Journal of Arid Environments (1998) **39**: 267–277
Article No. ae980404

Can science and community action connect to combat desertification?

M. K. Seely

Desert Research Foundation of Namibia, P.O. Box 20232, Windhoek, Namibia

(*Received 16 June 1997, accepted 12 December 1997*)

Ever since the process of desertification was first recognized, scientific expertise has been in the forefront of attempts to reduce or reverse its impact. More recently the importance of involving indigenous knowledge and people experiencing and being directly affected by desertification has been acknowledged. In Namibia several programmes working on aspects of desertification have highlighted the importance of the planning, policy and legislative framework, the environmental framework and the socio-economic framework in combating desertification. Science and community action can connect to combat desertification, but the results are effective only if the framework conditions are conducive to these interactions.

Keywords: Namibia; indigenous knowledge; community action; desertification; full participation; Napcod

Introduction

Ever since desertification was recognized as a growing threat to humankind, scientific expertise has been a main component of attempts to reduce or reverse its impact. As a result, a fair amount is known, although not unequivocally, about the primary causes and manifestations of the processes of desertification (Ellis & Swift, 1988; Westoby *et al.*, 1989; Behnke *et al.*, 1993; Seely & Jacobson, 1994; Williams & Balling, 1995; Odada *et al.*, 1996). Despite the ongoing best efforts of many scientists, the rate and extent of desertification continue to increase rather than decrease throughout the world.

More recently scientists and decision-makers involved in combating desertification have come to realize that little can be done to reverse desertification processes without the complete involvement of farmers, pastoralists and other natural resource users experiencing and being directly affected by desertification in its many forms (Chambers, 1994; Pretty, 1994; Scoones & Thompson, 1994*b*; Scoones, 1995; Abbot & Guijt, 1997). This realization has led to the theme of this and similar conferences and workshops: connecting science with community action to combat desertification.

0140–1963/98/020267 + 11 $30.00/0

What is this 'science' that is expected to contribute to combating desertification? From different points of view it appears that either the process or the products of science are expected to produce the desired results. Figure 1 briefly reviews the salient points of the scientific process and its outcomes with an indication of how they have been applied to desertification. After more than 20 years of scientific research applied to arrest desertification, this approach has been generally recognized as not providing the results expected and perhaps even to be contributing to some of the confusion, lack of understanding and increased degradation associated with desertification (Goldsmith & Hildyard, 1984; Kolawole, 1992; Darkoh, 1994; de Haan, 1994; Scoones & Thompson, 1994*b*; Stiles, 1995).

Now that the paradigm has shifted from science to community action as the single most important component of attempts to combat desertification, almost everyone is giving this shift verbal if not actual support (Scoones & Thompson, 1994*a*). For this

A: COMPONENTS OF SCIENCE

Scientific method — Applied to studies of the extent, expansion, biophysical causes and processes, and socio-economic impacts of desertification.
Knowledge and information — Derived from scientific research and have been used to describe, raise awareness of and combat desertification.
Technology and applications — Derived from scientific research and have been applied to combat desertification, often without an understanding of the causes or processes involved.
Alternatives — Identified by science and have been promoted for use by those suffering from or apparently causing desertification.
Predictive value — Applied to anticipate the impacts of desertification to people of the world's drylands.

B: COMPONENTS OF COMMUNITY ACTION

Organization and institutions — Contribute to information exchange, provide mechanisms for control over land use and provide a basis for co-operative action.
Awareness and sensitization — Originating from within or outside communities, essential for promoting and facilitating the changes needed to combat desertification or to maintain good land management practices.
Incorporation of information and knowledge — Application and adoption of information and knowledge from a variety of sources, originating from within science, communities or elsewhere.
Adaption of technology — Individuals or community-based organizations adopt technology provided by science and technology but developed elsewhere.
Enhancement of skills — Originating from formal or non-formal study or from experience, skills facilitate integration of information and technology.

C: COMPONENTS OF INDIGENOUS KNOWLEDGE

Knowledge and awareness — Arising from within the community and usually derived from oral and written tradition, experience and trial and error.
Technology and applications — Modified by the changing environment, a source of information.
Approaches —
Organizations and institutions — Traditional and/or adaptive to changing conditions.
Observations — Ongoing process based on many facets of new and indigenous knowledge.
Predictions — Based on individual and group experience and tradition as well as changing perspectives.
Alternatives and adaptations — Adopted to improve livelihoods.

Figure 1. Existing connections between science and community action.

reason it is time to immediately examine the attributes of community action that are expected to contribute to combating desertification. Figure 1 includes a brief overview of salient facets of community action that could be expected to contribute to attaining the desired results. Even now, some proponents see community action as the sole input needed to arrest land degradation and reinstate productivity.

If we examine the identified attributes of science and community action more closely, we see a number of levels where interaction can be expected and, indeed, already takes place (Fig. 1). Here it is important to consider not only the connections between science and community action but how these connections are established, operate and are managed and controlled (Chambers, 1994; Long & Villareal, 1994; Salas, 1994; Abbot & Guijt, 1997; Arasu, 1997). Much of the interaction between science and community action originates with and is managed and controlled by scientists. More recently the proportion of input from communities has increased. But scientists are not fully responsive to community needs, nor can they be under current conditions of funding and institutional structure.

One way in which the responsiveness of science to problems of desertification has been enhanced in recent years has been the recognition of the importance of indigenous knowledge (e.g. National Research Council, 1994, 1996). Indigenous knowledge has been accepted as a major source of important information, as a framework for interpreting information and data collected, and as a way of solving some of the problems scientists recognize in the field. Indigenous knowledge has been particularly obvious as the subject of study, however, and less so as a source of solutions to problems of natural resource management (Oba, 1994; Kreike, 1995; Hagmann & Murwira, 1996). Often the indigenous knowledge is the subject of 'scientific study' but does not constitute an input into the scientific process or into decision-making based upon the scientific information (originally indigenous knowledge) gained (e.g. Rodin, 1985). As a consequence, scientific interest in indigenous knowledge has not necessarily led to connections between science and community action.

Science and community action, as well as the recognition of indigenous knowledge, are all part of the process of connecting science and community action. But the connection is not effective without the missing component of full participation. Without full participation community action can be used merely as a vehicle to convey the results of science to the grassroots. Without full participation, indigenous knowledge may be merely a topic for study, providing insight into processes of desertification. On the other hand, with full participation science, community action and indigenous knowledge can all be effective, reinforcing components of the process of combating desertification and providing solutions to land degradation.

Examples from Namibia

Namibia is the driest country south of the Sahel (Brown, 1992; Tarr, 1996); 34% of Namibia is arid, 58% is semi-arid and only 8% can be classified as dry, sub-humid. More than 50% of its population of 1·6 million live on 11% of the land where dryland cropping is possible during some years. Although Namibia is large at more than 824,000 km^2, no perennial rivers flow within its borders. As a legacy of its pre-independence situation, 47% of the land is owned by commercial, mainly white farmers, while 43% of the land is occupied by communal farmers representing more than 90% of the entire population.

A number of programmes based in the communal farming areas are working toward and have reached varying degrees of broad participation involving scientists, development workers, government extension people and communities. Each of these participatory programmes involves proportions of the key components of science,

community action and indigenous knowledge. The examples below are from some of those programmes that have been operating for several years.

The Summer Desertification Programme (SDP) of the Desert Research Foundation of Namibia, involving university undergraduates, local and international researchers and communities, is a programme of research and dissemination of results to other researchers, other communities and decision-makers. Participants work together to document the use of natural resources and to identify changes in the environment that affect the community, the source of these changes and possible solutions. The study was initiated by researchers and students, although with full agreement and input of the community. The results are disseminated with the agreement of the community, but the community is not fully involved in either their presentation or distribution. Although the primary focus of the SDP is to provide appropriate, relevant research experience for Namibian undergraduates, the overall programme involves a high degree of community action within the context of Namibia's Programme to Combat Desertification (Dausab *et al.*, 1994; Jobst *et al.*, 1995; !Guidao-Oab *et al.*, 1996).

In Namibia the Community Based Natural Resource Management (CBNRM) Programme of the Ministry of Environment and Tourism helps communities organize to take advantage of wildlife and tourism as another income source and a partial alternative or supplement to livestock and dryland cropping. CBNRM has taken the Campfire Program pioneered in Zimbabwe as its model for implementation. Communities involved participate extensively in this programme. They help determine the form of their involvement, but the Ministry of Environment and Tourism determines the basic ideas, the rules under which benefits are distributed and the limits to these benefits (Jones, 1996; Turner, 1996).

Another programme with a high degree of success in Namibia is the Sustainable Animal and Range Development Programme (SARDEP), SARDEP's focus is on livestock in communal farming areas, perhaps the most important and certainly the most culturally relevant component of communal farming systems in Namibia. Within the confines of a focus on livestock, this programme experiences a high degree of participation with involved communities, setting much of the programme's direction and activities. The particularly high degree of participation by communities, extension people, development workers and researchers may be attributed to the programme's design as well as the cultural relevance of livestock farming in arid Namibia (Kruger, 1996).

Namibia's Programme to Combat Desertification (NAPCOD), a partnership among two government ministries and a non-governmental organization, is also designed to include a high degree of community action and participation (Fig. 2). The objectives for the entire programme were set at a workshop attended by community members, government and local and international scientists. NAPCOD's components, particularly one addressing the identifying and applying of local solutions to local problems, involve a high degree of participation of communities at selected pilot sites. Again, the type of participation is circumscribed by the programme's interests although this programme is broad enough to be considered the umbrella programme encompassing those already mentioned (Wolters, 1994).

All these programmes have enjoyed a fair degree of success with a high level of participation by communities and combined input by communities, researchers and extension services into the programme design and direction. Nevertheless, communities are constrained in their level of participation in addressing their own problems and on the potential for setting their own way forward. The constraints are mainly imposed from outside the farming community at the national level. A major conclusion reached by all these programmes is that, while participation is a key to connecting science and community action, science and community action cannot really connect effectively unless the proper overall planning, policy and legislative framework conditions exist.

The flaws in this framework include the absence of a land policy, which is precipitating a continued land grab in communal lands by people who can afford to buy fencing to privatize government boreholes and maintain large herds of livestock (Kerven, 1997). Strong centralization of all government functions, such as extension and veterinary services, prevents effective delivery in communal farming areas (Tvedten & Mupotola, 1996). Debilitating framework conditions hinder proper natural resource use and management and prevent connections between science and community action. Such conditions include long distances to markets and banking services, the presence of a veterinary control fence across the entire country to maintain disease-free herds for export, the lack of a cultural tradition of regularly selling livestock and the propensity for absentee farming.

Where the appropriate framework is in place, such as in Kenya (Tiffin *et al.*, 1993), natural resource management has improved in a variety of ways, either due to benign neglect or other factors not directly focused on altering management (Fuller, 1993; Tiffin *et al.*, 1993).

(In)appropriate framework

Proper use of natural resources is the primary focus of the several programmes that take advantage of the full range of tools, including science, participation and community action. These programmes recognize, however, that these components operating alone or in concert are still not enough to effectively combat desertification. As a result, all these programmes have other objectives, a major one of which is trying to influence framework conditions (Dewdney, 1996).

Three aspects of the framework conditions in Namibia are particularly important (after Jacobson *et al.*, 1995). These aspects include the policy and planning framework, the environmental framework and the socio-economic framework conditions that are influencing and sometimes over-riding all other considerations.

The policy and planning framework guiding developments in Namibia include such aspects as land reform, export markets, water use and the cost recovery of water use,

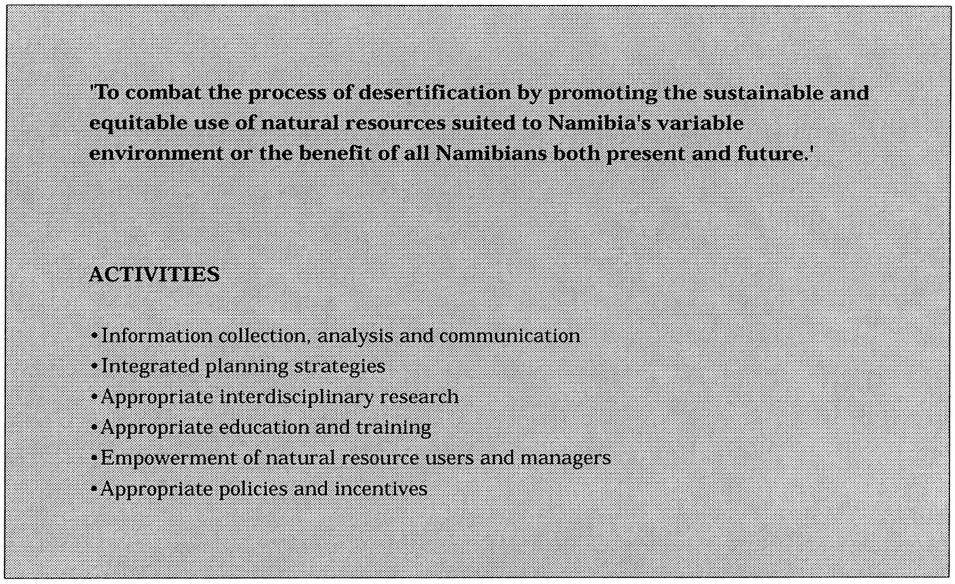

Figure 2. Namibia's National Programme to Combat Desertification (NAPCOD).

drought relief, regulation *vs.* incentives for natural resource use and integrated cross-sectoral planning (Dewdney, 1996). Policy and planning environments are currently not conducive to community action.

The environmental framework in which Namibia operates includes the pervading aridity and variability of rainfall, improper subsidies to natural resource users, e.g. in the form of drought aid, and a lack of diversification and alternative uses of natural resources (Tarr, 1996). The environmental framework is now largely ignored in national development planning.

The socio-economic framework prevailing in Namibia includes a rapidly increasing population, a high level of poverty, a focus on livestock and an increasingly entrenched and powerful elite (SIDA, 1995; UNDP, 1996). Overall, the socio-economic framework is not conducive to support science, participation or community action in combating desertification. Following are a few examples of the actions Namibia's Programme to Combat Desertification is undertaking to alter the existing framework.

Policy and planning framework

Namibia's Programme to Combat Desertification (NAPCOD) undertook an assessment of a variety of policies in Namibia and how they directly or indirectly affect the processes of desertification (Dewdney, 1996). The assessment focused on policies related to land, water, forestry and population with analysis and inputs from environmental scientists and other specialists. NAPCOD produced a document that was workshopped and supported by scientific resource people. A number of high-level government staff contributed either written comments or discussions. When agreement had been achieved at that level, the Minister of Environment and Tourism then circulated the revised document to several of his colleagues for written comments. When letters of support had been received from three ministers representing lands, agriculture and regional government, the document was then passed on to Cabinet for its approval.

At the same time the contents of the document were used to help the Namibian Non-Governmental Organisation Forum (NANGOF) develop its position on land reform (Nambian Non-Governmental Forum, 1996). NANGOF's land reform document was then taken to all 13 political regions of Namibia with the help of local non-governmental organizations. There the document was discussed in public workshops with participants ranging from regional governors and counselors to communal farmers. Preparations for the workshops had been made by NANGOF through the farmers' unions and their affiliated associations. Although many of the considerations raised and taken forward by NANGOF have been incorporated into the current draft of the National Land Policy, others have been omitted (NLP, 1997). Many of those omitted have their basis not in considerations of the scientific aspects of proper land use but in the historical legacy of apartheid and unequal access to land. This Namibian experience, however, shows that the contributions from science and community action can have a major impact on formulation of framework conditions existing for a variety of complex reasons. We feel that the potential is there for even greater change in the future.

On another level, the contents of the Namibia's Programme to Combat Desertification (NAPCOD) policy document were used to form the basis for consultations undertaken in response to the Prime Minister's call for a National Drought Task Force. Again, these consultations involved a variety of inputs, from scientists working on global climate change and food security, to managers of the Agricultural Credit Bank, to government officials responsible for extension services and emergency drought aid.

Less successful in applying the concepts in NAPCOD's policy document were the recommendations for cost recovery of water. In all rural communal areas water has been a free resource provided by government. New legislation has initiated cost recovery for infrastructural developments but not for water as a resource in itself (Kharapuwa, 1997). The process involved a year-long consultation where farmers and regional government representatives met with central government officials and foreign advisors. Although the concepts recommended in NAPCOD's policy analysis were not adopted in their entirety, they were discussed, and awareness of the limitations of water availability in our arid environment has greatly increased at all levels.

Most environmental impact assessments (EIAs) in Namibia are prepared for developments that could contribute to desertification if not properly handled. An example would be providing water points in areas previously used for seasonal grazing (Hartley, 1997). The NAPCOD policy analysis has provided a consolidated review of the issues being used by EIA practitioners throughout the country.

Environmental framework

In Namibia, as elsewhere in the world, the environmental framework is a given. As the most arid country south of the Sahel, Namibia has serious challenges as it strives for sustainable and proper use of natural resources (Tarr, 1996). When Namibia gained its independence in 1990, however, the Namibian leadership consisted of many people who had spent long years in exile, either in central Africa or Europe, where rainfall is higher than in Namibia. Since then science has contributed greatly to increased awareness of the realities of arid climate with variable rainfall (Updates, 1996, 1997).

The media have been a major target of the NAPCOD programme, and scientific information has been interpreted and distributed to a variety of media workers (Wolters, 1995). Headlines proclaiming an exceptional drought every year when rainfall in below average or when the rain starts later than expected are becoming a thing of the past.

Science and communities have strong mutual interests in the environmental consequences of fencing off large tracts of communal grazing and of village development in former cattle post areas that supported seasonal grazing (Holme & Kooiman, 1994; Tapscott & Hangula, 1994; EEAN, 1997; Kerven, 1997). NAPCOD is using the simple expedient of rain gauges to increase awareness of what is normal rainfall and as a basis for proper longer term planning for coping with drought, for example, or for diversifying farming and value-added activities or livestock mobility. Communities gather data and discuss its contextual interpretation and the consequences thereof with NAPCOD regional facilitators and other participants.

Action from the education community — teachers, student teachers and learners — has contributed to interest in and development of environmental education in Namibia (du Toit & Sguazzin 1995*a*,*b*). Science and rural communities have been active partners in these developments, providing the basis for materials development and participating in testing materials in a variety of contexts.

Namibia's arid environment provides an excellent teaching tool for future researchers (Jacobson *et al.*, 1995). Communities and students working directly together in field research projects under the NAPCOD umbrella can enhance mutual understanding of the problems of sustainable resource use in arid environments and solutions that could be applied (Dausab *et al.*, 1994; Jobst *et al.*, 1995; !Guidao-Oab *et al.*, 1996). By placing Namibia's arid environment firmly in focus in all these interactions between researchers and communities, NAPCOD is helping decision-makers at all levels gain an understanding of environmental problems.

Socio-economic framework

Science and community action with respect to the socio-economic framework are also connecting within Namibia's Programme to Combat Desertification, again particularly on the level of information dissemination and increased understanding. Researchers and community members are gathering, discussing and disseminating to higher government levels information on the effects of agricultural subsidies; population increase; unsustainable use of natural resources; and the focus on livestock numbers, absentee farming, or large-scale illegal fencing in communal areas by the powerful elite (Fuller & Turner, 1996). Sectors of the government are recognizing the importance of this type of interaction as, for example, when they establish community forests (EEAN, 1997) or wildlife conservancies (Jones, 1996).

There are no simple answers to the question posed in the title of this paper. Science and community action can connect. But they cannot do so without proper levels, degrees and types of participation from both sides of the equation. For this mix to be successful in combating desertification the framework conditions in which they operate must also be appropriate. The ray of light at the end of the tunnel is that science and community action, lubricated by participation, could prove a powerful force in altering these very frame conditions that influence their integrated effectiveness in the first place. Establishing clarity of understanding of the components of this mix, which can be greatly facilitated by applying the scientific process in a milieu of community action and participation, can be a first step.

I wish to thank all the students, researchers and community members who have discussed these topics in the field, in workshops and wherever the opportunity arises. Special thanks to Petra Jobst, Teofilis Nghitila, Mark Robertson and Juliane Zeidler, who helped prepare this paper.

References

Abbot, J. & Guijt, I. (1997). Creativity and compromise. In: *PLA Notes: notes on participatory learning and action* (formerly *RRA Notes*), No. 28, pp. 27–32. London: Sustainable Agriculture Programme, International Institute for Environment and Development. 267 pp.

Arasu, K.T. (1997). Towards full participation. In: *PLA Notes: notes on participatory learning and action* (formerly *RRA Notes*), No. 28, pp. 87–90. London: Sustainable Agriculture Programme, International Institute for Environment and Development. 267 pp.

Behnke, R., Scoones, I. & Kerven, C. (1993). *Range Ecology at Disequilibrium: new models of natural variability and pastoral adaptation in African savanna.* London: International Institute for Environment and Development/Overseas Development Institute/Commonwealth Secretariat. 248 pp.

Brown, C.J. (Ed.) (1992). *Namibia's Green Plan.* Windhoek: Namibia Ministry of Environment and Tourism. 174 pp.

Chambers, R. (1994). *The poor and environment: whose reality counts?* IDS Working Paper No. 3. Brighton, U.K.: Institute of Development Studies, University of Sussex. 18 pp.

Darkoh, M.B.K. (1994). The deterioration of the environment in Africa's drylands and river basins. *Desertification Control Bulletin*, **24**: 35–41.

Dausab, F., Francis, G., Johr, G., Kambatuku, J., Shanyengana, S.E. & Swartz, S. (1994). *Water usage patterns in the Kuiseb catchment area.* Occasional Paper No. 1. Windhoek: Desert Research Foundation of Namibia. 181 pp.

de Haan, C. (1994). *An overview of the World Bank's involvement in pastoral developments.* Pastoral Development Network Paper 36b. London: Overseas Development Institute. 30 pp.

Dewdney, R. (1996). *Policy factors and desertification — analysis and proposals.* Windhoek: Namibia's Programme to Combat Desertification, Desert Research Foundation of Namibia. 127 pp.

du Toit, D. & Sguazzin, T. (1995*a*). *My Land, My Life.* Windhoek, Namibia: Desert Research Foundation of Namibia/Ministry of Basic Education and Culture. 120 pp.

du Toit, D. & Sguazzin, T. (1995*b*). *Tools of the Trade — Skills and techniques for environmental education in Namibia.* Windhoek, Namibia: Desert Research Foundation of Namibia/MBEC. 206 pp.

EEAN (1997). *Community based management of the Okongo community forest.* Unpublished report on socioeconomic survey in the vicinity of the Okongo community forest. Windhoek: Environmental Evaluation Associates of Namibia (Pty) Ltd./Dir. Forestry. 33 pp.

Ellis, J.E. & Swift, D.M. (1988). Stability of African pastoral ecosystems: alternate paradigms and implications for development. *Journal of Range Management*, **41**: 450–459.

Fuller, B. (1993). Institutional appropriation and social change among agropastoralists in central Namibia, 1916–1988. Unpublished Ph.D. dissertation, Boston University, Boston, MA.

Fuller, B. & Turner, S. (1996). *Resource access and range land management in three communal areas of Namibia.* SSD research report No. 23. Windhoek: Social Science Division, University of Namibia. 66 pp.

Goldsmith, E. & Hildyard, N. (1984). *The social and environmental effects of large dams. Vol. 1: Overview, Report to the European Ecological Action Group (ECOROPA).* Cornwall, U.K.: Wadebridge Ecological Centre. 371 pp.

Guidao-Oab, J., Humavindu, M.N., Kakukuru, E., Ngairorue, T., Nghishoongele, I.O., Nghitila, T.M. & Ngololo, E.N. (1996). *A study of desertification at Engelbrecht.* Occasional Paper No. 3. Windhoek: Desert Research Foundation of Namibia. 73 pp.

Hagmann, J. & Murwira, K. (1996). *Indigenous soil and water conservation in southern Zimbabwe: a study of techniques, historical changes and recent developments under participatory research and extension.* Drylands Programme Paper No. 63. London: International Institute for Environment and Development.

Hartley, P. (Ed.) (1997). *A retrospective assessment of the environmental impacts of emergency borehole supply in the Gam and Khorixas areas of Namibia.* Windhoek: Environmental and Geographical Science Masters Class, Namibia's Programme to Combat Desertification. 187 pp.

Holme, D. & Kooiman, A. (1994). *Mapping fences in Oshikoto region, Namibia: a study on the extent and location of fences using remote sensing and geographic information systems.* Technical Notes NRSC No. 2. Windhoek: National Remote Sensing Centre (NRSC), Dir.Forestry/MET. 14 pp.

Jacobson, P.J., Jacobson, K.M. & Seely, M.K. (1995). *Ephemeral Rivers and their Catchments: sustaining people and development in western Namibia.* Windhoek: Desert Research Foundation of Namibia/Department of Water Affairs. 160 pp.

Jobst, P., Kakukuru, E., Kambatuku, J.R., Mouton, D., Netha, L., Nghitila, T.M., Siyambango, M.S. & Shanyengana, S.I. (1995). *Summer desertification project.* Windhoek: Namibia's Programme to Combat Desertification, Desert Foundation of Namibia. 94 pp.

Jones, B.T. B. (1996). *Institutional relationships, capacity and sustainability: lessons learned from a community-based conservation project, eastern Tsumkwe District, Namibia, 1991–1996.* Directorate of Environmental Affairs/Ministry of Environment and Tourism (DEA/MET) Research Discussion paper No. 11. 43 pp.

Kerven, C. (1997). *The knife cuts on both blades: redefining property rights in eastern Oshikoto region, Namibia.* Unpublished paper. London: Overseas Development Institute. 32 pp.

Kharapuwa, C.J. (1997). Towards community based rural water supply management. *AgriViews*, **1**(9): 1–3.

Kolawole, A. (1992). The Impact of Drought on Lake Chad and its influence upon the South Chad Irrigation Project. In: *African River Basins and Dryland Crises, Organisation for Social Science Research in Eastern Africa/Research Programme Environment and International Security*, pp. 121–132. Uppsala University, Sweden.

Kreike, E.M. (1995). *The Ovambo agro-sylvopastoral system: traditional landuse and indigenous natural resource management.* Forestry Publication No. 4. Windhoek: Dir.Forestry/MET. 86 pp.

Kruger, A.S. (1996). Closing the gap between farmers and support organisations in Namibia. In: *Towards Sustainable Land Use: furthering cooperation between people and institutions* (abstract), p. 367. Bonn: International Soil and Conservation Organisation. 391 pp.

Long, N. & Villareal, M. (1994). The interweaving of knowledge and power in development interfaces. In: Scoones, I. & Thompson, J. (Eds), *Beyond Farmer First: rural people's knowledge, agricultural research and extension practice*, pp. 41–51. London: Intermediate Technology Publications. 301 pp.

Namibian Non-Governmental Forum (1996). *The Outline of a National Land Policy (Dec.)*. Position paper. Windhoek: Namibian Non-Governmental Forum. 42 pp.

National Research Council (1994). *Lost Crops of the Incas*. Washington, DC: National Academy Press. 415 pp.

National Research Council (1996). *Lost Crops of Africa, Vol. 1: Grains*. Washington, DC: National Academy Press. 380 pp.

NLP (1997). (draft - 4th March) *National Land Policy*. Windhoek, Namibia: Government of the Republic of Namibia. 28 pp.

Oba, G. (1994). *The role of indigenous range management knowledge for desertification control in northern Kenya*. Research Report No. 4. EPOS, Linkoping University, Sweden. 25 pp.

Odada, E., Otlogetswe, T., Stafford-Smith, M. & Ingram, J. (1996). *Global change and subsistence rangelands in southern Africa (Global Change and Terrestrial Ecosystems (GCTE)), 1996 report of a workshop: Southern African rangelands today and tomorrow: social institutions for an ecologically sustainable future, GCTE Working Document* (draft - June (1996) on behalf of START, Botswana National International Geosphere and Biosphere Program Committee & GCTE). Lyneham, Australia: Global Change and Terrestrial Ecosystems.

Pretty, J.N. (1994). *Regenerating Agriculture: policies and practice for sustainable growth and self-reliance*. London: Earthscan Publications. 320 pp.

Rodin, R.J. (1985). *The Ethnobotany of the Kwanyama Owambos*. Monographs in Systematic Botany, Vol. 9, Missouri Botanical Gardens. Lawrence, KS: Allen Press. 163 pp.

Salas, M. (1994). Technicians only believe in science and cannot read the sky: cultural dimensions of the knowledge conflict in the Andes. In: Scoones, I. & Thompson, J. (Eds), *Beyond Farmer First: rural people's knowledge, agricultural research and extension practice*, pp. 57–69. London: Intermediate Technology Publications. 301 pp.

Scoones, I. (Ed.) (1995). *Living with Uncertainty: new directions in pastoral development*. London: Intermediate Technology Publications. 210 pp.

Scoones, I. & Thompson, J. (1994*a*). Knowledge, power and agriculture — towards a theoretical understanding. In: Scoones, I. & Thompson, J. (Eds), *Beyond Farmer First: rural people's knowledge, agricultural research and extension practice*, pp. 16–32. London: Intermediate Technology Publications. 301 pp.

Scoones, I. & Thompson, J. (Eds) (1994*b*). *Beyond Farmer First: rural people's knowledge, agricultural research and extension practice*. London: Intermediate Technology Publications. 301 pp.

Seely, M.K. & Jacobson, K.M. (1994). Desertification and Namibia: a perspective. *Journal of African Zoology*, **108**(1): 21–36.

SIDA (1995). *Namibia poverty profile*. A report prepared by the Social Sciences Division, Multi-Disciplinary Research Centre, University of Namibia. Windhoek: Swedish International Development Cooperation Agency. 91 pp.

Stiles, D. (1995). Desertification is not a myth. *Desertification Control Bulletin*, **26**: 29–37.

Tapscott, C. & Hangula, L. (1994). *Fencing of communal range land in northern Namibia: social and ecological implications*. SSD Discussion Paper 6. Windhoek: Social Science Division, University of Namibia. 15 pp.

Tarr, P. (Ed.) (1996). *Namibia environment, No. 1*. Windhoek: Namibia Ministry of Environment and Tourism. 208 pp.

Tiffin, M., Mortimore, M. & Gichuki, F.N. (1993). *More People, Less Erosion: environmental recovery in Kenya*. Chichester: John Wiley & Sons. 311 pp.

Turner, S. (1996). *Conservancies in Namibia: a model for successful common property resource management?* SSD Discussion Paper No. 13. Windhoek: Social Science Division, University of Namibia. 42 pp.

Tvedten, I. & Mupotola, M. (1996). *Urbanisation and urban policies in Namibia*. SSD Discussion Paper No. 10. Windhoek: Social Science Division, University of Namibia. 42 pp.

Updates (1996). *A regular briefing on aspects of sustainable development in Namibia*, Vol. 1: 1–18. Windhoek: Desert Research Foundation of Namibia. 36 pp.

Updates (1997). *A regular briefing on aspects of sustainable development in Namibia*, Vol. 1: 1–18, Vol. 2: 1–10, incomplete. Windhoek: Desert Research Foundation of Namibia. 20 pp.

UNDP (1996). *Human Development Report 1996*. Windhoek: United Nations Development Programme. 94 pp.

Westoby, M., Walker, B. & Noy-Meir, I. (1989). Opportunistic management for rangelands not at equilibrium. *Journal of Range Management*, **42**: 266–274.

Williams, M.A.J. & Balling, R.C. (1995). Interactions of desertification and climate: an overview. *Desertification Control Bulletin*, **26**: 8–16.

Wolters, S. (1994). *Proceedings of Namibia's National Workshop to Combat Desertification.* Windhoek: Desert Research Foundation of Namibia. 214 pp.

Wolters, S. (1995). *Proceedings of the desertification media awareness workshop, April 24, 1995.* Windhoek: Namibia's Programme to Combat Desertification, Desert Research Foundation of Namibia. 59 pp.