

Towards an integrated perspective on land degradation in the mountains of
Lesotho: A report on the inaugural meeting of the Lesotho Mountain
Research Group held at Malealea Lodge, Lesotho (28-29 September 1996) ¹

Second section: People's perception of land degradation in Lesotho ²

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BACKGROUND

'Land degradation' is widely recognised as a critical environmental problem in the mountains of Lesotho. Lesotho is renowned for its "prominent soil erosion. that stands out (in satellite imagery) in stark contrast to the surrounding well vegetated landscape of South Africa.... a stage only one above that of desert" The highland farmer and his livestock are commonly blamed for such spectacular depletion of Lesotho's natural resources.

In Lesotho, much effort has gone into documenting the obvious phenomena of degradation, i.e. soil erosion and range degradation, and their negative impact on rural livelihoods. Apart from various individual research projects aimed at specific aspects of land degradation, a number of large multidisciplinary research programmes (e.g. the Maluti/Drakensberg Catchment Conservation Programme and the Lesotho Highlands Water Project Baseline Biological Surveys) have reported, directly and indirectly, on various aspects of environmental degradation. However, despite these efforts, degradation appears to be continuing unabated and 'solutions' to the problem are not obvious, especially in the face of increasing demand for scarce resources.

Part of the failure to halt, or at least reduce, the rate of land degradation could be due to a poor understanding of the patterns and processes of degradation. Fundamental data on several processes do not exist, e.g. rates of soil erosion, and such lack of data may lead to spurious prognostications and unrealistic projections. More importantly, the complex causes and effects of degradation and feedbacks between the user and the land cannot be understood from isolated studies. What is required is an integrated perspective on the multifarious nature of degradation; where the patterns, processes and ramifications of degradation are understood in the socio-economic context of the land user.

Multidisciplinary projects, such as the M/DCCP, which involved a number of studies on various aspects of the environment and socio-economy of the

eastern mountain catchments of Lesotho, have failed to provide an integrated view of the mountain environment. Although the scope of these projects were broad, and the individual studies comprehensive in nature, the process of investigation did not involve integration of questions, methodology and field work right from the start. Consequently, synthesis of individual studies at the end of the research programmes did not provide the requisite holistic understanding of the ecological and sociological dynamics. An interdisciplinary approach to studying environmental problems, such as degradation, is therefore imperative.

The Lesotho Mountain Research Group (LMRG) was formed in 1995 to facilitate integrated, interdisciplinary research in the mountains of Lesotho. The LMRG (with a current membership of over 60) comprises a network of researchers and practitioners from a number of natural and human science disciplines who are interested in co-ordinating their research efforts and in the exchange of information relating to the mountain environment. As one of its first actions, the LMRG convened a workshop in September 1996 to examine the role that a multidisciplinary group, such as the LMRG, may play in researching critical environmental issues. The focus of this workshop was the complex nature of land degradation in Lesotho.

WORKSHOP OBJECTIVES

The overall aim of the workshop was to summarize current evidence of land degradation in the mountains of Lesotho and the consequences thereof for various users. The specific objectives were to:

Identify significant knowledge gaps in the understanding of the patterns, processes, mechanisms and consequences of land degradation;

Identify priority research questions and to outline interdisciplinary research proposals that will address these key topics;

formulate an appropriate mission statement and organisational structure for the LMRG which will facilitate the implementation of the identified research proposals as well as other integrated research; and

Specify short-term actions and long-term goals to implement the proposals outlined at the workshop.

Four papers were presented on biophysical and social aspects of land degradation as a means of generating discussion on these broad and interrelated themes. The papers are presented in this report along with a summary of the main points of discussion emanating from each presentation. Key outstanding questions were identified by the various speakers and some research was proposed to answer these questions. Guidelines for achieving

integration at various levels in an overall interdisciplinary research programme were discussed.

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SUMMARY OF WELCOME ADDRESS

Bore Motsamai

National Environmental Secretariat (NES), Lesotho

In his opening speech, Mr Motsamai focused on the co-ordinating role that the NES can play in environment related research in Lesotho. Presently, the NES's work is focused on coordinating local implementation of the following international conventions:

The Convention to Combat Drought and Desertification

The Convention on Biological Diversity

The Convention on Climate Change

The Montreal Protocol for the Protection of the Ozone Layer

All of the above have relevance to the broader problem of 'land degradation' in some way and various separate initiatives are presently under way to devise appropriate policy and strategies for implementing these environmental conventions. The aim is also to produce a State of the Environment Report for Lesotho. However, it was noted that NES faces a number of obstacles and challenges in its task, namely:

The NES lacks an adequate data base of relevant research done in Lesotho and further funds are needed to improve their data base.

The data available from past studies (e.g. LHWP Baseline Biological Surveys and the Maluti/Drakensberg Mountain Catchment Conservation Programme) do not provide an understanding that is complete enough to allow for effective management of the environment.

Data on the hydrology of the mountain catchments are particularly critical. However, such data are sparse partly because there is insufficient appreciation by those with economic and political power of the threats to the source of Lesotho's valuable 'white gold'.

Projections (e.g. a current annual rate of soil loss from Lesotho's catchments of >40 million tons) based on inadequate data may be misleading, and the models that are used to derive such estimates may be inappropriate to Lesotho's environment.

From resulting discussions, it appears that a multidisciplinary group, such as the LMRG, can assist the NES with compiling a bibliography and in their preparation of the detailed synopsis of the state of Lesotho's environment by providing an integrated view on environmental problems. The LMRG initiative

to compile an annotated bibliography must, however, be closely coordinated with other similar ventures (e.g. by the Department of Water Affairs).

REPORT-BACK ON THE WORKSHOP "SOUTHERN AFRICAN SUBSISTENCE RANGELANDS TODAY AND TOMORROW: SOCIAL INSTITUTIONS FOR AN ECOLOGICALLY SUSTAINABLE FUTURE" (GABORONE, JUNE 10-14, 1996)

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The LMRG was recently invited to present a synopsis on issues pertaining to Lesotho's subsistence rangelands at a workshop organised under the auspices of the Global Change and Terrestrial Ecosystems (GCTE) core project of the IGBP (International Geosphere-Biosphere Programme). The workshop was attended by more than 40 scientists (both human and bio-physical), managers and policy makers from various African countries (e.g. South Africa, Botswana, Kenya, Lesotho, Malawi, Namibia and Zimbabwe) as well as international facilitators. The objectives of the Botswana workshop were to:

Initiate a synthetic review of the many social, anthropological and ecological studies in the subcontinent in the context of global (both population and climatic) change.

Help create a process of producing a prioritized set of research actions on subsistence pastures and rangelands.

Draw up a collaborative project proposal between Southern African scientists that could be submitted to the European Union and other agencies for support. At the workshop, an overview of current climate change scenarios for Southern Africa was presented together with eight case studies from communal rangelands in various regions including the Eastern Cape, Lesotho, Namibia, Namaqualand and others. The LMRG case study presented a profile of the environmental, population and land tenure characteristics of Lesotho's rangelands. The influence of labour migration and Government policy (e.g. their Range Management Areas Policy) on livestock ownership and range use was also discussed.

The last two days of the workshop were devoted to consolidating all the participants' views on identification of constraints/solutions on subsistence rangelands in Southern Africa in the light of the dynamic sociological and biophysical changes in the Sub-Region. A research project was proposed to achieve a region-wide understanding of the impact of global change on rangeland productivity and rural livelihood, as mediated by resource tenure. A small team was elected to put this proposal together and to circulate the draft proposal to all participants and stakeholders for their comments prior to their submission of the proposal in September to the EU for consideration. This proposal provides guidelines for region (country) specific research projects which, when completed, will allow a region-wide comparison of the effects of global change on communal rangelands.

An Interim Southern African Subsistence Rangelands Coordination Group was also elected to ensure the maintenance of momentum and to facilitate communications within the subcontinent. Jobo Molapo will represent SADC-ELMS on this committee.

The main impression gained at the workshop was that:

There is an international trend towards conducting integrated research; and there is considerable funding for such research.

Lesotho researchers need to submit a country proposal to tie in with the overall region-wide project on subsistence rangelands in southern Africa. The LMRG is the appropriate agency to prepare this proposal [see action, p. 27].

DISCUSSION PAPERS

SOME PERSPECTIVES ON SOIL EROSION PROCESSES IN THE LESOTHO ALPINE BELT

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Introduction

Information on the causes, processes and rates of soil erosion in the Lesotho alpine belt is extremely limited, despite considerable erosion being visible in a number of places. It is also evident that soil loss and consequent land and wetland degradation has escalated in recent years (personal observations). The areas most affected are the valley bottoms, valley heads and valley side wetlands, which are important grazing lands to the Basotho livestock. The turf loss from such wetlands will have serious repercussions to the highland farmers in the years to come, should erosion continue unabated. Grazing pressure is commonly considered the prime factor responsible for turf loss and consequent soil erosion. However, the problem is somewhat more complex and several questions need to be addressed.

To what extent is accelerated erosion in highland Lesotho part of a natural cycle (e.g. through climatic change) and/or anthropogenically induced? Research should therefore focus on:

- climate change
- comparative studies examining soil loss from construction sites and relatively pristine environments
- What are the contemporary environmental controls on soil erosion in the Lesotho Mountains?
- Where soil erosion is most pronounced....and why?
- What are the rates of turf/soil loss?

The present study (Grab, unpublished data) has so far examined some of the soil erosion processes and resultant landforms in the upper Mashai Valley, Eastern Lesotho. While sheet and gully erosion are perhaps the best known forms of erosion, especially within or near wetlands, other lesser known processes such as turf exfoliation and stream bank erosion play an equally important role. The objective of this paper is to specifically examine turf exfoliation.

Turf Exfoliation

Turf exfoliation is a denudation process active in cold environments which destroys the continuous ground vegetation cover by removing the soil exposed along small terrace fronts. Needle ice action, desiccation and aeolian deflation are some of the primary causes of turf exfoliation. Turf exfoliation in Lesotho is common along valley floors and lower valley slopes. Steep slopes of over 10E rarely exhibit exfoliation features, but are rather occupied by grazing steps or terracettes. The zones in which turf exfoliation occurs most frequently are the valley bottom, valley floor and lower valley slopes, as well as at wetland periphery areas, which notably are zones of prime grazing.

At the valley bottom are found wet, incised depressions which are usually full of water in the summer months but are reduced to small pools in winter. The depressions may be 60 to 80 cm deep. Common along the valley floor are shallow pan-like depressions, usually no more than 20 cm deep. These pans hold only shallow pools after heavy rainfall events and become rapidly desiccated during the winter months. During winter, needle ice lifts the soil particles, which eventually desiccate and are deflated out towards August/September. On the lower valley slopes are found turf exfoliation terraces which frequently parallel the contours. Bare ground with rocks and stones is usually found down slope from the retreating terrace.

An examination of turf retreat at five exfoliation sites has been undertaken since May 1993. Of the 85 pins inserted to measure turf retreat, only 5 were lost by February 1995. The mean rate of turf retreat is greatest at lower valley sites and least at the valley floor sites, but even at individual sites there is disparity in the rate of retreat. Irregular retreat is a result of large volumes of plant and soil detachment over a short period. Preliminary findings indicate that the maximum rate of turf retreat at the valley floor and lower valley slope sites occurs during winter and spring months. However, at the valley bottom sites, the rate of retreat during summer and autumn almost doubles that during winter and spring.

Conclusion

It appears that the causes, processes and rates of soil erosion in the Lesotho Highlands are still inadequately understood. Before conservation strategies for

land/wetland degradation are put in place, the natural soil erosion processes need to be better understood.

A call is therefore made for collaborative research: Anthropologist-Ecologist-Geomorphologists-Climatologist. An issue is hereby addressed that requires expertise from various fields of interest. For instance, it appears that invader plant species, especially dry land shrub species, are encroaching into areas of wetlands that are degrading. To find answers and solutions to this problem will require the combined efforts of botanists, grassland scientists and geomorphologists.

It is also evident that areas which are intensively grazed are quite often susceptible to intensified turf and soil loss, so it is imperative that studies on soil erosion include anthropologists and the people of Lesotho.

Proposal

To set up a management team through the Lesotho Mountain Research Group which has as its primary objectives?

- The investigation of the causes, processes and rates of turf and soil loss in the alpine belt of Lesotho, with particular focus on the alpine wetlands.
- To implement plans of action combating degradation, together with the Basotho landholders.

SUMMARY OF DISCUSSION

It was noted that erosion may have a wide variety of causes, many of which are non-linear and interactive in their effect. Simplistic, and possibly misleading, assessments of land degradation may result from a poor understanding of the erosion cycle.

Certain processes may operate at one particular time of the year, while during another season, other erosion processes may be more important. The seasonal distribution of erosion processes is still poorly understood, particularly in the Subalpine and Montane Belts. An understanding of this seasonality may aid the prescription of time-specific management to reduce the impact of livestock on the environment (e.g. a rest from grazing at a particular time when the landscape is particularly susceptible to erosion).

Both the climate (cold/dry winters and warm/wet summers) and the properties of the basaltic soils (with particle sizes conducive to segregation ice development) of the Alpine Belt make the landscape susceptible to frost-induced erosion. Animal (moles, ice-rats) and man-induced (i.e. grazing)

impacts interact with natural factors in a complex way to determine present erosion patterns.

The impact of various climate change scenarios on frost-induced erosion needs to be evaluated. Certain features of the present landscape may be relics of a past climate, e.g. frost hummocks on the alpine wetlands ('thufur') and these features may disappear under a warmer climate.

Any detailed work that is done on erosion processes should preferably be undertaken within the LHWP project area.

CURRENT APPROACHES TO RANGE DEGRADATION IN LESOTHO

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Introduction

Conservation policies in Lesotho generally regard local people as a source of degradation and emphasize measures such as formal education and tougher legislation as solutions.

Conceptual models used in this approach tend to be simple, inflexible and generally reductionist in nature. This is in order to reach a solution as fast as possible. The result of this is usually failure to achieve the set goals due to poor understanding of the underlying problem and causes.

Knowledge

Knowledge is a source of power and not the other way round. Any external contribution to improve rural livelihoods should aim at strengthening the already existing knowledge systems rather than replacing them. Knowledge is usually contextual and evolves within a given set of environmental and social conditions. Survival strategies are therefore not necessarily universal. Disruption of indigenous knowledge systems often disempowers rural communities. Further, Enriquez (1992) pointed out that application of western concepts disempowers people and has argued for revival of indigenous concepts.

The 'classic approach' has disempowered people in Lesotho and many other developing countries through expert and donor driven development initiatives. There is therefore a need to explore ways in which indigenous knowledge systems could be legitimized and ways to empower local people to further their indigenous capacities.

Lesotho Government Perception of Degradation

Assumptions currently used in range management in Lesotho are simple and have serious limitations (Fig. 1). For example, linear/one-dimensional models are inappropriate for rangelands where many variables such as environmental, socio-cultural, economic, external political relations, historical etc. are all important. For example, the rate of soil erosion in Lesotho is intimately linked with South Africa's migrant labour policy (Blaikie 1993).

This simplistic and misinformed approach inevitably leads to wrong solutions and invariably poor results. Example: high stocking rates attributed to pride rather than lack of market - education and compulsion often used with little or no success.

PROBLEM	SYMPTOM	CAUSES	SOLUTIONS	RESULT
Lesotho has a crisis	3 Decreasing range productivity	3 Overstocking	3 Destock	3 Lack of environmental response
	3 Soil erosion	3 Ignorance (culture, tradition etc.)	3 Educate	3 Irrelevant knowledge
		3 Inadequate legislation	3 Tougher laws	3 Passive resistance

Figure1: Current Government Perception (after Baker 1981)

Causes of Degradation

In the current approach, the starting point of the Government, conservationists and researchers is to perceive rural people as the source of environmental problems. It is believed that environmental problems begin and end with the rural people themselves. They do not see themselves as part of the problem or source of the problem because they hardly investigate themselves. For example, unfair or weak government policies usually marginalize rural communities. For example, forestry programmes have displaced grazing, resulting in increased pressure on surrounding land. We should therefore see everybody as an object of analysis in our research.

Moreover, researchers do not spend enough time looking for causes of a problem and as a result most conservation initiatives fail due to misinformed social and ecological research (Nobe & Secker 1979). Also, misinformed research may identify a problem where a problem does not exist leading to unnecessary interventions which may create a problem.

Do we really have a problem or are we creating a problem?

Range Development Models

Range management in Lesotho is based on a range succession model which is a deterministic model. This model has been employed in an attempt to improve rangeland condition with little success due to weaknesses in its underlying assumptions. The model uses stocking rates as the main management tool. In addition, this model is associated with the management objective of trying to achieve an equilibrium rangeland condition - a balance the opposite forces of grazing pressure and vegetation succession (Westoby et al. 1989). Deterministic models are generally suitable for stable environments where resources for plant growth are generally reliable.

Recently, the succession model has been challenged by many rangeland ecologists for its poor performance in arid and semi-arid rangelands where environmental conditions are variable, for example, Walker et al. (1981), Mentis et al. (1989), Westoby et al. (1989), Tainton et al. (1996). These are non-equilibrium ecosystems where external forces such as climatic and ecosystem variability are important in causing complex system dynamics with no single stable end point (Ellis 1994). Also, systems that appear predictable under certain conditions can be forced into chaotic behaviour through perturbation of model parameters (O'Neill et al. 1982). In addition, in the absence of disturbance, ecological systems which are completely controlled by deterministic processes can become aperiodic, unpredictable or chaotic (May & Oster 1976).

A new approach of non-equilibrium theories, viz. Chaos and/or Alternative Stable States which considers the variable nature of a system should be considered in Lesotho. This would involve the development of appropriate stochastic models based on good understanding of the nature of important variables or perhaps the only fruitful way to use equilibrium theory would be to determine the time and space scales in which this concept applies for different phenomena of interest (viz. end-points) in range management.

Recommendations

A strong interdisciplinary research group should be formed to address the following areas:

Adoption of systems approach to address problems of range degradation. History of range condition in relation to changing resource use. This information is expected to provide evidence and causes of degradation. Current resource availability and use in different rural communities. Community needs constraints, perceptions and traditional knowledge systems including conflicts between traditional and modern approaches/authorities.

Impacts of current policies on range condition and rural livelihoods (including Environmental Impact Assessments of policies).

Local community's involvement in formulation and implementation of policies. Review how units of management are determined (e.g. Range Management Areas).

Determine the nature of specific localities, i.e. physical, climatic and biological variables for development of appropriate range management models.

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SUMMARY OF DISCUSSION

There is a narrow focus by government and non-government agencies on range degradation rather than livelihood degradation. A broader analysis is needed to ensure that the myriad of factors that affect the lives of mountain people (e.g. biophysical, local and regional economics etc) are adequately accounted for.

Destocking is still Government policy, although the move to introduce a land tax as a means of encouraging destocking has been halted. Therefore, such a policy, like many other resource-use policies in Lesotho, may exist only on paper and not on the 'ground'. The appropriateness of such policies for achieving effective management is therefore questionable.

Indigenous knowledge of resources, as reflected in the sophisticated local classification of natural resources, is generally undervalued by researchers, planners and policy makers. Researchers must be fully aware of local knowledge to ensure that their research is contextual and relevant. However, it is questionable whether a discrete and unchanging body of 'indigenous knowledge' can be easily defined, given the fluidity of information exchange between local people and 'outsiders'. Therefore, indigenous knowledge should be seen as a rapidly adapting set of information that is relevant to local circumstances.

The question of what type of rangeland model underpins Government thinking and policy is not trivial because certain actions emanating from a particular way of thinking about rangelands may have serious implications for the range and its users. For example, if equilibrium (i.e. successional) dynamics are envisaged then destocking to remedy degradation is an obvious option. In contrast, if disequilibrium dynamics are assumed then intervention (say, by removing livestock) is not necessary and can even be harmful in certain circumstances (e.g. by maintaining an artificial carrying capacity through fodder imports).

It was noted that caution should be exercised when applying broad models to local dynamics (at the field level) as various parts of the landscape may change in response to livestock pressure at different rates depending on their history and physical attributes. The movement of livestock between regions in Lesotho (e.g. Lowlands to Highlands) and across international boundaries makes the application of general concepts, such as 'ecological carrying capacity' problematic.

There are insufficient data available to assess which rangeland model (i.e. successional or disequilibrium) applies to the rangelands of Lesotho. Collection

of a number of years data on primary (vegetation) and secondary (livestock) production will facilitate such an assessment.

Second Section: People's perception of land degradation in Lesotho

Introduction

The aim of my presentation is to initiate debate on the issue of people's perceptions to land degradation. The issues raised in this paper are based on soil erosion as this is the most visible form of land degradation in Lesotho which also needs urgent attention.

Results of research over the years give conflicting views on the attitudes of ordinary Basotho farmers to soil erosion. Some research work suggest indifference to the problem among the Basotho farming community while others show that the Basotho are aware, concerned about the issue and know what should be done. The fact that little is being done about the problem and the fact that this form of degradation is accelerating is a matter of great concern for a country which is claimed to have its economy based on agriculture. The debate on attitudes in my opinion should centre on why people usually do nothing to combat this form of land degradation on their land and on communal land where they are claimed to derive their livelihoods. There is some evidence that people's attitudes have been shaped by the manner in which Government (colonial and post-colonial) tried and is still trying to address the problem. It is worth noting that in some cases the major part of land degradation is blamed on the actions of the Colonial Government, especially the decision to make contours and the design of the contour bands (Showers 1989).

On the other hand, people like JJ Machobane put the blame on the fact that all efforts have been directed at improving the land and not the people. His theory is that man must be enabled to look after the land. Other schools of thought indicate that, from the colonial era, incentives have been provided for dealing with the problem and this has killed the initiative of the farming community and has cultivated a culture of "waiting for the government to tell us that there is a problem and give us incentives to tackle it." Yet other people indicate that people are not very interested in farming seeing they have to put in more than they get out of the land. In short, the farmers subsidise farming and have little or no incentive to look after the land that in real terms make them poorer.

Example of 'indifference' to land degradation

Results of general surveys seem to suggest that land degradation is not seen as a major issue by the rural people who are supposed to depend on the land. The Poverty Mapping Study by Sechaba Consultants provides in-depth analysis of poverty in Lesotho. Results of a survey of attitudes of people to poverty indicate that factors that villagers perceive as leading to poverty are: poor crop production, unemployment, drought, alcoholism, witchcraft, and

injustice. Alcoholism and unemployment were noted to lead to many other factors that contribute to poverty. The loss of wage employment by the household head or breadwinner has the potential to lead to the decline in the status of the household and ultimately to poverty. The loss of wage employment may be due to death (especially for the miners), ill health, disability, or failure to get back to work in time after being home for week-end off or leave. The general picture that comes out of this extensive study is that land degradation has nothing to do with poverty. This is based on the fact that if it did, then people would have mentioned it as a causal factor. Results of needs assessment studies done by Sechaba also support the above theory which is that land degradation is not commonly mentioned when people are asked to note their general problems.

Gay's (1984) view is that the problem of soil erosion is less obvious to Basotho than to most foreigners who have written extensively about the problem. He substantiates this view by looking at results of a number of surveys. For example, in a survey he conducted in 1977, soil erosion featured very low when farmers were asked to list principal problems in farming, principal changes necessary in farming and the things they feel are necessary to succeed in farming. In response to the question, the people gave the following responses:

Problem	Percent
Worms	100
Drought	96.9
Hail	65.6
Too much rain	59.4
Weeds	56.3
No ploughing tools	50.0
No ploughing power	43.3
No good seeds	18.8
Frost	12.5
Theft	9.4
Poor soil	9.4
Rats	9.4
Storms	9.4
No fertilizers	6.3
Birds	3.2
Late ploughing	3.2
Soil erosion	3.2

When farmers were asked what should be done in the fields to ensure good crops, very few (3.4%) said that there should be conservation measures applied

on the fields. His work shows that people did not see erosion as increasing in severity. It is significant to note that 76% of farmers reported that they had done nothing to combat soil erosion on their land while only 12% had dug furrows to divert the water. Asked what they would recommend be done to combat erosion, 64% had nothing to recommend. His work also shows that reduction of available pasture was not seen as a major inducer of change in livestock production at the time of the survey.

Gay's work took a systematic approach, where the questioning started in a very general manner and addressed agriculture in general but dovetailed to land management issues and finally went directly to the issue of soil erosion. The idea was to see at what level does the concern about land degradation kick-in. This being the case, then methodology can be ruled out as a potential cause of the problem. Other issues may come to play such as ownership of other alternative means of survival, etc.

Example of 'constructive' attitudes

A study conducted in Mohale's Hoek for the SOWACO Project suggests that people are knowledgeable and concerned. The study was conducted inside the Initial Project Area and outside to see if there were significant differences.

Causes of degradation

State cause (percentage of responses)	Inside IPA	Outside IPA
Heavy rains	27.0	37.4
Overgrazing	25.7	20.1
Uncontrolled water	13.5	15.5
Using the same path	10.8	6.9
Bad farming	8.1	5.7
Not planting trees	5.4	4.6
Burning grass	5.4	2.9
Drought	1.4	2.9
Not having terraces	1.4	2.9
Wind	1.4	0.6

It is clear that most people are aware of causes and most mention man-made causes. Grass burning has been mentioned in other cases.

How people recognise land degradation

On fields	On the range
Sign of degradation %	Sign of degradation %

Donga formation	60.8	Scarce ground cover	56.4
Soil washing away	26.6	Donga formation	35.2
Drop in yields	12.2	Water running freely	7.6

It is evident that most people look for physical signs of degradation, but some are aware that a drop in yields is also a sign of degradation. It is important to note that many of the households interviewed had fields that were affected by degradation, which means that many are aware of the problem.

Soil Conservation activities done on fields by those whose fields have erosion

Activity	Percent responses
Nothing	25.5
Terracing	7.8
Waterways	3.9
Plant grass	3.9
Contour planting	2.9
Planting trees	1.0
Other	2.9

Very few respondents (12%) consider that coercive action should be taken against individuals who do not maintain conservation structures on their fields. A number of respondents (13%) see the major responsibility of taking coercive action lying with the VDC and chiefs.

Perceived methods of soil and water conservation on communal land

Method	Percent responses
Plant trees	29.9
Terracing	29.4
Plant grass	16.6
Contour planting	10.2
Make waterways	7.0
Limit grazing	5.9
Leave land fallow	0.5

Fewer people reported being involved in conservation work on their fields than those who worked on communal land. The communal work in many cases was sponsored by food-for-work programmes. A worrisome issue is that people hardly do address land degradation of their fields.

Reasons for not participating in communal conservation activities

No conservation activities in my villages	50%
Away for long periods as migrant	5%
Busy with other activities	2%
Sick & disabled	2%
Old age	1%
Not motivated	1%

On the issue of compensation for participating in communal conservation activities, 70% noted that they should be paid. Reasons for requiring payment are shortage of food (42%), incentive to encouraged people to work (11%) and the need for wage work in the rural areas (16%).

It is important to note that despite high positive perceptions of soil and water conservation work on communal land, only 32% considered the efforts made to be successful. The failure was attributed to the fact that the programme was done through food-for-work and that it was done piece-meal and not continued.

Issues related to the range

58% of respondents claimed they benefit from closing the range in the following manner:

- It improves the condition of the animals;
- It makes it possible to get thatch grass; and
- It protects our soil.

29% claim that only the livestock owners benefit. 52% claim that range management efforts are effective but efforts are nullified by drought. The efforts are effective because policing is effective, people respect the range laws, and the condition of the range and animals is usually good.

48% noted that efforts are not effective because there is a lot of trespassing and the condition of the range and animals is poor. 83% would agree to proposals for the use of rangeland for other purposes that would benefit the community. The chief would agree to people's decision.

How people think land degradation (soil erosion) might be prevented on communal land

Type of Activity	# of respondents	Percent
Plant trees	222	84.4
Make terraces	182	69.2
Plant grass	63	24.0

Make waterways	47	17.9
Plant cover crops	33	12.5
Limit grazing	35	13.3
Fill dongas with stones	23	8.7
Contour planting	22	8.4
Make furrows above fields	19	7.2
Plant fodder crops	16	6.1
Make dams	11	4.2
Leave land fallow	5	1.9
Rotational grazing	4	1.5
Put sand bags in dongas	3	1.1
Reduce livestock numbers	2	.8
Plant aloes	1	0.4

The work of Kate Showers indicates that the perception of people is that contour banks that were made by the colonial administration were a major contributing factors in land degradation. The following extract from her work best explains her findings:

".. In time, the contour banks were observed to cause erosion.

If the water came spreading down, the whole field gets watered at the same time and there would be no way for it to gather and move with force. I find contour banks of no importance; instead, harm is being done by collecting water.

The mechanism by which erosion was caused included broken contour banks and scouring in the channels behind them.

Since the construction of contour banks, water accumulates at the top of most contours to a point where the water has to force itself through the contour, causing a donga [gully]. There was no way it could be stopped, because the contour banks collected water in one place.

One man pointed out fields that had been cut in half by gullies caused by contour banks.

When you have constructed a contour bank directing water this way, you find that behind the contour bank more harm has been done. The furrow behind the banks has now become very deep, the field is now divided into two. You find that water has cut the field at the other end. You plough this side, and then jump over to the other side to plough."

The work of Showers' shows that not all Basotho have a passive view of the degradation problem as the following extract from her work show:

"The Basotho did not simply monitor the effects of the contour banks installed in their fields. They experimented to discover ways to mitigate the observed ill effects. The contour banks had transformed their fields into collection of oddly shaped plots; some farmers tried to straighten the banks to make more regular cropping areas. This, however, weakened the structures and caused gullies to form. One man's solution was to remove the contour banks, spread the soil evenly for plowing, and then reform the banks in different locations in alternating years. Since they were moved around the field, water "would take a different direction" and the field "was not spoiled". This process of indigenous monitoring and mitigation, its lack of official recognition, and its designation as wanton destruction are described in Showers and Malahleha (1992)."

The above example of attitudes is by no means exhaustive but they served to illustrate that the issues are many and complex. The challenge for the LMRG is to provide a clear perspective for policy makers and hopefully influence future soil conservation works.

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SUMMARY OF DISCUSSION

It was noted that erosion is not often viewed as a critical issue by land users, nor are causes perceived in the same light as scientists. This difference in perspective indicates the importance of including local people in research as researchers of their own situation and not merely as subjects of research. Such participatory research would help place degradation in its correct context.

Although land degradation is not mentioned as a primary concern of rural inhabitants, some of their problems (e.g. poverty) may result from land degradation. Therefore, degradation may be implicated in a number of livelihood 'problems'. It was questioned whether there is explicit Sesotho terminology for erosion or degradation.

Outsiders may perceive degradation to be a principal problem because they are not as desperate as some rural families whose immediate need for food and money overshadows problems that they perceive to arise from degradation. The logic of farmers needs to be clearly understood (e.g. why are people abandoning land?). Researchers should avoid valuing logic, e.g. that one way of thinking or mind-set is correct and the other is wrong. Is there indeed a dire need to 'educate the people'?

PERSPECTIVES OF ENVIRONMENTAL LITERACY: IMPLICATIONS FOR ENVIRONMENTAL EDUCATION

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Introduction

It is widely argued that lack of environmental awareness is one of the most important reasons for environmental degradation. However, the meaning attached to the concept 'environmental awareness' is usually varied. Environmental education initiatives that are not informed by a clear theoretical framework of this concept are likely to be superficial, and to fail to achieve the intended goals.

The concept 'environmental awareness' is often loosely used to mean being aware about one's own environment and the associated problems, and even to mean going beyond awareness of environmental problems, to take some form of action to solve them. Apropos to this is the loose utilisation of the concept 'environmental literacy'.

This paper identifies three interpretive orientations or perspectives of environmental literacy (in the context of educational institutions). Environmental awareness is also regarded as occurring in three interpretive levels: the first level being referred to by the author as 'crude environmental literacy', the second, 'sophisticated environmental literacy' and the third, 'socially transformative environmental literacy'. The characteristics of these three perspectives are summarized in Table 1.

In Lesotho, environmental education appears to be still at its infancy. Research is required in this area to investigate the status of environmental education initiatives. The author further argues that a socially transformative environmental literacy should be the goal of all environmental education activities and research.

Giving some examples about the curriculum in Lesotho, I argue that a socially transformative environmental literacy may be the answer to the complex nature of environmental issues and problems in that country. Curricula in

Lesotho seems to be informed by formal thinking (Kincheloe & Steinberg 1993), which is reflective of Newtonian thought (Doll 1989, Kincheloe & Steinberg 1993), i.e. cause-effect, hypothetico-deductive system of meaning. Apropos to this appears to be the consideration of the following concepts as characteristic of the environment/reality: simple ordered and uniform reality rather than complex chaos; harmony rather than discord; cumulative or incremental rather than transformative change; achievement of efficiency through objectivity rather than subjectivity, and pre-set ends (objectives) rather than explored ends.

Table 1: Three interpretive perspectives of environmental literacy.

Characteristic	Crude Environmental Literacy	Sophisticated Environmental Literacy	Socially Transformative Environmental Literacy
The environmental world-view	Biophysical (e.g. ecology topics).	Discrete, but related, components of the biophysical, social & political aspects of the environment (NB the whole is the sum of parts): the biophysical part is fundamental. Classroom context: multidisciplinary curriculum; identification & linkage of the r	Dynamic web of interconnected biophysical, social & political aspects of the environment: no part is individually fundamental. Classroom context: interdisciplinary whole curriculum; a conscious mental effort to deconstruct disciplinary world-view. e.g. t
Knowledge about the environment	A 'thing' to be learned from books/teacher (usually generalisable).	An 'instrument' for solving environ. problems (usually context specific) via technical solutions.	A (socially critical) 'process' or 'approach' of dealing with environ. issues/problems.
Knowledge exhibited	A wide knowledge of facts about environ. problems (e.g. from the teacher/text); naming of species.	Identification of causes of environ. problems (ability to find order in the chaotic	Exploration and planning of strategies for solving environ. problems.

		environment).	
Action to solve environ. problems	Procedural/obligatory: e.g. tree planting day; participation in cleaning campaigns & prevention activities. Environ. problems are 'given'.	Innovative/original, e.g. organisation of environ. awareness & cleaning campaigns. Focus on symptoms rather than causes.	Application of socially critical action-research to solve environ. problems/issues; action is informed by social justice and environ. problems are detected & solved.
Acquisition of knowledge about the environment	Rote-learned/constructed. Top-down approach.	Co-constructed and confirmed in the environment. Bottom-up approach.	Collaboratively acquired through application of a socially critical action research to solve environ. problems.
Sustainable development	Concerns self-sustaining development programmes. Little emphasis on the impact of broader economy.	Concerns grand economic models that do not damage the biophysical environment.	Embraces life support systems that evolve within people's own contexts. Rejects externally imposed grand economic models.

Some implications for formal education in Lesotho

The general trend of environmental education initiatives within the formal education in Lesotho seems to be the option of an addition of topics regarded as environmental within separate subjects. Environmental topics are considered as part of ecology topics and topics based on prevailing environmental issues.

And yet another environmental education approach, which presently only prevails at a theoretical level, is the notion of environmental education as a separate subject to be added to the already content loaded curricula. These approaches seem to be in line with the modernist view, within which cumulative or incremental rather than a transformative change in curriculum is over-emphasised (Doll 1989). In view of the fact that environmental problems and issues are contextual and that they wane and wax with socio-economic changes, this approach has limitations. Contrarily, a post-modern approach to environmental education within school curricula would, for example, imply a

change in the approach of teaching the subject (i.e. teaching the existing subjects with an environmental perspective), rather than the addition of more content in the curriculum on environmental issues and problems. For example, educators may explore how they may develop a dialogue with those affected by environmental problems, the students in the classroom, the rural communities, in order to get to unexplored terrains of understandings of our environment.

Further, and in line with constructivist theories (Bodner 1986; Stanton 1990), learning implies reorganisation of the mental structure (rather than learning more content), and it is the ability to reorganise that should be developed in students. Transformative change, as Doll puts it, "...is a change in view, in perspective, in methodology. It permanently alters one's relationship to nature, to life, to the environment, to learning" (Doll 1989:249). Environmental educators in Lesotho need to explore how a transformative change that promotes socially transformative environmental literacy may be attained within the formal education.

The prevailing modernist (Kincheloe & Steinberg 1993) and imported teacher-training and curriculum development approaches in Lesotho are inappropriate for the development of a socially transformative environmental literacy, and must be done away with. Teacher training institutions over-emphasise mechanical approaches to curriculum development and teaching, exemplified by pre-set ends and formulation of objectives in line with those ends and valuation or closure to establish whether the ends have been achieved.

From the perspective of socially transformative environmental literacy, disciplines are considered as a product of the modernist thought within which the complex web of reality with multiple interacting forces (rather than simple linear cause and effect forces) is simplified. The prevailing disciplinary based curriculum in Lesotho is informed by an attempt to simplify the complex reality about the environment. This practice has generated simple perceptions of environment, characterised by the reduction of environment to the biophysical component, which is taught as ecology in the class context. It could be argued that, within the prevailing disciplinary culture in Lesotho, teachers may perceive integration of disciplines as complex, chaotic and less representative of reality.

In Lesotho, secondary schools curriculum developers', as may be noted in the goals of the science curriculum (Examination Council of Lesotho 1983), have for many years attempted to promote the implicate order in students through the teaching of, initially, Integrated Science and, currently, Junior Science. However, little is known about the extent to which this important goal of the curriculum is achieved. Suffice to say that, based on the point I mentioned earlier, empirical methods may be inappropriate methods for determining this.

Implications for environmental education research:

As mentioned, there is no empirical information about the status of environmental education in Lesotho. Rigorous research needs to be undertaken with a goal to establish existing theoretical and practical approaches in environmental education within the following structures: the formal education system; different governmental structures; and NGO's, Churches etc.

The following are some important areas for research, which may lead to the achievement of the above goals:

Taking stock of activities in the institutions already involved in EE: analysis of such activities and conceptualisation of the form EE should take. Evaluation of the existing programmes of EE. Such evaluation could focus on the following:

- Analysis of how EE is integrated into programmes, taking into account current trends in EE;
- Determination of the share that individual disciplines (i.e. at University) or programmes have in EE; and
- Identification of possible interdisciplinary aspects in environmental education programmes and the contribution which programmes or discipline can make to the total task of EE.

Concerning the establishment of interdisciplinary directed EE in the university (colleges, schools etc) the following may be undertaken (see Jaritz 1996): First of all, the contribution made by each discipline/programme to EE should be determined.

An analysis of the actual situation at the institution should be made, covering all existing and planned projects in order to reveal unnecessary overlap and deficiencies. A comparison of the discipline's contribution with those of the neighbouring disciplines and a search for possible points of intersection in order to identify the appropriate coordination of EE at the institution.

Explanation of practicable didactic models of EE at the institution.

Moreover, integration of EE into teacher training institutions calls for investigation of questions such as:

- How to make EE accessible to all students when it cannot be assigned to any specific discipline in the institution.
- How to organise integrative teaching and inter-disciplinary research in this sphere (Jaritz 1996).

For efficacy EE must be coherent in terms of the objectives, content, and methods of EE (Jaritz 1996). Based on this argument research needs to

establish the extent to which the existing EE activities are coherent. Further research within formal education sector, NGO's and governmental structures should explore the design and implementation of interdisciplinary approaches to environmental education.

The following are also worth investigating in connection with EE as an interdisciplinary task in the formal education sector (Jaritz 1996): The relation of EE to other inter-disciplinary areas at school, e.g. health education.

The function and activity of the teacher in EE.

- Learners' environmental pre-understanding as pre-requisites to determining the starting points for an effective and appropriate approach; to the learners' given backgrounds.
- Analysis and further development of teachers' abilities to take part in pedagogical discourse.
- The relation between the particular subjects and EE to set out didactic guidelines for high education.
- The effectiveness of various models of inter-disciplinary teaching and learning.

In conclusion, I wish to argue along with Jaritz (1996) that the principle question (that should direct research and programmes) within EE is: "what task does education have to fulfil to aid the process of making the necessary transition from the traditional model of economic progress and wealth creation to a model of sustainable development?" (Jaritz, 1996:60).

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SUMMARY OF DISCUSSION

A 'socially transformative' model of environmental literacy, in which scientists and local people define and assess environmental problems, is becoming more common as it has the best chance of being accepted by those being 'educated'. The current degree of literacy of rural people about environmental matters, particularly their own home environment, should be respected and built on where necessary.

Who should be 'educated' first? In the short-term it may be most effective to inform politicians and policy makers of the environmental consequences of their policies and 'enlighten' them as to the assumptions inherent in the conceptual models that underpin their policies. Children (even pre-schoolers) should be targeted for long-term effectiveness.

Case studies, e.g. the donga reclamation programme at Matelile, can be useful for engendering the motivation to do something about a problem. Different case studies may be applicable for children/adults in different environments (i.e. city and country).

An interdisciplinary, participatory research effort to investigate a particular problem can play various educational roles: the researchers learn, the participants gain outside knowledge and clarify their view of their home environment, and the whole research process can be documented to be used as a case study for environmental education (film is a potentially useful media here). Therefore, an environmental educator can play a useful role in integrated research projects to ensure that learning is facilitated all along the way and that the message gets out.

Third Section: towards an integrated perspective on land degradation in the mountains of Lesotho

LMRG MISSION STATEMENT

In the light of suggestions of various of its members and discussion emanating from the workshop presentations, the following guiding principles for the LMRG were outlined.

The LMRG

- Is a Lesotho-based networking agency for local and international researchers.
- Is to be an independent research agency that will facilitate and undertake interdisciplinary research in Lesotho.
- Acknowledges the complexity of ecological and sociological processes
- Adopts an Integrated research approach

Defines 'Integrated' as research in which the researchers of different disciplines collaborate in the design of projects, in the formulation of questions, in the conducting of field work, and in analysis, in ways that ensure crossing of disciplinary boundaries. The aim is to go beyond the multi-disciplinary style of research that has characterised much environmental research in southern Africa.

In adopting an integrated research agenda, is committed to exploration of:

- Participatory research methods;
- Action oriented research;
- Inclusion of, and research on 'indigenous' or local knowledge;
- Partnership in research (both between scientific disciplines and between scientists and local people); and
- Appropriate forms of environmental education as an integral part of research conducted by its members.

It is committed to improving the capacity for environmental research amongst local people and students in Lesotho. It aspires to being a forum for improving environmental research design and procedures in Lesotho, by setting an example of collaboration between members in conducting research, and by convening workshops on relevant themes on a regular basis. It aims to provide a forum for debate around environmental issues in mountain areas.

THE LMRG ORGANISATIONAL STRUCTURE

The LMRG is designed to be a body which can function efficiently in terms of:

Communications between members and with other agencies, preparing research proposals and promoting inter-disciplinary collaboration, responding to initiatives of members and other agencies.

The LMRG is not an institution-based body, but a group of individuals who share common interests and aspirations for environmental research. The LMRG seeks collaboration and assistance from the institutions at which its office bearers work, and it is appropriate that both the group and the institutions benefit from this partnership. However, the group endorses the principle of a rotating secretariat, and thus is to remain an independent body.

Towards these ends, a simple organizational structure has been adopted, as outlined below:

LMRG BOARD

Area based; designed to liaise with the General Secretary when required, and to facilitate communication with members.

LMRG SECRETARIAT

Positions: General Secretary; Assistant Secretary; Treasurer.

- Designed to be filled by individuals in close proximity who are enthusiastic and prepared to serve the LMRG for a limited period.
- The Secretariat will rotate every two years amongst LMRG members, and will be elected at an appropriate LMRG workshop by those who attend.

MEMBERSHIP

Open to any person committed to the principles and aspirations of the LMRG; Membership fee:

- Individual membership: M/R20 per annum
- Organisation membership: M/R100 per annum

Fees are to cover administrative costs and are administered by the Treasurer.
1997-1998 BOARD MEMBERS

General Secretary:

None Mokitimi (Agricultural Economist; Institute of Southern African Studies, National University of Lesotho).

International Representatives:

Stefan Grab (Geomorphologist; Dept of Geography & Environmental Studies, Univ. of the Witwatersrand)

Craig Morris (Range Scientist; ARC - Range and Forage Institute, Pietermaritzburg).

Tim Quinlan (Anthropologist; Institute for Social and Economic Research, University of Durban Westville).

1997-1998 SECRETARIAT

General Secretary: None Mokitimi (ISAS, NUL)

Assistant Secretary: Chaba Mokuku (Dept Biology, NUL)

Treasurer: Thuso Green (Sechaba Consultants, Maseru)

LMRG ACTIONS 1997/1998

The actions outlined below were identified as priorities to achieve the goals of the LMRG and to act on the findings of this workshop.

Immediate Actions

- 1) Obtain SADC consultant's report, and SADC policy document, on environmental education. (Tsepo Mokuku)
- 2) Compile and distribute initial bibliography of Lesotho research to members. (Chaba Mokuku & Craig Morris)
- 3) Assess GCTE Rangeland project proposal; prepare initial Lesotho project proposal and distribute to interested members for comment. (None Mokitimi, Secretariat and Board) initial Lesotho Proposal to be ready by February 1997 Workshop to finalise the Proposal to be held in March 1997 at Malealea Lodge
- 4) Compile a data base of research expertise amongst membership, for distribution to members and other interested parties. (Craig Morris & None Mokitimi)
- 5) Contact the African Mountains Association to explore options for membership/affiliation. (Stefan Grab)
- 6) Open bank accounts for LMRG membership fees. (Thuso Green)
South African based members to pay annual membership fee into SA account;
Lesotho based members to deposit membership fees in Maseru account.

Additional Actions

- 1) To annotate the bibliography of research pertaining to Lesotho's mountains (including published and unpublished material) with keywords and location of material:

Continue to compile data base through membership contributions; Secretariat to prepare a funding proposal to assist a Basotho librarian student to compile an annotated bibliography as part of his/her student project work. Secretariat to approach librarianship academic departments in South Africa who might know of such a student.

Secretariat to provide research data base to:

- I. NES
- II. Ambrose (who has most extensive collection and knowledge of research material on Lesotho);
- III. Morija Museum and Archives.

Secretariat to contact Department of Water Affairs, Lesotho, which is also compiling a data base of research, to seek collaboration.

2) LMRG to be represented at the next conference of the African Mountains Association.

Secretariat to obtain details of a possible conference in Madagascar, 1997, and LMRG members to be encouraged to attend.

The AMA has approached the LMRG to possibly host the 1997 conference, should the Malagasy conference fall through.

3) Secretariat to contact LHDA with a view to placing information about LMRG on the LHDA World Wide Web home page.

4) To broadcast amongst membership the concept research proposal on erosion, which emanated from discussions at the workshop, for comment, elaboration and, ultimately, compilation into a concrete proposal, and to secure funding.

5) To broadcast amongst membership the guidelines outlined below for design of 'integrated' research projects, for comment and elaboration.

CONCEPT RESEARCH PROPOSAL

'To investigate causes, processes, rates and solutions to turf and soil loss in the Alpine Belt of Lesotho.' (Stefan Grab, p. 8)

Motivation:

Because of the complexity of erosion processes in the Alpine Belt, and in view of piecemeal research on these processes, to formulate a project which would

provide comparative data through research conducted at different sites (e.g. transect across the country).

Suggested modifications and elaborations:

- Implicit focus on wetlands to be complimented by a sub-project on dry-land erosion processes;
- accept climate as variable that could change as a result of the accelerated greenhouse effect; and
- extend project beyond Alpine Belt to the Sub-alpine and Montane Belts to allow for a comparison of the seasonal pattern of erosion processes.

The collaboration of LHDA needs to be sought in this project to ensure that the results are relevant to their project sites.

GUIDELINES FOR INTEGRATED RESEARCH WITHIN THE LMRG

There is a logical nesting of different sub-projects within an overall research programme that will allow both a focus on a range of detailed processes at a small scale and an integration of results at the broad scale. The need for integration between researchers from different disciplines (and from various organisations) will, by necessity, vary depending on the level of study and the complexity of the subject or process being researched. A brief example of how an overall research programme may be structured and what role the LMRG can play at each level is outlined below.

EXAMPLE:

'A study of wetland soil loss processes'

Level I:

University department based undergraduate and postgraduate (i.e. Honours) student research on specific topics identified by the LMRG. Such studies will be short-term and may include, inter alia literature based surveys and research (e.g. literature survey of location and results of research conducted on soil erosion in Lesotho; and an analysis of livestock import /export statistics in Lesotho to assess the changing economic value of livestock in the mountains).

Level II:

Set of complimentary research projects conducted by small multidisciplinary teams co-ordinated by the LMRG. For example, wetland erosion processes (sites determined by results of relevant Level I research; field research conducted by team at same time, together) incorporating local knowledge on factors under investigation (via social scientist). Research questions and teams may be as follows:

- Ice rats and their contribution to turf exfoliation:
It Includes zoologist, geomorphologists, and social scientist.
- Livestock use of wetlands, variation and impacts:
It includes social scientist and plant ecologist.
- The influence of livestock imports on transhumance patterns in the mountains:
It includes economist, anthropologist, and veterinarian.

Level III:

Design of Research Project (Level II studies) and subsequent data analysis (from Level II studies) organised by an appropriately skilled LMRG team. Meta-analysis of data from other mountain wetlands. Production of syntheses (e.g. a comparative analysis of the impacts of livestock on mountain wetlands in Africa).

Level IV:

Initial preparation of overall Research Programme Proposal following submission of ideas from interested LMRG members.

Co-ordination of Programme with other programmes; and facilitation of Levels I- IV procedures, by LMRG Secretariat, in consultation with LMRG Board.

Note that this is an ambitious and idealistic example. However, the point is that the LMRG is in a good position to draw together ideas for research, to organise them into coordinated projects or programmes (thereby avoiding duplication of effort), and to integrate the results of separate studies into useful syntheses.

ABBREVIATIONS

ARC	Agricultural Research Council
AMA	African Mountains Association
ELMS	Environment and Land Management Sector (of SADC)
ISAS	Institute of Southern African Studies
ISER	Institute of Social and Economic Research
GCTE	Global Change and Terrestrial Ecosystems
LHDA	Lesotho Highlands Development Authority
LHWP	Lesotho Highlands Water Project
LMRG	Lesotho Mountain Research Group
M/DCCP	

MOA	Ministry of Agriculture (Lesotho Government)
NUL	National University of Lesotho
NES	National Environmental Secretariat
RMA	Range Management Area
SADC	Southern African Development Community
SWaCAP	
VDC	Village Development Committee

Notes to readers

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