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Management of water resources for poverty alleviation in the Hindu-Kush Himalayas

SURESH R. CHALISE

Mountain Natural Resources Division, International Centre for Integrated Mountain Development (ICIMOD), PO Box 3226, Kathmandu, Nepal

e-mail: chalise@icimod.org.np

Abstract For the people living in the remote and inaccessible mountainous region of the Hindu-Kush Himalayas (HKH), year-round availability of water is a major problem. Over the last few decades development interventions have ignored the water needs of mountain communities, their traditional institutions and indigenous knowledge of water management. This has contributed to stagnant food production in the face of increasing population, leading to abandonment of land, migration out of the area and growing poverty of people. Policy reorientation to provide incentives for investment in participatory water harvesting and management systems can contribute to poverty alleviation in the Hindu-Kush Himalayas, in which international scientific programmes and donor communities can play an important role by providing support to national and regional initiatives.

Key words Hindu-Kush Himalayas; water policy; water harvesting; poverty alleviation

INTRODUCTION

The Hindu-Kush Himalayan (HKH) region (Fig. 1), containing the highest mountain ranges of the world and the Tibetan Plateau, is an important storehouse of global freshwater resources providing sustenance to 150 million people in the mountains and nearly 500 million people further downstream (ICIMOD, 1998). Mighty rivers, such as the Indus, the Ganges, the Brahmaputra, the Mekong and the Yangtze originate here. Despite such richness in water resources, shortage of water during dry periods is a major problem for the rapidly growing population in these mountains. There is an urgent need to reorient policy and investment for improved management of water to reduce poverty in the region.

WATER RESOURCES DEVELOPMENT: PROBLEMS AND PRIORITIES

Water resources development in the HKH countries has been primarily concerned about economic transformation of the highly populated urban centres located in downstream areas and plains, for hydropower, irrigation, water supply and flood control. The immense hydropower potential of the region has been of particular interest. For example, the hydropower potential of Pakistan is estimated to be 20 777 MW (Sharma, 1983) and that of the Ganga–Brahmaputra–Barak system to be of the order of

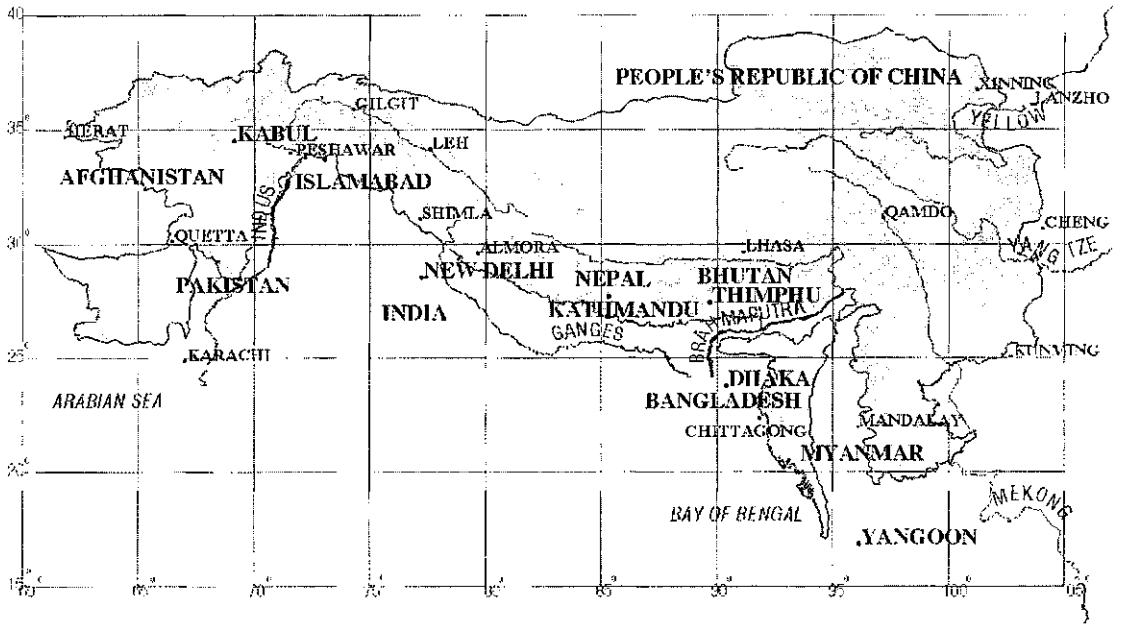

Fig. 1 The Hindu-Kush Himalayan region (source: MENRIS/ICIMOD).

200 000–250 000 MW (Verghese, 1990). Nepal alone has a theoretical potential of 83 000 MW (Gyawali, 1989), which is largely untapped. As the region faces the ravages of floods and droughts every year ambitious plans for optimal utilization of water from major rivers for power, irrigation and flood control have been drawn, such as those for the Ganga–Brahmaputra basin (Singh, 1995). Most of these plans have not been realized, not only because of the lack of funds and difficulties in reaching agreements amongst the riparian countries but also due to the complex hydrology of the Himalayan rivers.

Major rivers in the HKH usually originate in Tibet and reach the sea after traversing two or three countries across diverse climatic and physiographic zones. Thus the river basin of any major HKH river system transcends the national boundaries of several countries. Hence optimal development of regional waters is possible only through cooperation among the riparian countries, which is not easy. However, there are some successful examples of bilateral cooperation.

A major problem in developing an improved understanding of the hydrology of regional rivers is the lack of reliable long-term hydrometeorological data particularly for high elevations in most of the countries. Again such data even when they are available are not easily shared. In recent years, research, studies and training for improved understanding of the complex hydrology of the HKH waters have been initiated at the regional level by the International Centre for Integrated Mountain Development (ICIMOD) through some of its programmes (ICIMOD, 1998) and under the HKH-FRIEND project (Chalise *et al.*, 2002). HKH-FRIEND has also started a Regional Hydrological Data Centre, which encourages sharing of hydrometeorological data among researchers from the region.

Water and seasonality

Availability of water in the HKH mountains is not uniform throughout the year and depends on precipitation, which is highly characterized by seasonality. Precipitation decreases sharply from the south (annual mean 1000–2000 mm) to the north (<200 mm in the trans-Himalayan region and a large part of Tibet). Seasonal variations in precipitation and streamflow in Himalayan basins are very high. Mean monthly discharges of the Himalayan rivers in the low flow months before June and after September are generally 10–20 times lower than during the monsoon months (Chalise *et al.*, 2001). The bulk of the people living in these mountains have therefore to cope either with "too much" or "too little" of water annually.

Local problems, global connections

The impact of climate warming is already being faced by the people living in the harsh highland environments. Deglaciation has led to decreasing availability of water during the dry periods and has seriously affected their agricultural and livestock production as observed in some parts of Tibet, or Ladakh (India) and Mustang (Nepal). This has also led to increasing conflicts on local water rights.

The people living in these vulnerable environments do not have the means to cope with the impacts of changing climates on local hydrology or local agricultural calendars and cropping seasons (Chalise, 1994; Intergovernmental Panel on Climate Change, 2001). They are unable to change their farming practices to adjust to such uncertain changes. Sustained and systematic research on the impact of global warming on the water resources of the HKH have become necessary. The issue of climate change in the Himalayas and mitigation of the resulting hydrological anomalies should therefore be a matter of concern to the global scientific and development community (Shrestha, 1998).

Water, women and poverty

The *per capita* income of the HKH countries (220–780 US dollars) (World Bank, 2001), indicates the state of acute poverty in the region. The comparative figure for the USA is 30 600 US dollars which shows the wide gap that divides these countries from the developed world.

People living in the marginal lands on the upper slopes of the mountains are solely dependent on snowmelt or rainwater for their domestic and agricultural needs. This has seriously affected their food production and income as water storage systems for irrigation during the dry period are practically non-existent in the mountains. A rapid increase in population has also led to growing food insecurity and poverty in these mountains (Panday, 1992). Observations show that increasing scarcity of water is the principal cause of decline in crop yields in these mountains, although this relationship has not been well studied as yet. Growing and pervasive poverty has encouraged the able-bodied male population to move away from these mountains where remittance

economy has become predominant. This has further added to the drudgery of women in these mountains as, apart from their traditional responsibilities for domestic water supply and household chores, they have also got to manage their farmlands in the absence of the male members. In order to free people from the poverty trap a surplus in food production is a must, which is not possible unless critical irrigation needs are met.

Traditional management *vis-à-vis* development interventions

Throughout the HKH mountains, centuries'-old traditional water harvesting structures and management systems exist which are still being used for rural or urban water supply and crop production. Unfortunately, development interventions during the last few decades in most of the HKH countries have virtually ignored the age-old traditional knowledge, skills, technologies, and institutions of water management (Banskota & Chalise, 2000; Agarwal & Narain, 1997). A lot of investment in water supply and irrigation has therefore been wasted and the negative impacts of such external interventions are seen in terms of a growing dependency of people on external support and loss of confidence in their indigenous water management systems.

WATER HARVESTING FOR POVERTY ALLEVIATION IN THE MOUNTAINS: REGIONAL INITIATIVES

Poverty alleviation in the HKH mountains will therefore depend on how effectively water becomes available to the people at the household level to meet their increasing demands for domestic and irrigation needs.

The International Centre for Integrated Mountain Development has been actively engaged in the promotion of water harvesting in the region since 1997, under a project supported by the Ford Foundation. Studies carried out in five countries (Bhutan, China, India, Nepal and Pakistan) on water harvesting policies, technologies and management systems (Banskota & Chalise, 2000) have revealed that rainwater harvesting for year-round household consumption and irrigation is not commonly practised in these countries on a significant scale, except in China. Because of the lack of collection and storage systems, acute scarcity of water is faced by the people living in the hills and mountains of these countries even for drinking purpose during the dry period.

China, however, presents a different picture. As most of China receives less than 500 mm rainfall annually, it has given high priority to rainwater harvesting. In Yunnan, Sichuan and Gansu provinces as well as in the Tibet autonomous region of China, water harvesting is an integral part of the poverty alleviation programme of the national government (Liu & Li, 2000). A clear policy to promote water harvesting at the household level on a mass scale, with one-time subsidy and technical support for the construction of simple collection and storage system has dramatically improved the economy and quality of life of the people within less than a decade (Liu & Li, 2000; Chalise *et al.*, 1999). There are also other successful examples of water harvesting systems in some of the HKH countries (Agarwal & Narain, 1997;

RWSSP/HMG/FINNIDA, 1994), which need support so that they may be extended to make a substantial impact on poverty alleviation.

POLICY INCENTIVES AND INTERNATIONAL SUPPORT

A major policy shift is therefore needed to gear water resources development and management in the HKH countries towards poverty alleviation. However, policies in the developing countries are, more often than not, influenced by the developed donor countries. Presently the world is divided into two categories, the rich and the poor, that are pulling in opposite directions because of economic, technological and philosophical differences (Fig. 2). The affluent developed world is advancing forward with an accelerated speed and the developing world is lagging behind. The developed countries with relatively low population are politically stable and have the means and resources to influence the poor and more densely populated developing countries which are politically unstable and where policies and priorities can change abruptly with a change in political leadership.

The developed countries can therefore make a big impact by providing support to the HKH countries and regional initiatives, like that of ICIMOD, to reorient policies and programmes for the promotion of water harvesting for mountain households on a mass scale, to free the people from the age-old stagnation and "poverty trap". Similarly, support from the international scientific communities and donors for

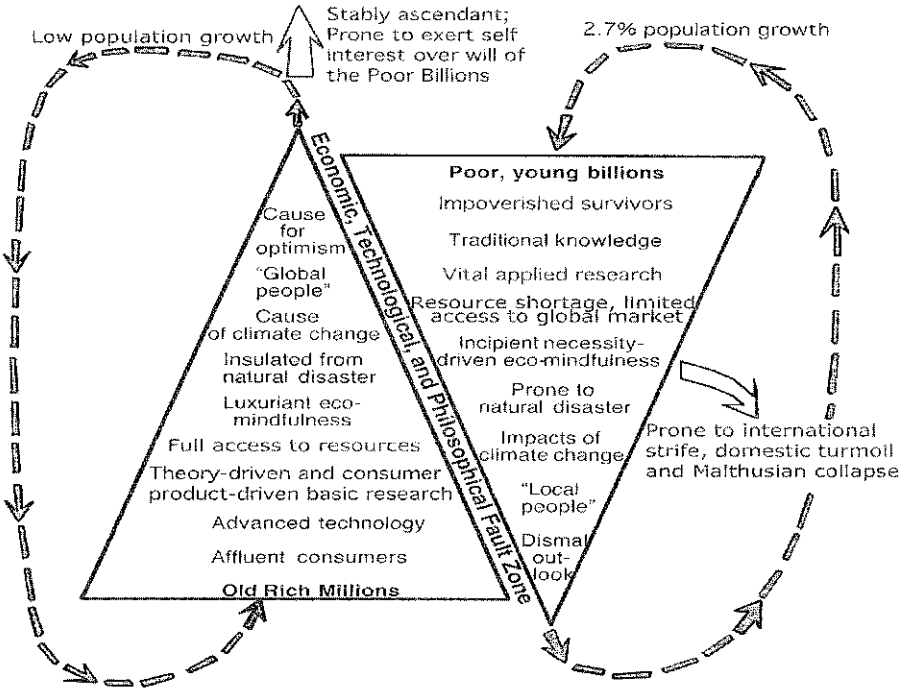

Fig. 2 The accelerating global divide (adapted from McCarthy & Dickson, 2000).

regional initiatives, such as those undertaken by ICIMOD and HKH-FRIEND, for sustained research on global warming impacts on HKH waters will pave the way for eradication of poverty from these mountains in the long term.

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