

Mega-Project 3

Improved Land Management to Combat Desertification

Introduction

Desertification has been defined as land degradation in arid, semi-arid and sub-humid areas resulting from various factors, including climatic variations and human activities. The drylands cover some 41% of the global surface area and house around 2.1 billion people. More importantly, 72% of drylands are in developing countries and approximately half of the world's poor live in drylands. Even by conservative estimates of land already degraded, desertification affects more people than any other environmental problem.

Earlier definitions failed to emphasize that desertification is a development problem and not specifically an environmental one. This is now clearly recognized by the United Nations Convention to Combat Desertification (UNCCD). For example, the convention states that "national action programs, designed to combat desertification, must be fully integrated into other national policies for sustainable development"... "combating desertification is really just part of a much broader objective: the sustainable development of countries affected by drought and desertification".

Given the complexity of causal factors, an integrated approach including broad stakeholder partici-

pation is essential if the livelihoods – and security needs – of the people inhabiting drylands are to be improved without further degrading their environments. Technology, institutional and policy options are required to prevent further land degradation and build viable livelihoods.

'Improved Land Management to Combat Desertification and Increase Productivity in Dry Areas' (Mega-Project 3) aims to identify options for rehabilitating degraded land resources and simultaneously strengthening land management systems to control degradation and sustain future production in order to contribute to sustainable livelihoods. Major elements of the Project include: development and testing of an integrated approach to natural resources management; understanding the causes and driving forces of land degradation, including regional assessments of desertification; 'best-bet' technologies for managing land, water and watersheds (linking to MP1), vegetation (linking to MP2) and rangelands; policy and institutional research (linking to MP5) to create an enabling environment for combating desertification; and institutional strengthening and capacity building in integrated approaches to sustainable land management.

Tribal dominance: implications for rangeland management in Morocco

Overgrazing and the spread of cultivation are two of the major causes of degradation of the rangelands of north-east Morocco. The creation of pastoral cooperatives in 1988 aimed to improve the use of rangelands. However, these cooperatives focused on improving services to pastoralists rather than on measures to prevent degradation. Previous experiences in pas-

toral management and pastoral organizations show that customary access rights to rangelands are essential for successful collective management. In Morocco, the creation of the pastoral cooperatives took this into account and cooperatives reflect local ethno-lineage systems. This means that members of cooperatives all belong to the same social unit – tribe, *fraction* (sub-tribe), or *douar*.

To get a better understanding of how different groups use the rangelands, researchers from ICARDA, the Institut National de Recherche Agronomique (INRA), Oujda, and the Centre de Cooperation Internationale en Recherche Agronomique pour le Développement (CIRAD) studied the area traditionally controlled

Tribal dominance: implications for rangeland management



Community structure and dynamics are important factors in the management of rangelands in north-eastern Morocco.

by the Northern Beni Guil tribe, the present-day rural communes of Tendirra and Maatarka. Nine pastoral cooperatives corre-

spond with the nine major *fractions* of the tribe, but herders of all *fractions* are still using the whole Beni Guil territory because

the territorial boundaries are not clear. While this ensures that livestock can graze the rangelands freely, it also means that the interests of different *fractions* conflict and that it is difficult to manage the rangelands collectively.

First, the research team mapped and characterized the Beni Guil rangelands. Rapid assessment by herders showed that half the rangelands were severely degraded. As expected, stocking rates were higher on better, non-degraded rangelands, particularly in winter and spring when there was more forage on the non-degraded rangelands than on the degraded rangelands. At these times livestock graze the best rangelands, so the stocking rate on these rangelands is higher.

Table 3.1. Ranking of nine *fractions* (F) of the Beni Guil tribe, Morocco, according to their dominance of rangeland.

| | Population [†] (residents) | Assets [†] (livestock) (%) | Rangeland use [†] | | Rangeland characteristic | | Dominance index [‡] | |
|----------------------|--|---|----------------------------|----------------------|--------------------------|---------------------|------------------------------|------|
| | | | Cultivated area (%) | Stocking rate (%) | Degraded (%) | Appropriated (%) | domL | domC |
| F2 | 5.8 | 8.0 | 9.3 | 18.1 | 43 | 13 | 1.00 | 0.87 |
| Dominant/rangelands | | | | | | | | |
| F8 | 18.9 | 28.7 | 12.2 | 15.7 | 45 | 19 | 0.96 | 0.00 |
| F3 | 11.2 | 17.9 | 11.2 | 10.2 | 53 | 18 | 0.82 | 0.08 |
| Dominant/cultivation | | | | | | | | |
| F1 | 6.5 | 4.6 | 12.1 | 9.0 | 76 | 3 | 0.09 | 1.00 |
| Dominant/relative | | | | | | | | |
| F6 | 7.9 | 9.2 | 13.2 | 11.7 | 73 | 8 | 0.26 | 0.68 |
| F4 | 7.2 | 6.5 | 22.4 | 9.5 | 61 | 15 | 0.46 | 0.73 |
| Dominated/relative | | | | | | | | |
| F7 | 10.5 | 6.5 | 6.3 | 6.2 | 66 | 13 | 0.30 | 0.11 |
| Dominated/absolute | | | | | | | | |
| F5 | 24.9 | 13.9 | 10.5 | 11.1 | 87 | 12 | 0.00 | 0.07 |
| F9 | 7.1 | 4.7 | 2.8 | 8.4 | 82 | 14 | 0.02 | 0.03 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | | | | |

[†]Distribution of variable according to the nine *fractions* (% of total)

[‡]Normalized value of the principal component factors in the principal components analysis

domL: dominance through greater livestock numbers; domC: dominance through cultivation of large areas

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Table 3.2. Factor analysis of dominance of rangeland use for the Beni Guil tribe, Morocco.

| | domL | domC |
|---|--------|--------|
| Indicators of dominance | | |
| Livestock/population | 0.378 | 0.024 |
| Cultivated area/population | -0.008 | 0.469 |
| Stocking rate/population | 0.156 | 0.43 |
| Indicators/rangeland characteristics | | |
| Appropriated rangelands (%) | 0.296 | -0.432 |
| Degraded rangelands (%) | -0.41 | 0.002 |

domL: dominance through greater livestock numbers
domC: dominance through cultivation of large areas

The survey results showed that half the map's polygons were used by a single *fraction*. These '*fraction*-appropriated rangelands' are significantly less degraded than the rangelands that are used by more than one *fraction*. There are two reasons for this. First, the '*fraction*-appropriated rangelands' are less cultivated than the other rangelands. Secondly, the stocking rates are not only lower but are also stable throughout the year. The characteristics of these '*fraction*-appropriated rangelands' suggest that they are, in fact, governed by informal rules, even though they are 'officially' open to all.

Next, the research team analyzed how each of the nine *fractions* used the rangelands. The populations, livestock, cultivated area and stocking rate on the rangeland for each *fraction*, were compared as well as the average characteristics of the rangelands used by each *fraction*. For example, Table 3.1 shows that, although *fraction* 2 (F2) makes up only 6% of the total Beni Guil population, they own 8% of the

total livestock, cultivate 9% of the total cultivated area and their livestock represents 18% of the stocking rate on the rangelands. In addition, only 43% of the rangelands used by F2 are degraded and 13% are used (appropriated) by F2 alone.

In order to make quantitative comparisons between the *fractions*, researchers aggregated the indicators in a principal components analysis. The analysis (Table 3.1) suggests that there are two types of dominance in rangeland use. In the first (domL), *fractions* own a greater share of the livestock population, select the best rangelands, and are able to exclude other *fractions*. In the second (domC), the *fractions* cultivate extensive areas to secure access to surrounding pastures. Normalized indexes provide the ranking of the *fractions* according to their level of dominance (Table 3.2) and show that F2 dominates the rangelands in all aspects, while other *fractions* only dominate in specific areas, such as overgrazing (F8 and F3) or cultivation (F1). At the bottom of the ranking, there are two *fractions* (F5

and F9) that are completely dominated in all aspects.

Understanding the origins of the bargaining power of the different *fractions* will be necessary to improve the collective management of these rangelands. So, the research team then considered the pattern of dominance. To understand this really needs a sociological study but the team's discussions with the leaders of the nine *fractions* did give some preliminary indications of the origins of power. Grazing dominance (domL) seems to be associated with historical power struggles between *fractions* and can be justifiably called domination, whereas cultivation dominance (domC) happens by default, and is used by the weakest groups to ensure access to the rangelands.

Finally, the research team did a regression analysis of the impact of *fraction* dominance on production and livelihood strategies – such as feeding costs, fattening activities, giving up breeding livestock, seeking work off-farm, and migrating. This took into account the composition and assets of households.

Overall, the level of dominance in cultivation (domC) had no impact on individual strategies. Herders who belong to *fractions* that dominate the area by appropriating the best rangelands (domL) are the least vulnerable as they are less likely to quit breeding livestock and migrate. These herders also have the lowest feeding costs and obtain the best price for their lambs. This means that grazing dominance is beneficial for *fraction* members, whereas cultiva-

Oasis consortium to combat land degradation

tion dominance makes no difference. This might suggest that promoting initiatives to limit further cultivation of the rangelands would be easy as this would have no impact on members of the *fractions* with weakest cultivation dominance.

So, what are the prospects for pastoral cooperatives? Technological innovations have failed to combat rangeland degradation. Most researchers, development actors and some policy makers now recognize the role of formal and informal institutions. Recent approaches promote a combination of community participation and decentralized management of natural resources for managing forests, watersheds, and rangelands. But the implications of these approaches for tribes living in Maghreb rangelands have not yet been fully addressed. For example, for the success of community-based natural resource management, the resource and its users must first be clearly delineated. But the

need for clear boundaries conflicts with the need to keep a certain degree of fuzziness in rangeland boundaries to allow livestock to graze freely.

Following the creation of the pastoral cooperatives, *fractions* in rural communes in Tendirra and Maatarka, Morocco, now officially manage rangelands. However, in reality, tribal *fractions* compete for access to grazing that has traditionally been open to all. And in this competition, all *fractions* are not equal. In the powerful *fractions* that dominate by selecting and appropriating the best rangelands, herders are better off. This means that the objectives of good natural resource management and equitable access to resources are difficult to achieve simultaneously. Even though certain *fractions* in effect prevent degradation of some rangelands by appropriating them for their use, by doing this they disadvantage the pastoralists of other *fractions*.



Project studies are helping to understand social dynamics and their influence on technology adoption in rangelands.

This suggests that, to be equitable and effective, rangeland management in Tendirra and Maatarka has to be organized at the tribe level. The recently created union of pastoral cooperatives offers a formal and functional framework for addressing conflicts and starting negotiations.

A new consortium to combat land degradation

A new consortium brings together the research expertise of 11 CGIAR research centers to tackle land degradation. Called the Oasis Consortium, it is co-convened by ICARDA and ICRISAT. The Consortium brings together a broad, multidisciplinary range of capacity, expertise, partnerships, and geographic experience in dryland degradation and builds on the work of its

predecessor, the Desertification, Drought, Poverty and Agriculture (DDPA) consortium.

Why Oasis is needed

The drylands are home to one-third of humanity and some of the least developed nations. The poorest people in the drylands are farmers and pastoralists. They struggle valiantly and with great ingenuity to eke out a living from fragile environments that are particularly vulnerable to degradation.

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The CGIAR Centers have invested significant effort in research in sustainable dryland development. But these efforts are fragmented and poorly coordinated.

An eight-year plan with five goals

Scientists can help solve intractable problems only by coordinating their efforts. The Oasis Consortium aims to do just this to tackle desertification. It is a partnership between people working on the ground and scientists in advanced research institutions from many disciplines. Already, the Consortium has consulted widely to set five goals, which are expected to make a significant impact.

The first goal is to develop an effective way of assessing and measuring dryland degradation at appropriate scales. This means taking into account subtle, long-term changes in the state of natural resources. It is a complex task. And, in addition, economists need to assess the cost of ecosystem goods and services, taking into account the needs of land users – especially the poor – and the needs of national, regional and global communities. Tackling this will produce much more effective tools for development agencies

and developing countries to assess land degradation, particularly in sub-Saharan Africa.

The second goal is to find a way of measuring the processes that cause soil and water erosion, flush away nutrients, and diminish biodiversity – and then to devise ways to prevent these happening. This effort is expected to produce practical, proven ways to use and recycle nutrients and water, preserve dryland agrobiodiversity, and to supplement nutrients and biodiversity by bringing them in from external sources. These tools will be used on farms throughout Africa and Asia.

The third goal is to find ways to change the policies, market forces, and institutional arrangements that aggravate land degradation. This effort will pay off in key policy changes and better dryland management.

The fourth goal is to find out what motivates dryland users to do things that degrade land. This would help to find ways to change their perceptions so that they become motivated to act in ways that lead to more sustainable, diverse, remunerative, and resilient dryland management. Here, the Consortium expects that there will be a shift from low-value to higher-value farming, such as combining tree-crops and livestock, and grow-

ing high-value crops and processing livestock products that capitalize on the particular advantages of dryland environments.

Lastly, there is a great deal of knowledge about how to manage land successfully to prevent degradation. The problem is how to share this knowledge with disadvantaged, isolated rural communities. The Consortium's efforts towards this are expected to produce new models for scaling-up better natural resource management.

Partnerships

The Oasis Consortium will build on strong existing partnerships with all the major stakeholders in desertification, such as UNCCD, TerrAfrica, United Nations agencies (UNEP, UNDP, UNESCO), the Sahara and Sahel Observatory, regional NARS bodies, NGOs, and funding agencies such as GEF, IFAD, and USAID. The Consortium will also make the most of other programs with parallel aims that the CGIAR Centers are involved in. These include the Desert Margins Program (ICRISAT, sub-Saharan Africa), the Mashreq and Maghreb project (ICARDA, North Africa and West Asia), and the CACILM project (ICARDA, Central Asia and the Caucasus).