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**CAPRI WORKING PAPER NO. 23**

**INTERNATIONAL CONFERENCE ON POLICY AND INSTITUTIONAL OPTIONS  
FOR THE MANAGEMENT OF RANGELANDS IN DRY AREAS**

**WORKSHOP SUMMARY PAPER**

**Tidiane Ngaido, Nancy McCarthy, and Monica Di Gregorio**



**CGIAR Systemwide Program on  
Collective Action and  
Property Rights**

**International Food  
Policy Research Institute**  
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Washington, D.C. 20006



*Under the Patronage of His Excellency The Minister of Agriculture, Tunisia*



**IRESA**  
Institution for Agricultural Research  
and High Education Tunisia



**OEP**  
Office of Livestock & Pasture  
Tunisia



**INRAT** National Institute for  
Agronomic Research Tunisia



**ICARDA**  
International Center for  
Agricultural Research in the  
Dry Areas



**ILRI**  
International Livestock  
Research Institute

**JANUARY 2002**

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## **ABSTRACT**

The System-wide Program for Collective Action and Property Rights (CAPRI) sponsored an International Conference on Policy and Institutional Options for the Management of Rangelands in Dry Areas, May 7-11, 2001 in Hammamet, Tunisia. The conference focused on institutional aspects of rangeland management and brought together policy makers and researchers from North Africa, Sub-Saharan Africa and West Asia to discuss sustainable rangeland production strategies and livelihood of pastoral communities in dry areas.

This conference summary paper contains summaries of the CAPRI sponsored research findings on institutional options for rangeland, policy makers' interventions and reactions as well as the synthesis of discussion groups. These working groups evaluated outcomes of policies and institutions guiding rangeland management in terms of their impact on livelihoods and environmental sustainability, and explored alternative policies and institutional strategies in light of their capacity to reduce poverty and enhance food security.

**Keywords:** Rangelands, institutions, natural resource management, property rights, collective action, case studies, Africa, sub-Saharan Africa, West Asia, North Africa

## **Acknowledgments**

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## WORKSHOP SUMMARY

### **International Conference on Policy and Institutional Options For the Management of Rangelands in Dry Areas**

Tidiane Ngaido,<sup>1</sup> Nancy McCarthy,<sup>2</sup> and Monica Di Gregorio<sup>3</sup>

#### **1. INTRODUCTION**

In many African and West Asian countries there is particular concern about the degradation and, in some regions, continued desertification of rangeland areas, and the social, economic, and environmental impact resulting from these processes. However, until recently governments and development agencies accorded semi-arid rangeland areas relatively low priority and most interventions have concentrated on technical solutions to improve range productivity.

There is a debate in the literature as to how much degradation of rangelands in arid and semi-arid regions is due to unpredictable changes in rainfall patterns, and how much is due to misuse by agro-pastoral populations. Nonetheless, low and declining productivity, increased impoverishment and vulnerability of pastoral peoples, and the increase in conflicts in these regions is still considered to be caused by inappropriate land use policies, multiple and contradictory legal systems (state, customary/religious) over

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pastoral resources, population pressures, and the disruption of pastoral production strategies and mechanisms that govern herder-farmer relationships – in addition to low and erratic rainfall patterns. Different types of tenure reform, ranging from privatization to common property to state ownership arrangements have been explored to support the improvement of rangelands and the development of pastoral communities, as have other institutional reforms such as the reorganization of pastoral communities into cooperatives and pastoral associations.

Results from these reforms differ from country to country. Understanding their impacts on livestock production and livelihood strategies of herding communities requires systematic evaluation in order to draw lessons for designing adequate policy and institutional frameworks. There is a general consensus amongst researchers and development practitioners on the need to reconcile the different institutional approaches to pastoral development (e.g. various property rights, mobility, access options), to enhance the enabling environment under which livestock producers operate, and to promote greater participation of local communities in the management of natural resources.

In response to these critical policy issues, the System-wide Program on Collective Action and Property Rights (CAPRI) of the Consultative Group on International Agricultural Research (CGIAR) organized an international conference to review the results of research and identify key policy recommendations. The conference was held under the patronage of the Minister of Agriculture of Tunisia, the conference host country. The case studies presented at the conference were undertaken by three CGIAR centers: the International Food Policy Research Institute (IFPRI), the International



Center for Agricultural Research in the Dry Areas (ICARDA) and the International Livestock Research Institute (ILRI) with collaboration of a number of national agricultural research institutes (NARS). Funding for the projects was provided by CAPRI, the Ford Foundation office in Cairo, ILRI and IFPRI. Additional presentations were prepared by the Makerere Institute for Social Research from Uganda, IFAD and Noragric. Local organizational support was provided by the ICARDA regional office in Tunis, the Tunisian National Institute for Agronomic Research (INRAT) and the Tunisian Office of Livestock and Pasture (OEP).

Other local national institutions as the Institution for Agricultural Research and High Education of Tunisia, played an active role in the organization of the event. The support and encouragement of the Tunisian Ministry of Agriculture, the high interest among regional institutions, as well as the participation of policymakers from 12 African and West Asian countries indicates the breadth of interest in the issues discussed at the conference.

#### OBJECTIVES OF THE WORKSHOP

The conference brought together over 50 participants from Algeria, Burkina Faso, Jordan, Ethiopia, Iraq, Kenya, Eritrea, Morocco, Niger, Syria, Tunisia, Uganda; including representatives from pastoral organizations, local and national government ministries, national, regional, and international research institutions and organizations working in the fields of agriculture, natural resource management and policy formulation. The broad goal of the conference was to contribute to sustainable rangeland production strategies and livelihood of pastoral communities, especially in African and West Asian countries,

through the participatory formulation of strategies for sustainable range management.

More specifically, five objectives for the conference were defined as follows:

- Presentation of the principal results and conclusions of CAPRI-sponsored research on rangeland management to policymakers and others involved in rangeland management.
- Discussion of current government policies, and the practical policy and implementation issues faced in setting rangeland policy in those countries.
- Identification of the appropriate medium- and longer-term roles of rangelands in contributing to poverty eradication and food security.
- Initiation of dialogue, through three working group sessions, amongst participants on the key issues identified, possible solutions and implications for future economic, social and environmental policies.
- Evaluation of the consequences, in terms of impact on livelihoods and environmental sustainability, of alternative institutional options and strategies for different types of rangelands and livestock production systems.

This paper summarizes the paper presentations and discussions, as well as recommendations developed by the conference working groups.

## **2. OPENING REMARKS BY THE HIS EXCELLENCY THE STATE SECRETARY AMEUR HORCHANI, TUNISIA**

This International Conference addresses important aspects of rangelands management and Tunisia has a special interest in the promotion of rangelands and development of policy options for improving the management of these areas.

So far, the major focus of researchers and of research centers has been on technological aspects, but technical solutions alone have failed to solve the problems of rangelands management. The understanding of social and historical processes, current local organizations and the creation of associations for developing rangelands are crucial to achieving positive results.

In Tunisia, there are around 2500 water associations, whose members are elected every year and whose work is supervised by the government. Tunisian rangelands support 30% of the national livestock population under very unstable climatic conditions especially with respect to rainfalls and a 3-year drought is not a rare event. The development of rangeland should integrate many aspects of the social and economic life of the country. Education, and in particular education for women, potable water supplies, infrastructures such as roads and local health care units, are part of an integrated plan for development of rangelands. It is also important to recognize the variability and diversity of local circumstances and take them into account when formulating policies.

Today, Tunisia's agricultural sector satisfies the national milk and vegetables demand and exports its products to the European Union. However, the big advances experienced in the agricultural sector have not occurred in the management of rangelands. For this reason further research is needed. Technological research should go hand in hand with institutional and social research to address rangeland management problems in an integrated fashion.

Tunisia's research and development planning for the future relies on the following key aspects:

- Rangeland projects should be integrated with projects in other sectors.

- Extension, in the form of training and farming consultation, should be an integral component of any development project and projects should improve the functioning of local government institutions, communities and herder associations to achieve greater efficiency.
- The study of conflicts and the development of mechanisms for conflict resolution are crucial for successful implementation of development projects and improvement of rangeland management.
- With respect to climatic variables the protection of rangelands during drought years is a crucial aspect, which has major implications for the vulnerability of rangeland populations that represent the poorest section of Tunisia's society.

The National Institute for Agricultural Research of Tunisia (INRAT) has recently started a 7-year rangeland management project in the southern part of the country that focuses on the following:

- Modernization
- New technology for water
- Creation of localized service centers
- Education campaigns
- Participation of herder families

The project is based on scientific research of a multidisciplinary team that includes agronomists, economists and sociologists. The promotion of rangeland development is today a priority for the Tunisian government. In the past, research was

done in laboratories and pastoralists' needs were often neglected. Another mistake consisted of addressing rangeland issues separately from other sectors and activities.

Ongoing and recent projects are trying to achieve the integration between rainfed agriculture, rangeland management and other sectors by designing an overall development policy. The development of rangelands is crucial for decreasing the vulnerability of the poorest section of Tunisia's population and alleviating poverty. These new integrated approaches and policy recommendations formulated at this International Conference will be Tunisia's best weapon to combat poverty.

### **3. RESEARCH RESULTS AND DISCUSSANTS COMMENTS**

#### **OVERVIEW OF THE MASHREQ AND MAGHREB PROJECT**

Presenter  
Tidiane Ngaido  
International Food Policy Research Institute  
and International Center for Agricultural Research in the Dry Areas, Syria.

The CAPRI/Ford Foundation/IFPRI project is a component of the ICARDA regional program on Development of Integrated Crop/Livestock Production Systems in Low Rainfall Areas of the Mashreq and Maghreb Regions, involving eight countries (Algeria, Iraq, Jordan, Lebanon, Libya, Morocco, Syria and Tunisia) and co-financed by AFESD (Arab Fund for Economic and Social Development) and IFAD (International Fund for Agricultural Development). The primary objective of the project is to provide policy makers, local communities and researchers with a better understanding and assessment of the likely economic, social and environmental consequences of the

different institutional options for managing and for improving rangelands in the low-rainfall areas of Jordan, Morocco, Syria and Tunisia.

The country case studies focused partly on testing the hypothesis of whether different range management systems (state, community, cooperative) improve the welfare of pastoral households. This research built on the country reviews of the policy and legal environments under which pastoral communities make their decisions and RRAs in 10-15 communities in each country. The data were used to characterize the pastoral communities, range management options and the constraints of pastoral communities. This exercise was followed by an in-depth pasture characterization to evaluate range productivity and floristic composition under each management option; and in-depth household surveys to evaluate the effects on these options on household feed expenditures.

Household data were collected amongst 292 households in Jordan, 325 households in Morocco, 265 households in Tunisia and 3-year monitoring data on 69 households in the Jub-Jamaa community in Syria. Econometric analysis was used to evaluate the effects of the different range management options on the welfare of the pastoralists and the strategies they use to access additional grazing resources. The preliminary results of the analyses are presented in the different country papers.

In the West Asia and North Africa region (WANA), small ruminants contribute to a large proportion of farmers', nomadic and semi-nomadic herders' income. In the 1950s, livestock production depended mainly on rangelands that provided 70 percent of the feed needs of small ruminants. But at present, natural grazing has declined to 10-25 percent, due to the continuous increase of flock numbers and removal of vegetation through

plowing or for fuelwood. To address some of the loss in rangeland productivity, governments of the Mashreq and Maghreb (M&M) countries carried out numerous policy and institutional reforms along with technological innovations. Even though many of these countries tried to enhance the decision-making environment of pastoral institutions, it is difficult to find a balance between the rights and roles of traditional pastoral communities and those of the state and its institutions. In most cases, policy and institutional reforms weakened pastoral institutions. The institutional reforms can be classified into three main approaches.

The first approach consisted of state appropriation of rangeland resources and was used by the majority of the M&M countries, as governments assumed that they were better equipped to manage rangeland resources. Along with tenure reforms, traditional tribal communities were reorganized into cooperatives. However, traditional institutions continued informally to manage range resources, although they did not have any legal rights over these resources. Such actions led to conflicts and disputes. In recent years, more emphasis is being placed on encouraging the participation and involvement of communities in the management of their resources (e.g. IFAD, AFESD, FAO and UNCCD projects in Jordan and Syria), but a legal framework to support such efforts is lacking.

The second policy option consisted of strengthening customary tribal claims. Under this option, pastoral communities have full control over their resources and continue to use traditional mechanisms and rules to define access and resource use for all community members. This framework, however, does not address intercommunity

access options and by confining livestock grazing on tribal resources reduces actual mobility.

The third option is privatization with titling, which has been tried mainly in Morocco and Tunisia. Tribal land titling is mainly found in Morocco. Privatization at the tribal level often results in tribes organizing into NGOs to undertake different development efforts. Privatization and titling at the individual level results in the individualization of tribal collective land, which destroys traditional access-options that serve as a safety net for herders during dry seasons and drought years.

A number of different herding communities reorganization policies have been implemented in the M&M countries:

*State ownership and state driven cooperatives.*

These cooperatives, prevailing in most WANA countries, co-opted the roles traditionally played by pastoral communities and institutions. They proved to be unpopular due to the separation between traditional rules and production systems, and rules governing the functioning of cooperatives and their resources.

*Herder-driven community cooperatives.*

Failure of the previous type of cooperatives encouraged some herders to organize their own cooperatives and request land from the government to improve and manage. The main benefit, compared to state-driven cooperatives, is that they offer better security of tenure to their members, in addition to new services such as health and feed provision. However, more exclusive decision-making authority on access and use of cooperative pastures is needed to prevent government institutions from issuing grazing licenses to non-cooperative members.



*Community-based cooperatives.*

These have been created to enhance the managerial role of local institutions and maintain customary access and use rules. They provide security of tenure over pastureland and mere local control over resource access and use.

*Co-management of community rangelands.*

This strategy, mainly used in Tunisia, involves placing non-privatized tribal pastureland under the control of the Forest Services to improve the range and manage its utilization. All community members pay a fee to access the range or cut fodder until the Forest Services recoups its investments, at which point the community reacquires control over the pasture.

Most M&M governments view pastoral resources as state property, while the pastoral communities consider them as their territory. Poorly defined tenure rights often lead to conflicts and equity issues. Those who advocate devolution policies suggest that the success of range management depends on the extent to which pastoral communities are granted full control over access and use of the resources and on the assurance of benefiting from improvements.

EXECUTIVE SUMMARY – TUNISIA: RANGELAND MANAGEMENT OPTIONS  
AND INDIVIDUAL AND COMMUNITY STRATEGIES OF AGROPASTORALISTS  
IN CENTRAL AND SOUTHERN TUNISIA

*(Original in French: Options de Gestion des Parcours et Strategies Individuelles et Communautaires des Agropasteurs du Centre et du Sud Tunisien)*

Presenter

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Paper co-authored with Mohamed Elloumi, Nouredine Nasr, Salah Selmi, Salah Chouki, Frej Chemak, Nasr Raggad, and Tidiane Ngaido.

Rangelands in Tunisia constitute about one-third (5.5 out of 16.4 million ha) of total land and are located mainly in the central and southern regions. In recent years rangelands in Central and Southern Tunisia have undergone profound changes following the privatization of rangelands, increasing human and livestock population and extension of agriculture into marginal areas. The contribution of rangelands to livestock diet has decreased from 65% to 10%. Nomadic and semi-nomadic pastoral production systems are slowly disappearing, herd sizes are shrinking, and agro-pastoral systems are intensifying.

This case study analyzes the different range management options implemented by the Tunisian government in the central and southern regions to improve the availability of feed resources and enhance the welfare of pastoral households. Most new institutional and tenure policies were introduced in the central region where the privatization process was more advanced. Four types of management regimes were identified in Tunisia:

1. The *tribal system* prevails in the majority of the ranges located in southern Tunisia. These ranges have not been privatized but the weakening managerial role of tribal institutions has led to crop encroachment and appropriation of the best pastoral areas by agriculturalists. State development intervention in some of these areas includes development of roads and watering points.

2. The *private system* emerged from the privatization of tribal rangelands. The Pasture and Livestock Office (OEP), a parastatal agency, is in charge of range improvement activities in these areas, such as promoting the development of cactus plantations. The main problem associated with this management option is land fragmentation.
3. The government sponsored *cooperative system* is relatively new, and involves organizing pastoral communities and devolving range management to local communities. The experience of the World Food Program (WFP) cooperatives has not been an overall success due to the limited role played by cooperative members.
4. The *co-management system* is in place on the residual tribal pastures that have not been privatized in central Tunisia. Under this system the community cedes control of overgrazed pastures to the Forest Services for pasture improvement. In exchange for the improvement the Forest Services charges grazing fees. The community may reclaim its rights once improvement costs have been fully recovered. The main problems facing this option are associated with strong state intervention and weak local participation.

Rapid rural appraisals, range productivity data collection and in-depth household surveys were conducted under these different management options. Econometric analysis was conducted to evaluate the effects of range management options on total household feed expenditures. The preliminary results show that, compared with the tribal system, the co-managed and privately managed reserves reduce household feed expenditures by 33% and 9% respectively, while cooperative reserves increase household feed expenditures by 62%. The results reflect the changes occurring in rural Tunisia. The performance of the co-managed reserves depends on the management quality of the Forest Services and the ability of community members to pay for grazing or cutting forage. Co-management could be the best option for providing additional feed resources while also improving the resource base. However, these are preliminary results and

generalizations may be misleading since problems facing rangeland management in Tunisia are diverse and complex.

All the sites studies, regardless of the type of management option, are facing similar problems such as animal and human population pressures, scarcity of grazing resources, and weak participation of communities in the management of their common resources. In addition, there are regional differences between central and southern Tunisia due to the extent to which privatization policies have been implemented. In central Tunisia, where the privatization process is very advanced, major problems include unequal access to grazing resources, overexploitation, and projects that introduce inappropriate technologies. The main problems in southern Tunisia where tribal systems prevail, are poorly defined property rights and consequent land encroachments and resource degradation. This situation is also fueling many inter- and intra-community conflicts. Suggested policy options include the development of coherent range management policies in integrated development projects that would organize and empower communities in the management of range resources as well as provide services and infrastructure.

Discussant

Mustapha Guellouz

Director General of the Pasture and Livestock Office in Tunisia  
President of the Council of Enterprises

Social changes after Tunisian independence generated structures and human relations that are different from those that prevailed under the tribal system. The dislocation of land tenure regimes provoked by the phenomenon of privatization or appropriation of the collective tribal lands is the prominent feature of this period. In

central Tunisia pastures are indeed relics of tribal lands that were not privatized, while in the south the land tenure system is not well-defined and litigations between right holders and users are frequent and persistent.

This study shows that these changes led to the development of weak management institutions whose role remains unclear or incompletely defined. For example, the WFP cooperatives that were created to manage pastures in tribal lands that were not individualized and the management councils that have an implementation oversight role in the allocation of tribal collective lands lack an adequate legal framework.

Will the present initiative to develop Agricultural Development Groups (GDA) for the management of pastures have positive effects? Will the GDA motivate the participation of the beneficiaries?

Besides the need for appropriate technological packages for different pasture conditions, (e.g. Pasture and Livestock Office program) there is the need to develop professional structures that emanate from the beneficiaries on the basis of their tribal cultural heritage. The designation of a single coordination center for all the intervention programs that will link to these structures will assure a stronger engagement of the populations.

The present report lends support to the process undertaken by the Tunisian Forest Services through pasture development plans and projects, and to the conclusions of the workshops on institutional and political aspects of range management held in Kairouan (June 28-29, 2000) and Tataouine (2000).

EXECUTIVE SUMMARY – MOROCCO: INSTITUTIONAL OPTIONS AND  
PASTORAL COMMUNITIES IN MOROCCO

Presenter

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Paper co-authored with Abdelali Laamari, Mohamed Boughlala and Tidiane Ngaido  
(IFPRI/ICARDA).

Traditional institutions (jmaas) for managing rangelands in Morocco have been disempowered and are no longer effective. Large areas are being appropriated and converted to crop production and the remaining rangelands are overexploited and degraded.

With the help from the donor community, the Moroccan government launched ambitious programs for the improvement of major rangeland areas. These programs cover entire agro-ecological zones, are holistic in vision and try to address in a comprehensive way the problems regarding rangelands.

The purpose of this study is to evaluate the impact of different institutional options introduced with the aim to enhance rangeland management. To capture the diversity of agro-ecologies and range management options, three zones were considered: the high plateau of the Eastern Atlas (or Oriental Atlas), where range cooperatives have been created according to tribal membership; the Middle Atlas, where traditional tribal rangeland management is reported to face severe difficulties; and the Central High Atlas, where the tribal management system continues to play an important role in the management of the community pastures.

The study is based on quantitative and qualitative data from rapid rural appraisals (RRA) that were conducted along transects in each of the three regions to characterize

production systems and range management options. The RRA was followed by an in-depth household survey on 325 households. Econometric analysis was used to evaluate the effects of different range management options on total household feed expenditures.

Except in the High Atlas, tribal management systems are playing a limited role in the management of their community pastures. In the Middle Atlas and the Oriental Atlas where cooperatives have been introduced, many people have an inadequate understanding of the functioning of cooperatives and there is a general tendency not to respect the rules governing the use of cooperative reserves.

Preliminary results of the econometric analysis suggests that, compared to households that relied mainly on tribal non-improved (or unmanaged) pastures, households with access to tribal cooperatives face 3.4% lower feed expenditures, and households with access and involvement in actual management tribal pastures (agdals of the High Atlas) face 10% lower feed expenditures. In comparison pastures under government management (Forest Services) demand 11% higher feed expenditure per household. These results suggest that in the Oriental Atlas, where the tribal management is eroding due to the increasing sedentarization of pastoral households, the cooperative reserve could be an important option. However, in the Central High Atlas, where traditional management systems continue to effectively manage access and use of the pastures, it is important to keep these systems in place. This does not mean that the Moroccan government should not intervene in the Central High Atlas, but that development action should be taken to improve the general performance of the system without disrupting existing management institutions.

## Discussant

Mohamed Milourhmane  
Directeur des Amenagements Fonciers, Morocco

Pastoral development represents one of the most difficult challenges for agricultural development. Given the localization of pastoral zones and their particular features (aridity of the climate and weak socioeconomic development), interventions are more difficult than in the rest of the agricultural space. Pastoral zones are characterized by insufficient infrastructures, isolation (especially in mountain regions), poverty, and absence of alternative sources of income for pastoralist populations. As such, a pastoral development project must be integrated and the parties involved (state and other stakeholders) should not only address the problems related to range improvement, but also those related to improvement of basic infrastructures and generation of alternative economic activities.

Moreover, range improvement should be based on knowledge of pastoral societies, their customs, their institutional arrangements, etc. Technological solutions alone will not solve the problems of developing pastoral zones. Often pastoral institutions need to be strengthened to enable them to implement improved range management practices. For this to be effective pastoral communities need to be involved in the elaboration and implementation of development projects.

Morocco has adopted principles of integration and participation in the preparation of agricultural development projects. Law No. 33-94 on the improvement of rainfed perimeters was promulgated in 1995 and its application is based on four principles:

1. sector integration in development efforts;



2. involvement of stakeholders;
3. use of contractual arrangements;
4. decentralization.

Existing development projects include pastoral areas and actively involve farmer/herder representatives. They integrate the necessary socio-economic infrastructures and production units, and are developing contractual arrangements with the beneficiaries.

Other project goals are to promote local development associations and revitalize the assemblies of delegates of tribal collective lands. Several pastoral cooperatives were created for the management of the pastures in the Oriental Atlas. Most pastoral areas are held under tribal collective land tenure regime. Privatization was promoted mainly in irrigated perimeters and in rainfed agricultural areas. Collective pastoral lands have been maintained partly in recognition of the need to support herd mobility. The plan promises to delimit the boundaries of pastures as to preserve them against crop encroachments, to reinforce the regulations governing their use and to undertake, in partnership with all the institutions responsible for range management, programs to improve range productivity.

EXECUTIVE SUMMARY – JORDAN: COMMUNITY AND HOUSEHOLD-LEVEL  
IMPACTS OF INSTITUTIONAL OPTIONS FOR MANAGING AND IMPROVING  
RANGELAND IN THE LOW RAINFALL AREAS OF JORDAN

Presenter

Laith Roussan

Jordan University for Science and Technology

Paper co-authored with Faisal Awawdeh, Emad Karableh, Samia Akroush, Khaleal Abu Soui, Nadira Al-Jouhari, Enass Ghraibeh and Tidiane Ngaido.

Over 91 percent of Jordan is desert with low and irregular rainfall. There are three main types of rangelands in Jordan: steppe rangelands (100-200 mm of average annual rainfall), desert rangelands (less than 100 mm), and mountainous rangelands (more than 200 mm). In the past, rangelands provided around 70 percent of feed requirements for animal grazing, but today it has declined to about 20-30 percent. The major factors that are contributing to range degradation are overgrazing, uprooting of shrubs for firewood, plowing for cereal crops, and land appropriations. Moreover, the availability of subsidized feeds had in the past promoted an increase in the livestock population.

Jordan has initiated many rangeland improvement projects, but tenure issues constitute the main constraint for future improvement. Since independence, the Jordanian government asserted ownership rights over rangelands and has been promoting the settlement of pastoral communities. As a result, there are three land tenure systems that prevail in the rangelands: individual ownership rights on lands allocated through settlement policies; tribal claims on traditional pastures; and state ownership in all areas below 250 mm rainfall. Competition between these different claims is negatively affecting the management of rangeland resources.

Since 1980, the Jordanian government has been trying to organize pastoral communities into cooperatives and develop rangelands through the Jordan Cooperative Organization (JCO). In addition, the Ministry of Agriculture is developing and managing range reserves. Under this system, specialists determine the grazing capacity and grant grazing licenses for a specific period of time for a specified number of animals. In recent years, new types of cooperatives have emerged requesting the government to recognize their claims on traditional tribal pastures and subsequently engaging in the improvement the allocated areas.

Four types of management options have been identified in Jordan: (1) private management, (2) government reserves, (3) herder-driven reserves and (4) tribal management. In the current study rapid rural appraisals (RRA) were used in different communities to characterize the production strategies and the functioning on the management option. Subsequently, in-depth household and range surveys were conducted in the selected communities to monitor range productivity and household production strategies. The preliminary results of the econometric analysis suggest that herder-driven cooperatives are the most efficient system. Within this system households spend 21% less on feed expenditures compared to tribal managed pastures. Another interesting result is that government reserves require 30% higher feed expenditures compared to tribal managed pastures. These results are also corroborated by the results of range productivity and vegetation cover for the three management options. Feed production per hectare exceeds the production of tribal systems' that have degenerated into open access by 124 kg/ha for cooperative and by 164 for government managed pastures. Although differences in productivity between government reserves and herder-driven

cooperatives are marginal, given the high transaction costs associated with fencing and guarding government reserves, herder-driven cooperatives are likely to be more efficient in managing rangeland reserves.

Discussant

Baker Qudah

Ministry of Agriculture, Jordan.

The total surface area of the Kingdom of the Jordanian Hashimate is 90,000 square km. Rangelands cover about 90% of the total area and receive less than 200 mm of annual rainfall. These rangelands are confronted with overgrazing, recurrent droughts and desertification leading to reductions in forage production.

Various studies and experiences of rangeland protection show that rangelands are resilient if correctly managed. Degradation in these areas is mainly due to unclear property and grazing rights. The study presented concludes that the cooperative system should be applied to improved rangelands and foster environmental sustainability. However, the study focuses on areas where property rights are well defined and not disputed.

The major problem regarding rangelands in Jordan pertains to ‘open rangelands’, which are under state ownership. The Rangelands Directorate and the Ministry of Agriculture should develop a national strategy to manage these rangelands. Policies should include: resolving property rights disputes, fostering participation of local communities during planning and implementation process, developing better drought coping strategies, and formulating strategies to offset the effect of rainfall fluctuations and to improve marketing of livestock products.

EXECUTIVE SUMMARY – SYRIA: RANGELAND MANAGEMENT OPTIONS  
AND SHEEP FEEDING STRATEGIES IN SYRIA

Presenter

Tidiane Ngaido

International Food Policy Research Institute

International Center for Agricultural Research in the Dry Areas, Syria.

Paper co-authored with Farouk Shomo and Georges Arab.

Over the years, the government of Syria (GOS) has introduced many institutional options to foster stewardship on privately licensed ranges and to promote collective action through rangeland cooperatives. State interventions since the late 1950's included state ownership over rangelands, settlement and transformation of herders into farmers, formal reorganization of the Bedouin population into range improvement and sheep husbandry cooperatives, and development of rangeland reserves.

Meanwhile, the GOS introduced several policies that extended crop production into more marginal areas leading to widespread land appropriation, destruction of the natural vegetation and decrease in grazing areas. In addition, opposing claims between state and pastoral communities have resulted in poorly defined tenure rights on rangeland resources. This confusion fostered a situation of absence of control, generally termed "open-access", and the objective of restoring the balance between crop production and environmental conservation was not met. To reassert its control over rangelands and revert rangelands to grazing, the Syrian government banned cultivation of rangelands in 1994. Switching back to common use of rangelands from private use faces many challenges due to the site holders' reluctance to lose their claims on the land they have been cultivating for a long time.

This paper presents results of the monitoring surveys conducted amongst 69 households in the Jub-Jamaa community in 1999 and 2000. The study estimates household feed expenditures of different feeding strategies. The results suggest that under normal conditions, access to other pastures is an important element of small and medium-sized sheep owners' production strategies because of lack of cash to purchase hand feeds. The survey also shows that medium-size sheep owners spend more time in the cropping areas.

The longer Bedouin households stay outside their own sites, the more likely they have to resort to supplemental feeding. Reflecting trends in the countryside, Bedouin livestock production systems are becoming increasingly dependent on purchased feed supplies. As lack of adequate water and marketing infrastructures further weakens Bedouin production systems, Bedouin households are developing strategies such as selling part of their flock to purchase irrigated fields, exiting the livestock industry by investing in the transportation business, or migrating to the Arabian Peninsula. Some of these strategies may work in the short run, but may not be sustainable in the long term. The improvement of Bedouin livelihood strategies will depend on the extent to which adequate policy, institutional, and technical options are identified and used with full participation of the communities.

Discussant

Mahmud Nuhayyer  
Director General of the Rangeland Project. Ministry of Agriculture and  
Agrarian Reform, Syria

The Syrian steppe represents 55% of the total Syrian surface area or 10.2 million hectares, with average annual rainfalls of less than 200 mm. In the past the dominant

grazing system was the Hema system, which includes the respect of tribal grazing and water rights. In the 1950s, after the implementation of state appropriation of rangelands, open grazing led to unorganized exploitation of steppe resources. The symptoms of degradation became clear with the increase in sheep numbers and human population, and the shrinking in the natural resource base.

Laws, decrees and regulations banned cultivation on the steppe which is to be used only for grazing. Cooperatives established for animal grazing and rangelands improvement help breeders to secure feed materials and other services. Each cooperative has its own boundaries, which are stated with the General Union of the Farmers, the Ministry of Agriculture and the Directorate of State Properties.

The Directorate of Steppe will provide the following services for pastures and sheep for the last 30 years:

- Cheap feed resources and securing water availability by digging 200 wells for drinking water
- 36 new protected areas on 400,000 hectares
- Vaccination and medical care for the flocks

The Ministry of Agricultural received a grant from IFAD to develop 3 million ha jointly with the herders. The IFAD project for the steppe development will contribute to the steppe through the following five components:

1. Rangeland development through seedlings, sowing pastures and protection
2. Livestock development through feed subsidies and quality improvement of rams
3. Improvement the infrastructure (roads and wells)
4. Development of local communities (education, support efforts to increase family income especially women's)

## 5. Project management through training of staff

One of the problems facing the cooperatives is that their boundaries do not coincide with tribal boundaries. In order to proceed with the steppe development, boundaries must be the same.

### **OVERVIEW OF THE PROPERTY RIGHTS, RISK AND LIVESTOCK DEVELOPMENT PROJECT**

Presenter  
Nancy McCarthy  
International Food Policy Research Institute and  
International Livestock Research Institute.

The research results presented below for Ethiopia, Niger and Burkina Faso, were undertaken as part of a project entitled “Property Rights, Risk and Livestock Development.” The goal of the project was to support appropriate reforms of property institutions and land policies in the semi-arid areas of Sub-Saharan Africa. The objectives were: (1) to better understand how environmental risk affects the use and management of resources under alternative property rights regimes; (2) to identify circumstances under which different pathways of land use and property rights change are followed; and (3) to identify how policy and other external interventions can assist communities to achieve desirable pathways and mitigate negative impacts of undesirable pathways.

Field studies were undertaken in south-central Niger, southern Ethiopia and northeast Burkina Faso. All sites are in semi-arid regions; crop, livestock and herd



mobility activities were undertaken in all study sites, though to varying degrees. The information collected included community-level land allocation patterns, herd mobility, and seasonal stock densities, as well as information on the institutions charged with managing natural resources, including rules, regulations, activities, and the methods of monitoring and enforcing rules and participation in activities. The team also collected data on those factors thought to affect the capacity of communities to cooperate, including market distance and prices of crops and livestock, reliance on outside wage work, social and economic heterogeneity, underlying ecological characteristics, rainfall and variability in rainfall, and the number of community members. Though each case is unique, some impacts are consistent among all three study sites:

- The team rarely observes formal rules on stock densities, land allocation or mobility. Nonetheless, effective collective action in other natural resource management activities (i.e. waterpoint maintenance, soil erosion control measures, seasonal access restrictions, restrictions on settlement locations, etc.) has a significant impact on pasture use and land management in all three regions.
- High rainfall variability is often associated with either lower stock densities or greater mobility, or both, but is never associated with higher stock densities as would be the case if livestock were predominantly used as a source of savings or as a drought survival strategy—often held assumptions by researchers and policymakers alike.
- Heterogeneity in terms of social and/or wealth differentiation has a negative impact on the capacity of a community to cooperate and often leads to greater stock densities and more land allocated to private uses.

- Greater profitability of livestock products generally has a positive impact on capacity to cooperate.
- Greater number of members and the degree to which community resources are shared with other communities appear to make cooperation more difficult, and often leads to higher stock densities, though estimated impacts are less pronounced than the effect of other variables.

EXECUTIVE SUMMARY – ETHIOPIA: THE EFFECT OF ENVIRONMENTAL  
VARIABILITY ON LIVESTOCK AND LAND-USE MANAGEMENT: THE  
BORANA PLATEAU, SOUTHERN ETHIOPIA

Presenter

Abdul Kamara

International Water Management Institute

Co-authored with Nancy McCarthy, IFPRI and ILRI,  
and Michael Kirk, University of Marburg.

The Borana people are the predominant ethnic group on the Borana Plateau in southern Ethiopia. Though traditionally transhumant pastoralists, they have recently increased their reliance on crops. Rainfall in the region is bimodal and averages between 353 mm to 873 mm; variability is high, with coefficients of variation ranging from .21 to .68. Anecdotal evidence implies that the vulnerability of pastoralist households to drought is increasing; stock levels increase dramatically during good rainfall years but plummet when rainfall is poor, indicating that the drought cycle is becoming more pronounced. In recent years, there has also been a dramatic increase in land allocated to crops and land allocated to pastures that are either privatized or accessible to only a small sub-group of people. Nonetheless, the Borana are still highly dependent on access to common grazing lands, which provide the predominant source of forage and, importantly,

which also provide a mechanism to reduce risk associated with poor rainfall in one area by allowing for mobility. Because many of the land resources are used and managed in common, it is hypothesized that one of the key determinants of the productivity and sustainability of the systems is the ability of community members to cooperate over the use and maintenance of these resources.

In this paper, the authors develop indicators of cooperation and examine factors affecting these indicators. They then use these indicators to determine the impact of cooperation on stock densities and land allocation patterns. Results indicate that cooperation is positively related to factors that increase the profitability of livestock, but negatively related to the total number of households, the use of community pastures by non-community members, and heterogeneity of wealth within the community. Furthermore, stock densities are negatively related to the index of cooperation as expected. Stock densities are also lower in areas with more highly variable rainfall, indicating that high variability reduces the number of livestock held, a result which is inconsistent with the hypothesis that households build greater stockholdings in highly variable environments in order to survive a drought with more animals or as a source of savings. Finally, results from the land allocation estimations give evidence to support the notion that more land is privatized for pasture where levels of cooperation are lower. Given the importance of mobility and the poor suitability of most land for cropping, measures to offset increasing stock densities and privatization of land should focus on improving the capacity of communities to cooperate and mitigate the impact of heterogeneity on that capacity, and on improving market access to improve cooperation and increase incentives to sell stock in good as well as poor rainfall years. Results also

highlight the need to search for alternative policy mechanisms that mitigate the impact of drought that do not simultaneously increase incentives to augment herd levels in non-drought years.

Discussant

Edmealem Shitaye

Head of Pastoral Extension Team, Agricultural Extension Department  
Ministry of Agriculture of Ethiopia

The authors of the paper are to be congratulated for the excellent work on the Borana Plateau. Nonetheless, the Borana Plateau is only one area of pastoralist activity in Ethiopia, and thus the study might not be representative for the status of rangeland management throughout the country.

Also the economic importance of environmental variability on crop and forage production is not highlighted enough in the study. In particular, rainfall variability has a more significant negative effect on crop production compared to livestock production, and more detailed attention should be given to changes in rainfall patterns and duration of drought conditions. One important aspect that is not mentioned in the paper is the role of rainfall variability on livestock market performance. Similarly the linkages between grain availability and livestock production for the local market also deserves more attention.

Care needs to be taken when considering the hypothesis that stocking densities do not have significant effect on rangelands, a hypothesis that might be too general. This might not always be true without consideration of particular time frames and species of animals.

With regard to socioeconomic values, the role of cooperation mitigates the tendency to over-allocate pastureland to private use. The degree of cooperation depends

on the homogeneity of interests within the community and on the level of possession and distribution of property assets.

With regard to the overall situation in Ethiopia, the major constraints to pastoral and agropastoral production systems are the inability of the existing systems to adequately manage rapid population growth, a declining resource base, and climatic variability. Other constraints not specifically dealt with by the authors are: the encroachment of unwanted plant species, conflict over use of rangeland resources, the recurrence of droughts (which can cause 50% mortality for adult livestock and up to 90% for calves), lack of appropriate research technologies, and the widespread distribution of human and livestock diseases.

#### EXECUTIVE SUMMARY – NIGER: THE IMPACT OF COOPERATION ON STOCK DENSITIES AND MOBILITY

Presenter

Nancy McCarthy

International Food Policy Research Institute and  
International Livestock Research Institute.

Co-authored with Jean-Paul Vanderlinden  
Université de Moncton.

In Niger, key climatic characteristics include the high relative rainfall variability and recently increased frequency of droughts. Livestock mobility is often seen as one of the most valuable risk mitigation strategies, as it enables herders to improve both mean output as well as decrease output fluctuations associated with both spatial and temporal variability in rainfall. Broadly speaking, land tenure in this region consists of a mix of quasi-private and essentially common property, allowing for both fixed agricultural production and mobile livestock production.

Unlike the case for Ethiopia and Burkina Faso, it was not able to develop a proxy index of cooperation based on observed features of existing community structures, rules, regulations and activities in other areas of natural resource management. Thus, an index was developed based directly on exogenous variables thought to help or hinder collective action: degree of ethnic heterogeneity and distribution of farm sizes, number of members, degree of use of community land by neighbors and transhumants in the dry and in the rainy season, and the extent of migration of household heads for wage work. The factor analysis resulted in two primary factors, both of which were hypothesized to hinder cooperation. The first captured heterogeneity within the community and total households, while the second factor captured pressure on resources by neighbors – but not transhumants – as well as total number of members. These factors were then used as explanatory variables in an econometric model of mobility, stock densities, and land allocation.

There are three main conclusions to be drawn from the analysis. The first is that even when there are no formal “rules” or regulations regarding stocking rates on common pastures, factors associated with capacity to cooperate at the community level do impact decisions on stocking rates and on mobility. In communities with relatively high scores on the constructed non-cooperation indices, mobility is reduced and overall stock densities are much higher. Though difficult to address directly through policy measures, the results reinforce the notion that devolution of management of resources must consider the capacity of communities to cooperate. The results do support the notion that measures will have to be developed to offset the negative impacts of heterogeneity—in terms of wealth and ethnicity—on the ability of the community to cooperate. External

pressures on the resource and the number of households, which are more highly correlated with the second index of non-cooperation, also affect mobility and stock density, but the estimated effects are smaller than those associated with the first index.

Second, relative prices favoring livestock actually increase the share of land allocated to crops. This indicates that in these communities, the value of crops (i.e. through use of residues as animal feed) is quite high in livestock activities. It would be ideal to be able to combine this information with studies identifying factors associated with off-take rates; results from this study alone, however, indicate that increasing relative prices for livestock will likely not have a large effect on stock densities per se, but the response is likely to be increasingly intensified animal production and stronger crop-livestock linkages.

Finally, the impact of rainfall variability is quite pronounced for stock densities, but has no impact either on mobility or on percent of land allocated to crops. A priori, it would seem reasonable that mobility would be related to rainfall variability. The discrepancy may in part be due to the fact that mobility, by definition, is a flexible response to actual rainfall, whereas stock densities and the percent of land allocated to crops are less flexible and thus depend more on longer-term indicators of variability and mean rainfall realizations. Thus, the measure of long-term mean rainfall and variability used in this study might not adequately capture incentives for mobility in the particular year studied. However, consistent with results from the study undertaken in Ethiopia, there is a strong negative impact on stock densities particularly in communities where rainfall variability is relatively high. This result is important, because many drought mitigation and preparedness measures are predicated on the belief that programs that

offset the impact of rainfall variability on animal productivity will lead to *lower* stock densities. The results do not support this belief; rather, it is likely that stock densities would increase in response to measures directly aimed at reducing the impact of poor rainfall on animal productivity. Unfortunately, the policy conclusion is thus that measures to mitigate the impacts of drought must simultaneously consider measures to increase off-take or otherwise reduce stock densities.

#### Discussant

Maïdadji Bagoudou,  
Conseiller Technique du Ministre des Ressources Animales, Niger

The new context of globalization as well as the recent agreements that Niger has signed with the UEMOA (West African Economic and Monetary Union) and the CEDEAO (Economic Community of the West African States) countries has led our government to give priority to the development of crop and livestock production. This emphasizes livestock production in particular because Niger has a comparative advantage in this sector with respect to other countries.

The countryside offers the following favorable conditions for livestock production:

- 62 million hectares of pasture areas, especially in pastoral zones.
- A diversity of forage species with high nutritive value, particularly in the lower rainfall regions.

Nonetheless, evidence on the status of rangelands shows a worrying process of degradation, which is manifest through:

- Decreased plant density and proliferation of denuded soils.



- The disappearance of species desirable to animals, notably perennial species.
- The invasion of grasslands by undesirable species such as *sida cordifolia*, *pergularia tomentosa*, *boerhavia spp*, *zornia glochidiata*.

The herders and some pastoralists attribute this degradation to climatic changes. Though rainfall has indeed played an important role in the degradation process, the comparison of areas without pastures in the Sudanian zone with areas in the pastoral zone show that livestock, through the forage selection process, has also played an important role in this degradation process, perhaps a more important role than decreased rainfall.

This situation is surely the consequence of the traditional management system in Niger in which livestock has largely free access to most areas. While this system is efficient for adding value from the sparse but nutritious forage species in the Sahel, overgrazing leads to the excessive selection of the more nutritive forage species. However due to the absence of other viable approaches to optimal rangeland management, the government has not been able to introduce modifications. This calls for more research regarding appropriate alternative approaches, research in line with the work of Dr. McCarthy and her colleagues.

Research work has rarely been carried out on the management of pastoral resources, a domain in which the government needs a great deal of information in order to set up appropriate programs to sustainably improve rangeland productivity. Lack of information has been one reason why the Niger government has not yet effectively responded to instances of land privatization now occurring in the pastoral zones, which

unfortunately continue. The option of privatization merits reflection where several factors might favor this process:

- Demographic pressures that lead to the exploitation of arable land for agricultural activities in areas originally used for animal production. Land privatization might actually slow down this process of converting pastures to cropland.
- The successful role played by State ranches as reserves during the drought periods, which is in part due to herders' respecting limited access because it is considered as "private property" of the state.
- Transhumance constraints in parts of the Sahelian sub-region call for systems that can maintain livestock herds with limited mobility.

The last option deserves deeper analysis in order to make it effective in terms of sustainable production and resource conditions. While waiting for a broader analysis, the government decided to create the Secrétariat du Code Rural de Commission Foncière in order to look more closely at property rights issues and the resolution of land conflicts. This body, though just beginning, can constitute an important mechanism to manage lands. The question remains as to whether and what mechanisms can be used efficiently to manage land in pastoral zones.

By discussing the experiences of each country at this workshop we can learn about different options that might be used as 'pilot' programs in our country.

EXECUTIVE SUMMARY – BURKINA FASO: INSTITUTIONS, COLLECTIVE ACTION AND NATURAL RESOURCE USE IN BURKINABE’S SAHELIAN ZONE

Presenters

Drabo Bouraima, PSB/GTZ

Dori, Burkina Faso

and Céline Dutilly-Diané

International Food Policy Research Institute and the University of California at Berkeley

The Sahelian zone of Burkina Faso has traditionally been characterized as being overwhelmingly geared towards livestock production heavily reliant on mobility.

However, with the process of sedentarization of the population, the region is more accurately depicted as agro-pastoral, though livestock products still comprise the largest share in combined value of cash income and home consumption. Nevertheless, most pastoral land is still “owned” in common, which means that the success of provision and management of most natural resources relies on cooperation between villagers.

Villagers’ decisions depend also on the presence of external actors (state, projects and NGO’s) in this region such as the PSB/GTZ project, co-managed by the government and the German Technical Cooperation Agency. Traditionally oriented toward supporting local desertification control and natural resource management (NRM) through the ‘gestion des terroirs’ approach, the project changed focus in the mid-90s by putting emphasis on the institutional side of NRM.

The purpose of the paper is twofold: first, to determine the external and internal factors influencing the way NRM institutions work and second, to identify how these institutions’ performance affects the level of resource use, observed in this study through stock densities and land allocation. For this purpose, the paper relies on a survey conducted in 48 villages of the provinces of Oudalan and Seno, stratified on the basis of

their entry date in the PSB/GTZ program, to include sites where the project had employed only a technical approach, sites with institutional interventions, and control sites in which the project had not yet begun to work.

A general authority - traditional chief and/or official delegate (RAV) - is present in every village, though several other institutions are almost always present, including: general village associations (men, women, mixed), producers associations (farmers, or herders), and water and tree management associations. The main activities operated by those institutions are water source maintenance and management, erosion control, reforestation, and agro-pastoral zoning. Rules that govern NRM in these villages concern the pastoral as well as the agricultural zone (e.g. calendar for animals to enter or be removed from cultivated fields), restrictions or prohibitions on harvesting hay and/or forest products, and water use rules and regulations (e.g. health and hygiene norms, access conditions).

Since the analysis consists of comparing institutions at the community level, the authors built several indicators by aggregating the institutional information at the village level. These indicators were then classified according to structure (% rules monitored and enforced by the chief only, % institutions that work at the supra-community level), conduct (number of institutions, rules, activities in the village), and performance (participation in meeting, in working activities, presence of conflicts, rule violations). A correlation matrix was computed between village characteristics and NRM institutional indicators.

The following patterns could be identified through the correlation coefficients: i) the presence of projects and education are positively and significantly correlated with

conduct and performance indicators, ii) population density and heterogeneity are positively correlated with conduct but negatively related to performance of the institutions, iii) institutional indicators were lower in communities where the responsibility for monitoring and enforcing rules rests almost exclusively on the chief.

To analyze the relation that exists between cooperation and resource use a three-step analysis is performed. Because a unique indicator is insufficient to explain the level of cooperation attained in the community, an indicator of cooperation and one of non-cooperation were constructed based on a set of variables depicting the general performance (conflicts, rule violation, work participation, success of activity) and conduct (number of institutions and rules relevant to NRM) of the institutions present in each village.

Those two indices are regressed on factors hypothesized to affect cooperation: structural characteristics (size of the community, heterogeneity, external pressure) and institutional structure indicators (predominance of the chief's role in monitoring and enforcing rules, percent of institutions with an elected body). The findings show that cooperation is strongly affected by the structure of institutions, while non-cooperation is better explained by village internal factors such as ethnicity and heterogeneity in cattle ownership.

Investigating the links between cooperation and resource use, we find that stock densities and percentage of land allocated to crops are explained by non-cooperation (i.e. higher degrees of disagreement lead to higher stock densities and higher proportion of land dedicated to crops), population density (i.e. the greater the pressure, the greater the

use of pasture and the lower the provision of pasture), and rainfall variability (i.e. the higher the variability, the lower the stock density).

Institutional design and performance play a major role in the success of natural resource management. Some points that could open further debate for policy recommendations include: the role of democratization in villages, the role of literacy and other internal factors such as heterogeneity, and finally, the impact of external pressure on natural resource management.

#### Discussant

Hubert Ouedraogo  
Université de Ouagadougou, Burkina Faso

The current case study concerns the Sahelian zone in the North of Burkina Faso which has a particular socio-cultural context: a strong hierarchy between the masters (the Peuhls) and their former slaves (the Rimaibe). The former used to be the traditional landlords, who were primarily involved in livestock activities, and the latter farmed the land for their masters. With the Burkinabe Revolution in 1984, slavery was abolished with the consequence that the Rimaibe and migrants into the area (notably the Mossi) dramatically increased their political voice. Today, traditional Peuhl chiefs often try to regain their lost advantages by investing in modern political and institutional spheres.

The specific and clear rules enforced on pastoral land in the past allowed a harmonious integration of crop and livestock activities in those agro-pastoral societies. Today increased clearing of pastoral space for agricultural activities has resulted in severe conflicts. Policy and institutional environment are a source of confusion for the local population as well as for the different development actors. This situation is due to the

State, which proceeds with successive reforms without clarifying the previous or current policies on land tenure, etc. Also, NGOs and projects often do not build on the existing institutional structures, but rather create new structures under their control in order to realize their development objectives.

The case study emphasizes how increasing rural population pressure by in-migrants, who are considered as strangers by the indigenous population, disrupted local cohesion and the capacity of local community members to manage their natural resources. It further draws attention to the distinction between projects that favor the power of the local chief versus those that actively seek to include all actors for the preservation and management of the resources. It is important to implement an institutional framework that assures efficient participation of the population in NRM, the execution of laws and rules for NRM, and the durability of development actions. A last word reminds the audience how important it is that this Conference supports sustaining pastoralism as the appropriate mode of natural resource exploitation in these dry regions of the world.

## EXECUTIVE SUMMARY – UGANDA: RANGELAND MANAGEMENT POLICY IN UGANDA

Presenter  
W. Kisamba-Mugerwa  
Minister of Agriculture of Uganda

This paper reviews the history and policy outcomes of Uganda's rangelands which are concentrated in the "cattle corridor" of Uganda. The main use of rangelands in Uganda is grazing by wild and domestic animals, which provides the cheapest source of

nutrients for ruminants in Uganda. Rangelands support about 90% of the national cattle population, mainly kept by pastoral and agro-pastoral communities. About 85% of the total marketed milk and beef in the country is produced from indigenous cattle that thrive on natural rangeland pasture. Yet, most of the farmers remain poor and are increasingly experiencing food insecurity.

From an environmental point of view, rangelands in Uganda constitute very fragile ecosystems, subject to desertification due to drought, overgrazing, deforestation, poor farming practices and soil erosion. Poverty coupled with a rapidly increasing population exacerbates these factors.

Since colonial times policies have fallen short of recognizing pastoralism (livestock farming) as an economic activity. The tendency has been to introduce policies geared at the sedenterization of pastoralists. Apart from the 'crop production bias' favoring agriculture over pastoralism, two recent policies have further marginalized pastoralists. One is the development of a very strong environment-oriented pressure group which has caused the displacement of the encroachers on gazetted land, such as forest reserves. The existence of these closed areas within the cattle corridor has created management problems for pastoralists, as well as for forestry and wildlife authorities. Secondly, the development of tourism, although a very important source of foreign exchange, has further marginalized the interests and the rights of pastoralists whose land has been turned into national parks, wildlife reserves or wildlife sanctuaries.

#### *Land tenure*

There are three main land tenure systems in Uganda:



*Customary tenure* is the most prevalent tenure system throughout the pastoral and non-pastoral areas of Uganda. It is the most egalitarian tenure system but generally does not foster investments for maintenance of the resource.

*Private property* has resulted from a high level of individualization of the communal pastoral land throughout the entire corridor, but tends to lead to a reduction in the available grazing land.

*State property* includes national forest reserves, national parks, game reserves, wild life sanctuaries and community wild life areas. Generally, traditional rights of existing populations have been neglected by policy decisions regarding these lands.

The shift from customary to private and state property has triggered a number of regional conflicts, as well as disrupted traditional management rules. Local communities have often lost control over rangeland resources.

*Areas of focus for policy:*

Current policies continue to concentrate on sedentarization of pastoralists, rehabilitation of the animal sector (e.g. veterinary support), provision of water, attention to gender issues, and agricultural modernization. New areas that need policy intervention include the problem of livestock overstocking on rangelands, inadequate water supply, insufficient market facilities, disease and pest control, as well as low investment in extension, infrastructure, and research on rangelands. However, the most important factor is probably the lack of institutional support to local communities.

*New policy directions:*

Comprehensive national policies that recognize the multiple use characteristics of rangeland resources and reduce coordination problems among agencies are needed. Policy approaches need to involve communities in the planning and implementation of programs. Decentralization of power should favor marginalized pastoral people, though this may be challenging given their isolation and difficulty of integrating them into the policy arena. Major research efforts are needed to increase productivity of rangelands and identify viable income generating activities for pastoralists.

Discussant

Brent Swallow

International Center for Research in Agroforestry, Nairobi

There is a need for a new approach to dryland and pastoral development in Uganda. Four important areas for policy indicated in the paper should be highlighted.

The first is a role of pro-active government policy toward pastoral property rights. With respect to this issue in Uganda there is the need for an over-all land use allocation strategy toward agro-pastoral and other uses (conservation etc.), and the possibility of using conservation areas as fall-back resources without threatening conservation objectives. The government must recognize the existing trade-off between conservation and production. With regard to the implementation of the land law (1998 Land Act), it is important to investigate the applicability of this law that seeks to solidify private claims to agricultural lands. The establishment of government ranches is generally not an appropriate policy approach, except possibly as multi-use conservation, buffer zone or transition from other ownership types.

The second area regards the guidelines for macro, environmental and trade policy and their effects on pastoral areas. Food security and international relations issues, as well as decentralization strategies, all affect pastoralist livelihood strategies. With respect to decentralization, apart from obvious advantages it can also carry risks for pastoralists when there is a lack of contact with central planning authorities, as is evident from the experience of the *terroir* approach in Niger.

The third area relates to the possible existence of an “optimal fuzziness” in land use planning and property rights. Major issues in this respect are the zoning within national parks and forests, the need to set aside areas for rest and regeneration, the need for agricultural-livestock integration and intensification of production strategies and the need for mobility during drought times.

The last area relates to collective action strategies. There is a strong inter-relation between collective action and property rights. Collective action should be a higher

priority for policy than property rights per se. Especially in case of high variability of rainfall, collective action should not be seen only as bonding within a group. It is important to consider collective action across groups and collective action to integrate into markets. It is thus important to look at broader political agendas and international relations. It is also important to keep in mind that the final goal of research on pastoral areas is to arrive at appropriate policy implementation.

#### **4. A DONOR PERSPECTIVE: NORAGRIC AND IFAD**

##### **EXECUTIVE SUMMARY – ASSESSMENTS OF LANDSCAPE LEVEL DEGRADATION IN SOUTHERN ETHIOPIA: PASTORALISTS VERSUS ECOLOGISTS**

Presenter

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This paper compares land degradation assessment techniques using indigenous ecological knowledge (IEK) of the Booran pastoralists and techniques used by ecologists. The study was conducted at landscape and regional levels in southern Ethiopia, where the Booran pastoral production system comprised the Golbo (lowlands), the Dirre (Plateau) and the Liiban production systems (hereafter also referred to as regions). By involving traditional range scouts in evaluating landscape and regional level environmental changes, the study challenges the notion that IEK is mythical and could not meet scientific rigor. The use of common soil and vegetation indices allows comparisons of land degradation assessments between IEK of the pastoralists and ecological techniques.

Evaluation by traditional range scouts (TRSC) and range ecologists (RE) on changes in range conditions and trends showed high correlations. IEK was effectively used to determine landscape suitability and potential grazing capacity of individual landscapes and at regional levels. The study shows different perceptions in interpreting grazing suitability and potential grazing capacity. While grazing capacity is an inherent property of individual landscapes, management decisions have impact on grazing suitability. Both TRSC and RE made comparable predictions on threats to range conditions and trends, but interpreted landscape stability differently. We suggest that integrating IEK in the ecological methods would help identify important perceptions of the pastoralists on effects of land use on local landscapes. Moreover, the value of IEK should also be considered when monitoring landscape level changes as well as when assessing degradation of the grazing lands. We hope the information in this paper will motivate policy makers to incorporate IEK of the pastoralists into decisions on landscape level range rehabilitation.

**EXECUTIVE SUMMARY – STRATEGIES FOR INSTITUTIONAL OPTIONS  
FOR RANGELAND MANAGEMENT IN THE NEAR EAST NORTH AFRICA  
REGION: IFAD EXPERIENCE**

Presenter  
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This paper presents IFAD's project approach to rangeland management and development (findings and recommendations are based on IFAD projects in Morocco,

Jordan, and Syria) which focuses on empowering local communities to become the main players in the management process. At least three inter-related tools have been used by IFAD for the empowerment of herder communities:

1. Involvement of the herders through introduction of *participatory approaches*. Beneficiary participation is key to the success of conservation-oriented projects. NGOs have an important role to play in testing, identifying and experimenting with new alternatives and technologies that can contribute to sustainable rangelands management by the herders themselves.
2. Policy dialogue with governments for the promotion of appropriate *land rights*: Granting long-term grazing rights to local communities is important for conservation management, yet a very complex process. Acknowledgement of local land users' rights and the integration of customary land-tenure arrangements within new administrative structures is a pre-requisite for any long-term sustainable investment activity for the rehabilitation and management of the rangelands.
3. Provision of *economic incentives*: The benefits from rangelands conservation activities are of a long-term nature, while poverty compels herders to engage in conservation activities that produce substantial, quick returns at low cost. Therefore conservation projects need to contemplate compensation of foregone income at least during the initial years.

Difficulties arise if new approaches are adopted under pressure from external donors and without complete commitment of the government. Implementation is also more difficult where there is increasing stratification and diversification of herders' income, because of conflict of interests.

## 5. WORKING GROUPS

### SESSION 1: CHARACTERISTICS OF DIFFERENT PROPERTY RIGHTS REGIMES FOR RANGELAND MANAGEMENT

During the first session the working groups discussed the three broad categories of property rights regimes: state ownership, traditional/indigenous common property, and private property. Participants were asked to identify the key property rights and collective action issues arising under each regime.

In particular these questions were addressed:

1. What are the key issues (problems, questions) regarding access, use, ownership claims, and management of resources?
2. What are the strengths and limits regarding poverty alleviation?
3. What are the strengths and limits regarding environment sustainability?

#### SUMMARY OF SESSION 1:

##### *State ownership*

One of the key issues regarding state management regards the capacity of the state to effectively control access and use of rangeland resources. It was felt that management capacity is often quite limited due to lack of local knowledge necessary for good management. The state may also face higher costs in enforcement than would more local level authorities, and may instead be forced to rely on such costly measures as fencing and paying for guards. There would also need to be mechanisms for the identification of violators and enforcement of fines, and again, such mechanisms may be much more costly for the state. Also, poor management by the state may make previously “common-pool” resources open access with consequent negative impacts on productivity and an

increase in conflicts. In fact, inappropriate or inadequate management capacity by the state may lead to use rates anywhere along the spectrum of far too little to far too much.

State ownership may also have an adverse effect on the rights of the poor. This may be particularly true where the state's objectives are mainly conservation and/or to promote productivity of the relatively wealthy livestock owners. Again, because of lack of local knowledge, the state may inadvertently deny access to those who had previously had at least some degree of access to the resource. Pure conservation goals may be more likely to be achieved by the state, but at a very high cost if local community members are not involved with setting and attaining those goals, or if members are not compensated in any form when the government completely restricts access. Links between users and government have generally been very poor, many user groups have been alienated by various state agencies. Furthermore, where there are differences between those who consider themselves predominantly crop farmers versus pastoralists, the state has often sided with the crop farmers. Lack of criteria – or lack of transparency of criteria – by which the state allocates rights, promotes uncertainty and often conflict among users. This is also true in land use planning at the national level when decisions are made by centralized state agencies regarding land classification into different systems (national park, national reserves, national forests, etc.)

Many participants felt that there was a role for the state to play in providing fall-back reserves – though not all agreed that state was the best level to manage reserves. Also, the state may have a role to play in undertaking specific large-scale investments, and in gathering and disseminating the best available technical information.



*Common Property*

Generally (though not always), common property is considered the most equitable regime. Effective management is still seen as a large problem – and questions still remain regarding under what circumstances local communities effectively create and enforce rules. Also, what policies can be created and implemented to empower local level institutions to undertake NRM, especially where national legal frameworks are unclear or un-enforced regarding rights and responsibilities of local communities in NRM. It was felt that successful local level NRM requires better links with other actors in the national system, and should be part of an overall development strategy.

In most instances, there is a hierarchy of access rights with different individuals or groups negotiating access in response to such factors as very poor rainfall or loss of wage-earning income. Many systems are flexible and capable of responding to crises – either experienced by just one individual or by the whole communities. Thus, the risk-spreading role of common rangelands is considered very important, particularly for poor and marginalized groups. This brings one to the issue of devolution policies, and how they might retain a hierarchical structure with rights and responsibilities matched to the appropriate levels of governance to ensure flexibility and equity. It was suggested that consideration of policy instruments such as “long-term” leases (99 years) would be best to promote long-term interests by community members, but at the same time retain certain roles for the state.

However, problems of identifying which local institutions best represent the interests of all community members was also mentioned by many participants; equitable distribution of access to and control over community-based resources may be

compromised when powerful local elite assert their power, especially if they co-opt community-based institutions that are given legitimacy by the state. Furthermore, equity in access does not necessarily mean equity in use, since the difference between large and small scale herders may be very large – and large scale herders will benefit disproportionately. Also, boundary conflicts may often arise. The flexibility of the system, which is beneficial for risk management may inadvertently lead to more conflicts. Conflicts of interests may also weaken management under common property, but it was felt that many of these conflicts could be managed by the different groups, although legitimate conflict management mechanisms need to be developed.

It was noted that there are many other resources on pastureland, and community members must also find mechanisms to allocate access to and perhaps restrictions over such resources as wood for fuel, hay, soil for cropping, etc.

Finally, participants also raised the issue of the capacity of local level institutions to withstand changes in the external environment, especially changes that promote over-use by certain groups or that increase incentives to privately appropriate land. In fact, the very flexibility that is seen as very valuable for responding to temporary crises and to offset variability in production and income, was also mentioned as being a factor that may make it easier for certain groups or individuals to privatize and/or mis-use the resource. Also, with very large changes, local level institutions may not be able to adapt conflict resolution mechanisms to adequately handle pressures for land use change.

*Private Property*

In many cases, privatization of common grazing lands leads to unequal distribution of grazing resources, and there is the risk of excessive fragmentation. Privatization also makes mobility more difficult, if not impossible, increasing the riskiness of livestock production. It also may lead to inappropriate practices that are undertaken simply to stake claims on rangeland – for example, inappropriate planting of poorly adapted but cheap tree species or cropping on marginal and fragile areas.

It was thought that management of private property, however, is likely to be “cheapest” – allowing for quick decision making. Private property may also facilitate innovations and adaptations, which may have spillover benefits for local populations.

It is important to understand which factors accelerate change towards privatization, in order to adequately manage land-based resources. Also, under all regimes, there needs to be better integration between technicians, land-use planners in government ministries, and the users themselves.

**SESSION 2: INSTITUTIONAL CONDITIONS FOR EFFECTIVE RANGELAND MANAGEMENT UNDER DIFFERENT PROPERTY RIGHTS REGIMES**

During the second session, participants built on the issues discussed in the first session to identify the conditions under which each property rights institution is effective in reaching goals related to the efficient, equitable and sustainable management of rangeland resources. Secondly, acknowledging that optimal management likely requires participation of different actors at different levels (individuals, communities, local, regional, national – and sometimes international – governments), the groups discussed the roles and tasks of different actors in achieving effective management.

*State ownership/management/control*

Participants thought that at least partial state control might be the best option in the following contexts:

- Environments with very fragile ecosystems or areas with important bio-diversity characteristics. Even here, however, partnerships with local users are considered necessary to achieve goals of rehabilitation and sustainability. Federations of user groups may play a key role in interacting with governments.
- Managing large-scale water catchment areas, where communication, coordination and cooperation would otherwise have to be undertaken by many distant and disparate communities.
- Where large-scale investments and basic infrastructure must be made to rehabilitate rangelands or protect environmental amenities; or in other investments where returns will not be realized until some time in the future.

As before, participants emphasized the fact that the role of compensation to users who will now be denied access or restricted in activities must be addressed by the state in a transparent way, particularly when the state's goals are to achieve benefits at the supra-community level. The state should also consider appropriate policies to aid newly restricted herders to adopt new practices.

Some participants also thought the state had a role in managing reserve areas designated to be used only during drought years; and again, where required large-scale investments would be very risky for communities to undertake alone. Managing

mobility, especially trans-national migration, should be negotiated at many levels, including nation to nation.

Many participants saw a role for the state in securing property rights for certain marginalized groups, especially where conflicts are severe and widespread, where restrictions are thought necessary, and where local organizations do not serve the needs of the minority or the poor. The state should also play a role in setting up and empowering local conflict negotiation forums, which required a well-articulated and transparent role of state in the process. Transparency is also required to reduce corruption and patronage, which may have negative consequences for poor and marginalized.

In all cases, the state's activities should be limited to those activities where there is ease of monitoring and enforcement, i.e. where information is readily accessible. There is no need to engage in micro-management, since that requires local knowledge and constantly updating information on changing local conditions.

To summarize, it was thought that the state's direct involvement in the management of rangeland resources is best reserved for enforcing temporary use; undertaking large and risky investments; protecting and rehabilitating heavily degraded and/or fragile ecosystems; and managing situations of heavy conflict. Clearly, there is a key role for the state to play in land use policy, regulation, and legislation; establishment of a guiding framework of rules and regulations, to give legitimacy to local institutions where appropriate, and devise adequate compensatory mechanisms where access will be denied or restricted.

*Common Property*

It was felt that common property was most likely to achieve both equity and sustainability objectives under the following conditions:

- where the distribution of herd/flock sizes are roughly similar;
- where users groups are relatively homogeneous in terms of ethnic/religious/wealth status;
- where strong links exist between users and among groups involved in different aspects of NRM;
- where spatial and temporal variability in forage resources is large;
- where there are only a limited number of competing uses of the resource, which means that management would be easier and conflicts less likely (i.e. “true” rangeland, where neither forest nor cropping are viable);
- where strong local/traditional institutions are in place,
- where there are credible forums for negotiation of conflict, and
- where local knowledge is required for devising site-appropriate rules and regulations, and systems of monitoring and enforcement.

Management and capacity to actually enforce rules or successfully undertake activities requires that all stakeholders have some forum for voicing their concerns, and is most likely to be found where there is social cohesion and a strong local tradition of cooperation.

There is a role for the state in fostering and supporting strong local institutions, and in providing information on technical and/or market conditions. Common tenure

regimes will work best where local authority is recognized and supported by the national government.

*Private Property*

Participants felt that private property rights are likely to be the most appropriate under the following conditions:

- high production potential but low spatial and temporal variability in rainfall;
- high potential for crops and trees, and land suitable to multiple production activities more generally;
- when quick decisions are required to make productive use of the resource or adopt promising new technologies;
- where high investments are required but where there is potential for quick returns; and where labor, credit and input markets and insurance mechanisms are well-functioning
- where cultural norms allow for the ownership of private property;
- where land allocation is seen as equitable;
- when small plots are enough to guarantee at least subsistence livelihoods;
- where there are other safety nets available for poor and landless; and
- where there are opportunities for employment in other activities.

However, private property requires security and thus credible legal framework and enforcement mechanisms that are considered legitimate by local community members.

Also, where privatization has occurred or is occurring, it is still desirable to promote institutional structures and arrangements that facilitate exchange of grazing areas and mobility of animals.

### SESSION 3: POLICY RECOMMENDATIONS

Participants in this final session were asked to consider concrete policy recommendations, with the caveat that some recommendations would pertain only under certain conditions. Key recommendations for the role of the state include:

- Integrate rangeland management into the overall framework for rural land use, allocation and management.
- As a first step, draw up well-defined goals for optimal rangeland management and clearly state the criteria for establishing the goals, in consultation with all stakeholders, taking into consideration local knowledge and customary rules, and determining the appropriate levels at which different functions and activities will be undertaken. This should produce a general framework of rules and regulations. It should not be overly detailed, as detailed resource management should be undertaken at the local level. Caution must be taken not to devolve responsibility without devolving any real authority, or devolving responsibility in the absence of credible and legitimate institutional structures from the local level on up, as discussed below.
- Clearly articulate the rights and responsibilities of local institutions in managing pasture resources, as well as the rights and responsibilities of higher levels of government. In some cases, use and management rights granted to a community



may be made conditional on responsibility in use and management, but these conditions must be fairly negotiated and clearly understood by all participants.

- Identify appropriate local institutions, and give clear criteria for this identification, so that the institution is then seen as both credible and legitimate. Revitalize traditional institutions where appropriate, but only where these institutions are also considered appropriate according to the criteria. Legislation should also be adopted to legally recognize common property rights. Legitimacy is most easily established where concerns of all users are voiced and listened to. Local empowerment is part of the strategy for successful devolution.
- Take a lead role in facilitating cooperation when this is required across many different communities (i.e. for mobility or for management of water catchment areas), and make sure that weaker groups are not marginalized (e.g. poor pastoralists and women).
- Design policies to promote fair and credible conflict management mechanisms by empowering local communities.
- Carefully consider large-scale, strategic investments that generate large public goods, and undertake those that yield benefits to users, particularly both now and in the long run. Some participants also felt that establishing drought reserves is still an important policy to be undertaken and enforced by the state.
- Take an active role in disseminating information related to rangeland management and livestock production – and integrate indigenous knowledge with knowledge from other sources.

- Develop a distinct set of contingency plans and social safety nets in the event of serious droughts and/or other catastrophes.
- Ensure state to state coordination for the management of the transboundary pastures.
- Foster diversification and income generation sources for pastoral zones in order to reduce the vulnerability of poor pastoralist communities.

## 6. CONCLUDING OBSERVATIONS

In the arid and semi-arid areas of North Africa, Sub-Saharan Africa and West Asia, rangeland management issues remain of critical importance in ensuring both equitable and sustainable development in a highly variable environment. Participants emphasized the risk-reducing role of mobility and access to a wide range of pastoral resources. Nonetheless, increasing population pressures and policies that increased uncertainty over access and use rights over rangelands resources and favored sedenterization of pastoral populations and crop production. Consequently, many regions have experienced degradation of rangeland resources and increased vulnerability of pastoralists' livelihoods. Conference participants identified the following critically important issues:

- Maintaining mobility while simultaneously ensuring that community investments in the management of common pastures accrue primarily to community members. The role of drought reserve areas, restrictions on access, and which institutions should make and enforce decisions were also considered.

- Identifying the appropriate institutional mix: one that balances the flexibility of more informal systems of access, use and management rights with institutional arrangements that offset the high level of conflicts, greater opportunities for private appropriation, greater ease with which households justify circumventing restrictions, and permanent encroachment that often accompany such flexible systems.
- Designing legal frameworks to resolve uncertain property rights, which are seen as the root cause of degraded and unproductive rangelands.

The papers presented and discussed at the conference highlight four important points related to the issues presented above:

1. Communities can and do cooperate over the management of resources, either through cooperative societies or more informal traditional mechanisms. Building on local knowledge and traditional structures to create more formal structures, i.e. herder cooperatives, is likely to lead to better management than relying on informal mechanisms only, particularly in regions subject to large changes in population pressures, weakened traditional institutions, market access, etc. However, certain communities and cooperatives are more successful than others.
2. The number of members, heterogeneity in wealth and ethnicity, and the extent to which community resources are shared with others all negatively affect the capacity to cooperate, whereas greater profitability of livestock activities often improves cooperative capacity.
3. Both long and short distance mobility is important to increase livestock productivity in all years, as well as to reduce vulnerability under poor rainfall conditions. Mobility is also a function of the capacity of the community to cooperate; lower cooperation leads to lower mobility.
4. Areas with relatively high rainfall variability have lower stock densities because of the added risk to production. Policies and programs that successfully mitigate impacts of drought may in fact induce dramatic and unsustainable increases in stock levels. Drought mitigation strategies must be developed that reduce

vulnerability of herders to drought but that do not lead to large increases in stockholdings.

Policy recommendations reached by conference participants focus strongly on identifying appropriate roles, rights and responsibilities of government and local level institutions in rangelands management. Community participation is considered a necessary prerequisite for sustainable management, since local knowledge is required for technical aspects of management and local institutions have better information on which to base management decisions and enforcement mechanisms. However, the state still has a role to play, particularly in ensuring that local institutions represent interests of all community members (and not only the wealthy elite), and, in many cases, in helping to create legitimate conflict resolution mechanisms. Some participants remain skeptical of devolving responsibility of rangelands management to communities, but the empirical evidence does support the fact that communities can and do manage use of pastoral resources, though investments may remain lower than socially optimal. Thus, the state may have a role to play in undertaking larger scale investment projects whose benefits are realized only in the long term. Even here, however, evaluating the benefits and costs to such a project must be done in conjunction with the community, and arrangements for cost sharing may also be considered.

One reason for the skepticism arises from the impact of heterogeneity of resource users – in terms of wealth levels, ethnicity, education, access to credit, and access to non-farm income sources – which participants strongly felt hindered collective action in the management of natural resources. The negative impact of heterogeneity on collective action was also borne out by research results. Thus, there remains a knowledge gap in

understanding which specific policy mechanisms may best alleviate the negative impact of heterogeneity of local and regional interests.

Also, appropriate legal frameworks that reduce uncertainty and ambiguity over property rights must be developed, since ambiguity often leads to open access situations and resource degradation. On the other hand, any legal framework needs to incorporate the valuable aspects of flexibility in access and use, while mitigating the potential negative consequences of increased conflicts and mis-use of resources by a sub-set of herders or households. The empirical results support the notion that shared resources increase the flexibility of the systems, but that they also diminish the capacity of the communities to regulate resource use. A system of mixed rights to different resources may very well be required. In Ethiopia, a small percentage of range resources are *de facto* private; another fraction is restricted to a sub-set of community members; another fraction restricted to community members though outsiders may ask permission to use these resources; and another fraction of land is open to all tribal members. In certain countries, government range reserves that are mainly used during droughts and specific periods are managed by the state, tribal rangelands are open to all members of the tribe, and in some cases a fraction of rangeland resources may be under private control, particularly where investments in fodder trees (i.e. cactus) are optimal.

Finally, participants emphasized the need to incorporate rangelands management into the larger context of development plans at the national level. Rangeland restoration projects, drought contingency plans, and property rights policies must consider the overall functioning of systems fundamentally characterized by high environmental variability.

## 7. PARTICIPANT LIST

Conference opening ceremony guests:

His Excellency The State Secretary, Ministry of Agriculture, Tunisia,  
 The Governor de Nabeul  
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