# Introduction

RAINER LOOF & PUSHPA R. ONTA

*Asian Institute of Technology, GPO Box 2754, Bangkok-10501, Thailand*

Irrigation has historically played, and will continue to play, a critical role in the agricultural development and the overall well-being of many societies around the world. Since the beginning of this century, there has been a significant expansion of irrigated land. Governments and donors have made massive investments in the irrigation sector. According to the Food and Agriculture Organization (FAO) of the United Nations, the global irrigation area increased from about 40 million hectares (ha) in 1900 to about 153.7 million ha in 1965 and about 241.6 million ha in 1991. A significant proportion of this expansion was in developing countries, with Asia accounting for almost 65.4% (100.5 million ha) in 1965 and 64.0% (154.5 million ha) in 1991. Irrigation, indeed, has been a major factor in meeting the food requirements of the vast population of the Asian region, which at 3.233 billion (in 1992) represents about 59% of the world's total population.

Yet it is now well recognized that the irrigation systems, particularly in developing countries, have generally been performing far below their potential. Most irrigation systems are known to operate in an inefficient manner thus resulting in a smaller than expected irrigated area. Inadequate and erratic supply of water have adversely affected the levels of production thus reducing the actual irrigation benefits and making the system financially and economically unattractive. Irrigation water supply is normally inequitable to the tail-enders or poorer farmers thus leading to social injustice. The physical facilities are known to be improperly planned, designed and constructed, without the required participation of local people. The requirements of the specific environment and the role of indigenous institutions for managing irrigation are not fully considered. Moreover, in the absence of timely and proper maintenance, irrigation systems deteriorate quite rapidly with time and cease to provide the expected quality of service early in their design life. Many irrigation schemes have also been suffering from adverse environmental impacts such as waterlogging and salinization, which raises the question of sustainability of these schemes.

The worldwide observation of low irrigation system performance is disappointing because much is expected from the irrigation sector in the future in order to satisfy anticipated food demands for an ever-increasing population. The population, especially in developing countries, continues to grow at alarmingly high rates. The annual population growth rate for Asia during the 1975–92 period was 2.20%, which was higher than the global rate of 2.02% during the same period. On the other hand, irrigation expansion cannot continue as

observed in the past for various reasons such as financial constraints, increasing development costs, limited additional irrigation potential, increased competition for water from municipal and industrial uses, inappropriate pricing and land use policies, and environmental concerns. In fact, the average growth rate of the irrigation area in Asia has declined from 1.83% over the 1965–70 period to 1.76% from 1975–80 and 1.28% from 1985–90. The ratio of arable and permanently cropped land to total agricultural population has declined from 0.31 ha/capita in 1965 to 0.23 ha/capita in 1990. Thus, improved performance of both existing and new irrigation systems will be critical for sustained agricultural growth in the future. Several studies already indicate that if the current trends of irrigation development and management continue, the Asian region will face a serious challenge of food shortage as early as the dawn of the next century.

Some important issues confronting irrigation today are ineffective management procedures and practices, inefficient system operation and water utilization, inappropriate technology including that for maintenance, lack of monitoring and evaluation, adverse social and environmental impacts, lack of peoples' participation, and ineffective policies and institutions. All these should be addressed with greater vigour in the future than in the past if sustainability of irrigation is to be ensured. This has been recognized by concerned governments and various international and regional institutions such as FAO/UN, IRRI, ICID, IIMI, IPTRID, IFPRI, World Bank and Asian Development Bank, which are working in the above-mentioned problem areas within the scope of their respective mandates. Several research and development studies, many in cooperation with the governments concerned, have been carried out to understand and solve some of the critical problems facing the irrigation sector.

Regarding the important areas of advanced education, research and training, the Asian Institute of Technology (AIT), based in Thailand, has been contributing to meet the growing need of the Asian and the Pacific region, ever since its establishment in 1959 as the SEATO Graduate School of Engineering and in 1967 as an autonomous international institution dedicated to excellence in postgraduate education, research, training and outreach activities such as workshops, conferences, short courses and studies. The Irrigation Engineering and Management (IREM) Programme at AIT was established with the aim of educating students for the planning, design, construction, operation and maintenance of irrigation and drainage systems. In response to changing situations in the region in particular and the world at large, the curriculum was substantially revised nearly three years ago in order to provide additional in-depth coverage on management and policy-related issues in irrigated agriculture. The objective is to integrate technology, planning and management aspects, which include attention to environmental and socio-economic considerations.

This special issue of the *International Journal of Water Resources Development* on 'Irrigation Management in Asia' contains selected papers on various related issues. It is clear that the issues are too numerous and complex to attempt to treat them all in a single publication of this kind. Therefore the topics have been selected based on the fact that they have not received adequate attention and the practical consideration of having them compiled in the limited time available. Irrigation was earlier considered to include developments and impacts within the irrigated area only. With increasing water scarcity and resource limitations, irrigation has to be considered in a much larger dimension within the overall context of river basin management and in some cases on even larger scales. The

papers may be broadly categorized into two types: conceptual and case studies. The topics themselves or their sequencing do not, in any way, represent the 'most' important issues related to irrigation in Asia or their ranking. The publication is a modest attempt to disseminate certain issues, concepts and results to a wider audience and promote discussion so that they may help in solving the urgent problems related to irrigated agriculture, with special reference to developing countries.