical step in poverty eradication.

Introduction

Despite the remarkable expansion of irrigated agriculture in Asia that brought dramatic increases in aggregate food production in the past three decades, there remain vast areas in the established irrigation systems where productivity and incomes of farmers remain generally low and highly variable. This is attributed to a number of factors, including inequitable access to water, poor management, and a range of other physical, sociocultural, and economic constraints. The efforts of developing country governments to address poverty reduction in these specific areas have been limited and ineffective due to lack of proactive policies and actions, and knowledge of how alternative economic, institutional, governance, and technical interventions can address poverty related constraints. However, in the face of increasing water scarcity and ever-increasing demand for food, many developing countries in the Asian region are gearing up for major policy

and institutional reforms to optimize the management of their water resources. Enhancing the productivity of poor farmers in these areas is a priority, as they are most vulnerable to the impacts of water scarcity. Poverty eradication is now the shared goal of donors including the Asian Development Bank (ADB), developing country governments, the CGIAR, and other major research and development institutions. Since the bulk of the poor in Asia still live in rural areas and are largely dependent on agriculture for food, income and livelihoods, and since irrigation is a major contributor to agricultural production, it is logical to focus on how the performance of this sector can be improved, so that it can become an effective instrument to fight rural poverty in the region.

Irrigation has played a major role in poverty reduction in the past, even though the benefits were not always equitable. Irrigated agriculture will continue to be the main source of food supplies and employment for the poor in Asia. But the vitality of this sector is declining with growing scarcity and competition for water and increasing overexploitation and degradation of groundwater. Three conditions must be met to restore the pro-poor economic potential of irrigated agriculture: productivity, equity and sustainability. The productivity of irrigated agriculture is substantially below its potential in the region, with significant variation within and across countries. Low productivity in irrigated agriculture is largely a consequence of inappropriate policies and weak management institutions, which were designed for very different conditions in the past. Moreover, the extent to which irrigation contributes directly to improving the lives of poor rural people is a function of proactive policies and effective support mechanisms aimed at promoting equity and people-centered development. More will be said on what these policies might be during the workshop deliberations. Sustainable irrigation systems imply balancing economic, social, and environmental benefits through implementation of development policies, programs, and projects that will not enhance one type of benefit at the cost of others.

This paper highlights major issues related to irrigation management and suggests approaches that can help make this important sector more productive, equitable and sustainable, with the ultimate aim to reducing widespread poverty in the region.

Background

Agriculture in developing Asia as a whole has made remarkable progress over the past three decades. Between 1970 and 1995, cereal production more than doubled from over 300 million metric tons to 650 million tons, while the population increase during the same period was 60 percent. This remarkable growth in food production was largely attributed to the growth in irrigated agriculture, coupled with the use of high-yielding varieties of crops and the application of fertilizers and pesticides. At present about 40 percent of the cropland in Asia is irrigated and accounts for about 70 percent of total cereal production. Irrigation has greatly improved the incomes of farmers with access to fertile and well-drained lands, reliable water supplies, yield-enhancing inputs, and credit as well as other supporting services. It has also benefited the overall population by providing more food at reduced prices.

Although benefits are generally considered to be skewed in favor of those having access to fertile, well-drained lands, reliable water supplies, and yield-enhancing inputs, poor people have also benefited in terms of enhanced food security and incomes (marginal and small farmers), lower food prices (mostly urban poor) and employment (both rural and urban poor). In the period between 1965 and 1984, the net irrigated area grew at a compound rate of 1.6 percent, while food production was increasing at 3 percent per year. Between the 1960s and the 1990s real food grain prices fell by nearly 50 percent (ADB 2000). For landless laborers, tenants and share-croppers, increased cropping intensities through irrigation has meant more work over more days of the year.

Despite these achievements, the productivity of a large part of irrigation systems remains severely constrained by insufficiency of some or all of these inputs. Such low-productivity areas are characterized by persistent rural poverty. The distribution of benefits from irrigation development is thus largely skewed and unequal. Furthermore, the agriculture sector in the Asian and Pacific region is now facing the challenge of meeting increasing food demand, while conceding more water to other, 'high-value' uses. To add to this the many environmental negatives associated with irrigation were underestimated when large irrigation systems were originally designed. This raises the question of sustainability. The population of the Asian region is expected to grow from the current 3.0 billion people to over 4.5 billion by 2025. The per capita availability of water in 2025 is estimated between 15 and 35 percent of levels in 1950. ADB's 1999 rural Asia study showed that the cost of investing in new irrigation schemes has also increased substantially.¹ Moreover, the demand for water for other economic uses is rising fast in association with the rapid economic growth and urbanization in the region, along with the growing pressure to protect the environment.

During the past two decades, the rate of expansion in irrigated area has declined to be nearly stagnant throughout Asia. Much of the past expansion in agriculture came through development of large and medium-scale irrigation systems. However, this option is no longer available to the majority of Asian developing countries. It is becoming increasingly difficult to expand irrigated areas, as most accessible water resources have already been developed to capacity in a growing number of river basins and the areas having good land and water resources are diminishing— thus closing land frontiers and basins. Perhaps even more important reasons for lack of expansion are, escalating financial costs, lower economic returns, and increasing concerns about environmental and social impacts of large scale irrigation systems (Rosegrant and Ringler 1998).

From a food security perspective, there has been very slow growth in yields and in the total output of the main cereals (ADB 2000). As the single most dominant user of available water resources, irrigated agriculture is facing increasing pressure to produce more food with less water through significant improvements in water use efficiency at the farm and system levels. Low-productivity irrigated areas are in a particular stress, as

¹The real cost of new irrigation schemes increased by 150% in South and Southeast Asia between 1966 and 1988, thus weakening the justification for investing in new irrigation.

resource-poor farmers in those areas are most vulnerable to water shortages, while there is also a significant need to enhance food production there to ensure food security for the growing population.

Causes of Rural Poverty

Low productivity and low incomes

A number of factors contributing to poverty relate to low-productivity in irrigated systems. These include:

- i. Poor performance of irrigation systems caused by institutional and managerial factors;
- ii. Physical factors (poor design, unsuitable topography, poor drainage, poor soil conditions);
- iii. Economic constraints (smaller landholdings, lack of financial resources and credit, lack of key inputs and marketing outlets); and
- iv. Sociocultural problems (tenure arrangements such as insecure rights and large landholdings leased to individual farmers, caste-related inequities, gender bias).

While the determinants of low productivity are numerous and complex, they are to a large extent associated with poor performance of many of the established irrigation systems, which causes low, inequitable, and unreliable water supplies in those areas.² It has been widely acknowledged that actual irrigated areas in many of the irrigation systems are much smaller than planned. Large areas within the irrigation systems suffer from chronic and severe water shortages, especially the tail-end reaches. Large-scale waterlogging has also been reported. It is now widely known that these problems are

²Examples of low-productivity irrigated areas in Asian developing countries include parts of both upper and lower Indus basin (in Punjab and Sindh Provinces Pakistan); tail-end areas of large government-managed systems in several Indian states including the states of Bihar, Uttar Pradesh, and Andhra Pradesh; northern and northeastern Bangladesh; northern uplands, north-central and central highland regions in Vietnam; irrigation systems in Central Java and in some of the outer islands in Indonesia; and northwestern part of the People's Republic of China including the provinces of Shaanxi, Gansu, Qinghai, Ningxia, and Xingjiang.

largely caused by institutional and managerial factors, poor governance, and lack of funds for maintenance, rather than technical constraints, which could be addressed without large physical interventions but with greater cost-effectiveness benefiting the poor.

Most of the past investments in irrigation were not targeted specifically to poor people. Also, women's needs and environmental concerns were rarely assessed in most of the earlier projects (ADB 1995). These were largely concerned with increasing the overall food production to achieve national food security and broad economic growth. In projects lacking a specific poverty focus, benefits to the poor have often been insufficient to significantly improve their living standards. The efforts of governments and other agencies to improve the livelihoods of poor irrigation farmers have not been uniformly successful, and a better understanding of the reasons of this phenomenon is needed, particularly as competition for available water resources increases throughout the region.

Inequities in access to water resources and skewed benefits in irrigated agriculture

In the past, agricultural policies in Asia, driven by the notions of self-sufficiency, were largely focused on aggregate food production. Investments in irrigation were determined on crude economic indicators, such as return on investment and the internal rate of return; social returns and environmental impacts received cursory consideration in the early investment decisions. The politically powerless smallholder farmers, women and the landless were unable to have their economic interests articulated in national policies. This meant that poverty and environmental (crucial for poor) considerations were either not included, or were left to the 'invisible hand.' New knowledge available over the last decade suggests that strategies exclusively focused on growth do not deliver, unless they are accompanied by deliberate measures that ensure a good degree of equity in access to, and control over, resources. What are some of the main equity issues in large irrigation systems in Asia, and how can they be addressed? More importantly, what are the best practices in the region in this area, and how they can be up-scaled and replicated?

Inequities exist in many forms: some social categories get access to water, whereas others do not, or do so on less favorable terms. Inclusion and exclusion processes in decisions regarding investment in allocation and governance of water resources typically take place along class, caste and ethnic as well as gender lines. Poverty, a state of multidimensional deprivation, is very often correlated to deprivation from water in sufficient quantity and quality. Deprivation from access to water for productive uses is a strong bottleneck preventing poor people from fulfilling their basic income needs and escaping income poverty. Under growing water scarcity it is very probable that the social categories with the stronger water rights will secure their access to water first. Thus, the limited water rights that a number of poor people gained in the past risk being weakened and those poor people who were already excluded in the past risk being excluded forever. Growing water scarcity risks to aggravate rural poverty.

These and other inequity issues are an important focus of the current project and constitute a challenging topic for the workshop. For instance, in the classical case of head-tail inequities found in an irrigation system, an important discovery may be a higher concentration of the poor at the tail end of the system, which will have implications on water allocation strategies. Similarly, well-defined water rights and guaranteed provision of specified irrigation services may have a positive poverty impact. Quantification and comparison of water productivity on small and large farms together with labor absorption capacity at different levels of farm size will provide important clues to allocating water resources that meet both the productivity and equity criteria.

Environmental Issues in irrigation

Irrigation is the largest user—some say abuser—of fresh water resources, especially in the Asian region. The inescapable conclusion is that irrigation has to produce more food with less water. What are the options for water savings, for mitigating the negative environmental impacts of irrigation, and for maintaining the regenerative capacity of agro-ecological systems in Asia? Before we can address these questions, we need to assess, quantify and put an economic value on the environmental consequences of irrigation and compare those with its benefits. This will enable governments, communities and individual farmers to make informed choices about the sustainable use and management of their water and indeed other natural resources.

What can be done to increase productivity, equity and sustainability in irrigated agriculture?

Attempts made by most Asian developing countries to improve the productivity of irrigated areas have been minimal and largely ineffective. Irrigation-related research has largely been focused on general agricultural productivity increases under the overall goal of increasing food production and enhancing food self-sufficiency. While international research organizations, including IWMI, have pursued the improvement of irrigation systems performance, the research efforts have not gone much beyond technical and physical interventions and general irrigation management transfer to farmer organizations at large. Little scientific knowledge exists on how a range of non-technical interventions such as economic, financial, institutional, and governance measures can most effectively contribute to reducing poverty in these low-productivity areas.

With few opportunities to expand irrigated areas in most Asian countries, attention is now shifting to increasing the productivity of irrigated agriculture, with a particular focus on “poverty stricken irrigated areas.” These areas are characterized by substantially lower agricultural productivity than the national averages and their potential, acute water shortages, water and land degradation, and competition for, and inequity in access to, water. The low-productivity irrigated areas in Asia are home to a large number of poor

people. Typically, poor people in these areas have smallholdings, or are landless or otherwise asset-less. They lack financial resources to invest in productivity enhancing technologies, often have no access to credit, and are more prone to risks associated with higher investment and failing water delivery. Also, many sociocultural factors and political influences limit their access to and participation in the decision-making processes. As users of small quantities of water, poor people play minor roles in causing water scarcity and pollution, but are affected most adversely by their consequences. For them, access to small quantities of good quality water is the difference between having a crop or no crop at all.

Under the circumstances, attention should now be focused on improving the productivity of these less productive irrigated areas, while addressing the range of specific poverty related problems therein. This should be pursued in the context of improving the overall water use efficiency, equity, and sustainability of the concerned irrigation systems. Emerging water policies of countries and donors encourage the transfer of management to autonomous and accountable service delivery agencies with appropriate user representation. Reducing poverty by ensuring equitable distribution of water in this process is also emphasized. ADB draft water policy and its poverty reduction strategies are examples of this. Some developing countries in Asia have already initiated programs toward this direction, adopting certain levels of management transfer of irrigation facilities to water user associations and installing financial autonomy and accountability measures. However, there is little evidence that these measures have resulted in more efficient water use. Even less available is the evidence that they have contributed to poverty reduction.

To enhance the overall performance of irrigation schemes, in terms of productivity, equity and sustainability, a more elaborate set of appropriate interventions and their sequencing, need to be defined. The interventions should be able to provide necessary incentives and mechanisms for improved equity and reliability of water supply to those areas, ensuring the participation of poor farmers in the decision-making processes of water management. Necessary measures to ensure the sustainability of operation and maintenance (O&M) should also be put in place adopting the user-pay principle while taking into account affordability to the poor. Furthermore, specific interventions should be identified and designed to address other types of location-specific constraints to poor farmers. This objective can only be pursued through a rigorous assessment of the determinants of poverty in the low-productivity areas, and analysis of the poverty impacts of a range of alternative pro-poor economic, financial, institutional, governance, and technical interventions that are available or emerging within the region. Necessary changes in the overall policy and institutional framework should also be assessed to ensure an enabling environment. Given that the managerial and institutional weaknesses largely contribute to the persistent poverty in these areas, due attention should be paid to a range of non-technical interventions. These include managerial reforms in water user organizations, administration of water rights and water pricing, regulatory and supervisory measures, and other incentives and mechanisms to improve equity while improving system performance.

As mentioned earlier, much of the irrigation-related research to date has been limited to analyzing the general agricultural productivity increases resulting from technical and

management interventions. Little empirical knowledge exists on the specific poverty and productivity impact pathways of policy and institutional interventions. Consequently, attempts to target the poor have met with limited success. Rigorous analysis of poverty, water scarcity and low productivity in low performing irrigation systems and their relationship with the policy and institutional environment is therefore needed to develop effective poverty reduction strategies.

Attention must be paid to broader analysis of irrigation performance in the context of scarcity and competing uses of water basins and to finding ways to increase the productivity of water used in agriculture. Other broader issues such as institutional reforms at the system and river basin levels and the understanding the water-poverty nexus must be addressed urgently. Poverty and gender in irrigated areas is currently a subject of special research. This work is rooted in the current understanding on poverty and its causes, especially those offered by Amartya Sen and others. IWMI's research shows that poor people are essentially *water deprived*, and the policy interventions to combat this situation have to be based on the idea of *entitlement*. This means that policies and interventions need to address not just low productivity, but also inequities in access to water and decision-making forums.

IWMI has documented several cases where policy changes have led to positive outcomes for the poor. For example, an ADB supported study in Bangladesh confirmed that, the pro-poor impact of freeing the market in small pumps reduced the vulnerability of smallholders to "water lords" and the emergence of a competitive water market with excellent water service even to the poorest farmers. Institutional research in Pakistan led to establishing joint management of irrigation systems by water users and agency staff, and reduced head-tail inequities, and eventually induced pro-poor legislation and primary and provincial level institutions (IWMI 1999). Preliminary findings from studies in South Africa on *water reserves* for the poor, show promising prospects to ensure poor people's entitlement to water to meet their basic social and economic needs (Van Koppen 2000). Research in India, Sri Lanka and elsewhere show that targeted irrigation development and improvement of existing systems can be a significant tool for poverty reduction.

Irrigation Management Transfer (IMT) policies can also have a strong poverty reduction impact by actively stimulating conjunctive water use and by organizing tail enders to contest water use at the head. There is considerable evidence that IMT is only viable if larger farmers see an opportunity to improve water delivery considerably through own management, and if extra labor and monetary costs still remain a minor portion of their total production costs (Shah forthcoming). This implies that poor farmers in the same command area would be passive followers, taking advantage of the trickle-down effects. This contradicts the often-implicit belief that IMT will stimulate democratic decision making through brand-new inclusive and horizontally organized member-organizations. A better understanding of equity effects and functional differentiation in water user organizations will allow identifying critical measures to ensure both effectiveness and equity, and better targeting of those measures. Better understanding of gender relations in irrigated agriculture and removing specific bottlenecks for women farmers to become more productive will also be an effective strategy. These approaches have not yet been consistently applied to the irrigation sector.

A study on ‘Pro-poor intervention strategies in irrigated agriculture in Asia’ has been proposed that will undertake a rigorous analysis of poverty, assessments of performance of irrigation systems and its impacts on poverty in low productivity irrigated areas and determine their relationship with the policy and institutional environment, in order to develop effective poverty reduction strategies.

The Proposed Study

Objectives

The overall goal of the proposed study is to promote and catalyze equitable economic growth in rural areas through pro-poor irrigation interventions in the participating Developing Member Countries (DMCs) of ADB [Bangladesh, People’s Republic of China [PRC], India, Indonesia, Pakistan, and Viet Nam]. The immediate objective is to determine what can realistically be done to improve the returns to poor farmers in the low-productivity irrigated areas, the context of improving the overall performance and sustainability of the established irrigation schemes.

Scope

The study will focus on selected representative low-productivity irrigated areas and their peripheries with a large number of people under persistent poverty in the participating DMCs. The emphasis is on identifying and assessing a set of appropriate economic, financial, institutional, governance, and technical interventions at field and system levels, and changes in the overall policy and institutional framework as far as they affect the poor people’s access to water resources. The scope is as follows:

- i. Analysis and field research on the impacts of the current policy and institutional framework, and the impacts of underlying physical, economic, and sociocultural conditions on the selected areas in particular and on the overall irrigation systems at large, including the assessment of opportunities for and constraints on improving productivity in these less-productive areas through improved access to irrigation water;
- ii. Identification and in-depth evaluation of a range of potential pro-poor economic, financial, institutional, governance, and technical interventions at field and system levels against a set of criteria including cost of implementation and potential to reduce poverty, and assessment of necessary changes in the overall policy and institutional framework under which such interventions could most effectively address poverty reduction in the study areas; and

- iii. Formulation of a set of appropriate interventions and the policy and institutional frameworks, including adequate support systems, required to ensure large-scale uptake, replicability, and higher impacts within and between Asian countries, to culminate into (a) the guidelines for identifying and evaluating appropriate pro-poor interventions and enabling policy and institutional framework for irrigated agriculture in Asia, and (b) country-specific action agendas for the selected low-productivity areas of the participating DMCs.

The participating DMCs are Bangladesh, China, India, Indonesia, Pakistan, and Vietnam. These countries have responded positively to IWMI's inquiries about their interest in participating in this study, and all have vast poverty-stricken low-productivity irrigated areas in their established irrigation schemes and the peripheries. They therefore have a strong interest in reducing poverty in these areas, with sound research-based advice and assistance in planning and implementing necessary pro-poor interventions.

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