



# Drylands in East and South Asia

Asia's total land area of 4.3 billion hectares includes about 1.7 billion hectares of drylands, reaching from the Mediterranean coast to the shores of the Pacific. Degraded dry areas of the region include degraded lands in China, India, Iran, Mongolia and Pakistan; eroded mountain slopes in Nepal; and the deforested and overgrazed highlands of the Lao People's Democratic Republic.

In India desertification and drought have long been major concerns. About 76 percent of the country's total land area falls within arid, semi-arid and dry sub-humid zones, and serious land degradation is widespread as a result of intense pressure on the land from a large and growing population.

Widespread adoption of improved wheat and rice varieties through the Green Revolution had a remarkable impact on agricultural productivity in areas of India that enjoy favorable growing conditions. But this approach, centering mainly on crop improvement, made little headway in areas dependent on scant and unreliable rainfall. Starting in the 1950s, researchers embarked on a watersheds approach aimed at achieving more efficient water management in areas prone to desertification. This approach has demonstrated positive results and is now being implemented more widely in many dry areas of South Asia and beyond.

Desertification threatens as much as a third of China's total land area. To a large extent, this is occurring where dryland agropastoral systems are under pressure from a growing population. But deforestation, the destruction of native grasslands through tillage for cultivation and the drainage of wetlands are also prompting widespread land degradation, environmental pollution, sand storms and floods. New development programs aimed at curbing land degradation in China rely on remote sensing to provide early warning of desertification.

China, India and other Asian countries are keenly aware of the importance of combating desertification. And through international cooperation, they

are exploring new approaches to confront land degradation in the region and improve the livelihoods of millions of poor people.

## Selected Highlights from Research for Dryland Development

**Managing watersheds:** An integrated approach referred to as watershed management has proved useful for developing and disseminating practices that contribute to more efficient water management and improved crop productivity.

In China, India, Thailand and Vietnam, innovative approaches to watershed management are changing the lives of some 50,000 families in more than 200 villages. A detailed impact assessment of one watershed in India indicated that from 1998 to 2003 the use of new technologies, combined with traditional methods, almost doubled the incomes of small farmers, raised groundwater levels by 5–6 meters, expanded green cover from 129 to 200 hectares and more than doubled agricultural productivity. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has played a key role in this work and is now sharing its experience in Africa.

**More efficient use of groundwater:** In northwestern India's parched Rajasthan and Gujarat States, the rural poor depend on groundwater from wells for drinking and for cattle and crops. With increasing demand, though, groundwater levels have dropped, while concentrations of pollutants have risen. Using

satellite images, scientists at the International Water Management Institute (IWMI) have determined that small-scale water harvesting — that is, capturing rainwater — is effective for restoring local groundwater reserves. As a result of this practice, vegetation has increased significantly over large areas over the past several years — a change that is evident from satellite images.

**Promoting improved pigeonpea:** This is a hardy, drought-tolerant food legume that is high in protein (20-22 percent) and offers the added benefit of fixing nitrogen and other nutrients in the soil. The crop also provides suitable fodder for cattle, goats and rabbits.

In the drylands of India, farmers are adopting new drought-tolerant and disease-resistant varieties of pigeonpea developed at ICRISAT. The early maturity of the new varieties makes them well suited to the short growing season of drylands and to multiple cropping systems. With these improved materials, farmers can raise pigeonpea yields by 57 percent and boost their incomes by 30 percent.

In China ICRISAT and its national partners began introducing pigeonpea in Guangxi and Yunnan Provinces in 1998, primarily as part of efforts to promote soil conservation. Since then the total area planted to pigeonpea has reached around 50,000 hectares. The Chinese Academy of Agricultural Sciences (CAAS) is promoting pigeonpea in three more provinces characterized by harsh, dry farming conditions. Recently, an export market for fresh pigeonpea seed has been established, and this has enhanced farmers' income significantly.

**Heightening the appeal of millet and sorghum for livestock:** In addition to figuring importantly in the human diet, millet and sorghum also provide critical feed resources for ruminant animals in dryland areas of developing countries. In India's semi-arid tropical regions, for example, the residues of these crops (that is, the dried stalks remaining after harvest) play a major role in meeting the feed requirements of cattle and buffalo in smallholder mixed crop-livestock systems. However, the crop residues consumed by animals are of poor nutritional value, being low in digestible energy, crude protein and mineral content.

A practical approach for overcoming this limitation lies in genetic improvement, as demonstrated by research at the International Livestock Research Institute (ILRI) and ICRISAT. The two Centers have undertaken a joint project, in collaboration with national partners, through which they are identifying quality traits of sorghum and millet residues that are



important for ruminants, so plant breeders can take these into account in conventional crop breeding. The objective is to offer farmers improved sorghum and millet varieties whose residues provide more nutritious and digestible livestock feed.