

# Assessing Rural Community Livelihoods in the Mountain Terraces of Yemen

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## Introduction

Yemen is one of the least developed countries in the world and is a low-income, food deficit country. Agriculture contributes 23% of GDP, employs 60% of the work force, and provides a livelihood for rural residents, who represent 76% of the population. Fragile and highly variable natural resources of land, water, and biodiversity are major challenges facing the development of the agricultural sector.

Yemen has limited arable land, and 72% of that total area is already cultivated. Man-made terraces account for about 35% of this land. For centuries, Yemeni farmers have developed indigenous techniques for harvesting water and constructing mountain terraces. These and other community-based practices have enabled the long-term sustainability of agriculture in Yemen over many centuries. Prior to the oil boom of the 1970s, most Yemenis had no economic alternatives to intensive, subsistence-level agriculture.

The complex landscape of the Yemeni mountains has developed from human management of the natural resource base, resulting in an interdependence between the farming systems that have evolved and the natural resources of these mountain slopes. For this reason, integrated analysis of the biophysical and socioeconomic factors affecting the use of natural resources is necessary. The extent and rate of terrace degradation must be estimated and quantified, in order to identify priority areas for intervention.

While the Yemeni farmers' innovations and development of local technical knowledge are apparent in production systems developed over many centuries, their participation in identifying problems and testing land conservation practices has been limited. Because natural resources management invariably involves different stakeholders in a village, involvement of these stakeholders in identifying natural resource management problems and their solutions is paramount.

This project aims to fill these gaps by building on existing research and conducting empirical participatory research to identify and evaluate land conservation practices. While this project builds on the findings and experience of earlier research in the mountains of Yemen, there are three important guiding principles: (a) effective stakeholder participation at individual, community, and policy levels; (b) immediate impact on the livelihood of participating rural households; and (c) integrated analysis of natural resources management within a community context.

## Study Approach

The Participatory Rural Appraisal (PRA) method was followed involving land users and communities in each watershed. Detailed guidelines were developed for community characterisation and for collecting a land information database in a GIS framework. The aim was to gain understanding of the communities in the research sites (watershed) and the land resources, and relate that to land use, terrace conditions, and maintenance.

The PRA approach was implemented from November 2000 to March 2001. The activities involved in generating data were: (1) meeting with farmers to explain the objectives, the procedures, and to gain their confidence for participation; (2) group discussions with farmers at the village level; (3) interviews with individual farmers; (4) field observations; (5) mapping of various land resources by knowledgeable farmers; (6) use of farmers' criteria to assess the status of terraces, well-being of the community/households, soil fertility, and crop production; and (7) ranking of the problems and priorities by the farmers.

A preliminary community-level land information database was developed; and micro-watershed sites, communities living at these sites, and resources utilised were identified.

Annual rainfall in the study areas ranges from 200 mm to 1000 mm. Three sites were selected, one each in the Northern Highlands, Middle Mountains, and Southern Uplands.

## Results

The complex landscape of the Yemeni mountains consists of steep slopes, terraced croplands, rangelands, and patches of trees. Irrigated production takes place along the banks of the wadis that dissect the mountains. Rain fed agriculture in mountainous areas was developed centuries ago based on intricate systems of man-made terraces. The terraces are built to safely withhold rainwater, and the surplus water is carefully diverted to stone-paved outlets or carried away by sophisticated underground conduit systems. Rainwater harvesting is based solely on gravity. Irrigation from seasonal post-rain springs is also practiced on confined nearby fields, but due to low flows these are widely used for domestic purposes. Terraces contribute to both soil and water conservation on sloping land. The process of soil erosion downslope is greatly slowed due to retention and collection of runoffs on terraces.

The traditional terrace farming system provided the best possible resource utilisation, optimising available water and minimising land degradation. Rain fed farming is practised on about 35% of the total land area, mostly on terraced land, due to scarcity of groundwater.

Rapid urbanisation, population increases, increased role of markets, and increased employment opportunities in non-farm sectors led to a massive rural-urban migration, particularly among adult males. Subsidised food supplies and higher non-farm incomes reduced dependence on the land for food and income. Farmers' attitudes and behaviours changed due to several factors that impact their livelihoods. Lack of government support and proper technologies are the major constraints contributing to low production and increased poverty. These factors have changed the traditional values that had been the

basis for community cohesion and management of community land resources, this had led to terrace abandonment and accelerated resource degradation. Large water flows over the terraces occur after heavy showers, leading to heavy soil erosion and allowing uncontrollable overland flow from upper terraces throughout the watershed to reach the wadi.

Soil erosion due to land abandonment and lack of regular maintenance has caused degradation of terraces in the highlands, and valuable agricultural land is lost every year. The degradation of terraced lands in the mountains has serious consequences on the production systems downstream. Lack of maintenance of individual terraces could result in the knocking over of other terraces downslope, increased run-off damaging wadi banks, and flash floods affecting the spate irrigation systems in lowlands areas.

## **Conclusion**

The degradation of the terraces in the Yemeni Mountains is now well documented. If the current trends continue, Yemen may permanently lose a significant portion of its productive land to soil erosion due to lack of maintenance of traditional soil and water conservation systems. The threat that the degradation of terraces in the highlands poses to rural household food security and welfare and to national economic development has been clearly recognised. Development of cost effective soil and water conservation practices, productivity enhancing technologies, and identification of policy and institutional options that enable the adoption of these technologies and practices is needed.

## **Acknowledgements**

The author thanks DG, ICARDA for nominating him to participate in the symposium and Dr. A. Aw-Hasson, MTP Leader, NRMP, ICARDA for his assistance and contribution to the preparation of the presentation.