

Desertification and the CCD: issues and links to poverty, natural resources and policies

David Thomas, SCIDR, Department of Geography, University of Sheffield

This briefing paper attempts to summarise some of the key aspects of desertification pertinent to the DFID 'Policies, poverty and natural resource use, southern Africa' (PANRUSA) project. In particular, the characteristics of desertification, and links to the environment, sustainable development, poverty and people are considered. The CCD is used as a framework for reviewing the issue and its different NR, social and environmental aspects. Commonalties between the CCD and the DFID 1997 White Paper on International Development are also referred to.

1. Introduction

DESERTIFICATION has proved to be a controversial environmental issue, especially since 1977. In that year the UNCOD (United Nations Conference on Desertification), held primarily at the behest of national governments of African Sahel countries (which at the time were experiencing the impacts of severe drought), firmly launched desertification into the arena of global politics and environmental problems. Controversy has surrounded what exactly desertification is, what causes it and how it is manifested, where exactly it occurs, and how it links to natural phenomena such as drought and to social actions. During the late 1980s, UNEP, UNDP and various scientific groups attempted to clarify many issues relating to desertification, including

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

establishing an agreed definition, agreeing on its environmental manifestations, attempting to assess its extent, identifying its links to social issues, and setting the framework for tackling the problem. These issues arose from the almost total lack of success on the action points of the UN General Assembly Plan of Action to Combat Desertification.

At the 1992 United Nations Conference on Environment and Development (UNCED- the Rio Earth Summit), a general assessment of progress (GAP2) was presented with regard to the targets set at UNCOD, along with a new global database on the extent of desertification. Progress on tackling desertification was largely considered a failure (Thomas and Middleton 1994), with failures including severe short falls in securing the funding needed to tackle the issue, and when efforts were made, a reliance on technical solutions to address a problem with significant social dimensions. Chapter 12 of Agenda 21, which stemmed from UNCED, covered combating desertification and drought. It included a need for better determination of the nature and extent of the problem and assessment of the social and economic impacts of desertification, at local and national levels. A significant outcome of discussion at UNCED, which was adopted by the 47th UN General Assembly, was 'the establishment of an intergovernmental negotiating committee for the elaboration of an international convention to combat desertification in those countries experiencing serious drought and/or desertification, particularly in Africa' (UN 1992).

This committee, termed INC-D, met on many occasions between May 1993 and June 1995. Notably, INC-D included not only government representatives but representatives of many North and South NGOs, UN bodies and technical 'experts'. The convention was first signed in October 1995, and came into force after the 50th national ratification, on 26 December 1996. As of 15 September 1998, 136 countries, including Botswana (45th to ratify, on 11/9/96), the United

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Kingdom (53rd, 18/10/96), Namibia (72nd, 16/5/97) and South Africa (113th, 30/9/97), have ratified the convention. The convention, known as the CCD, contains 40 Articles plus four annexes, running to 71 text pages¹. It contains sections covering the environment, development, poverty, education, research and training and the levels of action. Many components reflect current thinking about linkages between people and the environment, poverty, and the different spatial scales of impact and action. For a UN document, it is very people, rather than institution, centred.

2. What is desertification?

What is desertification? Everyone, generally, knows; but objective scientific definition is elusive (Spooner 1989:114).

The literature concerning the nature and occurrence of desertification is voluminous, and the discussions about what exactly desertification is have been considerable and often controversial, sometimes directing attention away from the real issues applying to affected peoples and environments. Spooner (1989) has discussed some of the sources of confusion and conflicting efforts towards achieving a universal definition. According to Glantz and Orlovsky (1983), over 100 definitions of desertification have been published since 1949, when the term was first used (Aubreville 1949). Definitional debates really matter only if confusion or ignorance results, which does appear to have been the case even within some of the highest levels of discussion. For example, Harold Dregne, a US range ecologist and someone considerably involved in UN-level considerations about desertification in the late 1970s and 1980s, noted the following with respect to discussions occurring around the 1977 UN Conference on Desertification:

¹ The text of the CCD, plus other useful information, can be accessed on <http://www.unccd.ch/lite>

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Desertification carried the connotation of disaster and required no explanation. Practically everyone knew intuitively that desertification was bad, irrespective of what it referred to. And if it was bad, something should be done to stop it....the UNCOD consultants spent at least a year ..before we got round to asking what the term meant. (Dregne 1987:8).

For desertification, differences and difficulties in definition have related to *how* the issue is manifested, *what* processes, both social and environmental, are involved, and *where* the problem occurs. None of the individual attributes of how, what and where are unique to desertification (Box 1), with each relating in various degrees to other environmental and social factors. What characterises desertification is not then any single attribute, but the combination of how, what and where.

Box 1. Desertification: how, what and where

‘Desertification’ attribute

e.g. of alternative/linked cause

How is desertification manifested?:

- Falling crop and livestock productivity
- floral and faunal changes
- societal disruption

*soil erosion, disease, drought
drought, succession
drought, war, development*

What processes are involved? *-environmental*

- soil erosion
- soil depletion
- biomass reduction
- declining water resources

*{heavy rain, windiness,
{too many/too few people
“ “
climate change/variability*

-social

- increased poverty
- out-migration
- famine

*{drought, war, market forces,
{structural changes
{war*

Where does desertification occur?

- vulnerable drylands
- Africa

*drought, market changes
political instability/change*

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Given that the scale of any attempted remedial action, or assessment of the nature of any impact, is dependent on the scale of the causative factor (e.g. Warren and Agnew 1988), and that an agreed understanding of the issue is necessary for consistent action, issue clarity and a widely accepted definition are really required (Thomas 1997a, b). It is however only since the early 1990s that a widely agreed definition has been achieved, first via discussions leading up to the UNCED and then in the negotiations leading up to the CCD. This definition of desertification is:

Land degradation in arid, semi arid and dry subhumid areas resulting from various factors including climatic variability and human actions,

where:

land degradation means the reduction or loss of the biological or economic productivity and complexity of the land, and includes degradation to soils (both erosion and internal changes), vegetation and water;

the affected areas are the so-called 'susceptible drylands',

climatic variability includes both the impact of droughts on human actions and the wider impacts of global changes including global warming, which are expected to increase the drought-susceptibility of many (especially African) drylands; and

human actions include the direct effects of land use activities and wider political and structural changes that cause disruption and changes to previously successful actions.

The definition allows a wide set of combinations of factors to lead to desertification but does implicitly distinguish (as noted in Article 1 (c) of the CCD) between the natural background

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

variability of environmental conditions in susceptible drylands (e.g. droughts) and enhanced levels of change forced by external pressures. These include both direct human pressures and the indirect impacts of, say, raised global atmospheric CO₂ levels. Two examples illustrate possible combinations on a continuum of causative impacts. At one end global climate changes may lead to a changed amplitude of climate variability, or changes to climatic patterns, that result in previously successful indigenous practices adapted to environmental variability (drought) becoming less sustainable- such as through changing the length of the growing season. At the other end of the spectrum, policy-driven changes in land use designations may inhibit land users applying flexible coping strategies adapted to seasonal climate variations, by exerting greater pressures on lands previously only used at times of environmental stress.

The definition, therefore, recognises the distinction between drought and desertification (the impacts of which have frequently been confused), but it is also noted in the CCD how the two can be linked. If either the resilience to drought of susceptible dryland people, or of the environment, is compromised, it can lead to the occurrence of desertifying processes.

It can be concluded that on scientific grounds desertification cannot readily be regarded as a very special form of land degradation (Thomas and Middleton 1994); indeed, some workers have consequently argued for the abolition of the term (e.g Mainguet 1991). None of the *how*, *what* or *where* are unique but, rather, it is the combination of the three, and the vulnerability of large numbers of people in relatively little-understood environments (the scientific community knows more and spends more on research in uninhabited polar regions than in populated drylands), that have highlighted a specific position for desertification. Its links with the use of natural resources,

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

status of rural peoples, poverty, development agendas and environmental variability place desertification at an important point in the PANRUSA project.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

3. The science gap

During the 1980s in particular, the physical sciences tended to dominate considerations of desertification. Most positions in UNEP DC/PAC (the branch of the UN set up to monitor desertification and administer remedial actions) were occupied almost exclusively by soil and environmental scientists (Thomas and Middleton 1994). People and the social scientists were frequently seen as secondary players in the official treatment of desertification, although this view was repeatedly and widely challenged (e.g. by Brian Spooner, see section 4 below). The CCD attaches greater, if not the greatest, importance to the human dimensions of desertification, as will be seen below. It is necessary to give some brief mention of some major physical-science issues in desertification, and to indicate the role the science can play in desertification issues.

The importance attached to physical science in the decade or so following UNCOD is not surprising since the three main aims of the conference were (after Verstraete 1986): to increase global awareness of desertification, to assimilate all available scientific and technical information on the problem and its solutions; and to start a programme to combat desertification. The second of these aims threw up, both directly and indirectly, a series of problems that were essentially scientific:

- awareness of a poor understanding of the extent of desertification- this led directly to attempts to *monitor* and *assess* its extent, measured through criteria reflecting changes in the environment and using scientific methods including remote sensing and field measurements;
- awareness of just how poor the scientific understanding of dryland environments, their dynamics and physical processes, actually was;

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

- a (misguided) belief that science could provide affirmative technical solutions to the physical manifestations of desertification. This belief was misguided both because science is rarely definitive and because science does not provide simple, easily applied solutions (Thomas 1997a) especially when the scale and nature of the problems were not agreed and when the environmental basis (of drylands) was so poorly understood!

Politicians and administrators may to some extent have sought solace in the 'rigour' of science, but an analysis of the aftermath of UNCOD (Thomas and Middleton 1994) shows that the scientists involved were often simultaneously trying to find solutions, generate basic data and understand the complexities of the affected environments.

Since UNCOD (and maybe to extent as a result of the interest in drylands that it engendered) research in the environmental sciences has (in a process that is still underway) led to major advances in the understanding of dryland environments. Developments relevant to this discussion and this project are given briefly in Box 2.

These scientific advances have both contributed to a better understanding of the scientific aspects of desertification and to critiques of earlier assessments of the scale and scope of the problem (e.g Thomas 1993), and to major criticisms of the overall scientific role in desertification matters. Notwithstanding this, Thomas (1997a) has suggested four main roles that physical science has to play in the resolution and awareness of desertification: establishing and retaining issue clarity (relative to other issues and to natural dryland characteristics); monitoring desertification; identifying appropriate scales of action; and identifying the characteristics of system recovery (after disturbance caused by people or natural dryland dynamics) and their relationships of recovery to human activities. The CCD also recognises the important role of science, by establishing a

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Committee on Science and Technology, to advise the central conference of the CCD on technical matters and on actions and activities commensurate with the overall objectives and scales of action.

Box 2. Some scientific advances c 1980s onwards, relevant to desertification issues

Awareness that dryland environments are characterised by significant temporal and spatial variability in key system components, e.g. rainfall (see Hulme 1992) and natural vegetation systems (see e.g Warren 1995 for a summary and discussion).

Drought is a natural dynamic component of dryland rainfall systems (and subsequently awareness that many indigenous NR systems are/were adapted to this).

The concept of climax vegetation systems is not appropriate to most dryland settings, and that many ecological systems display disequilibrium characteristics (and subsequently that NR management systems which attempt stable, constant, off take levels are thus not likely to be successful).

The soil resources of many drylands are nutrient poor and in some cases are closely coupled to vegetation systems.

That natural environmental variability has to be accounted for in assessments of dryland change and degradation.

That feedbacks may occur between ecosystem changes are lower atmosphere processes, potentially resulting in the enhancement of desertification.

That the lack of spatial and temporal homogeneity in dryland systems makes the scaling up of data from small scale studies inappropriate (Stocking 1996), and also frequently makes prescriptive solutions to desertification inappropriate.

4. Environment and people

The concern of politicians over the social and economic well being of rural African people (especially in the Sahel zone), effectively drove desertification (however defined) to a high

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

position on environmental issue agendas. For those who linked desertification to drought, it was largely considered to be an 'act of god', with people as innocent victims. For others, human carelessness, including through the use of inappropriate agricultural methods, led to environmental degradation. In the decade after UNCOD, desertification was commonly viewed, including in 'official' circles, as an environmental problem with environmental solutions (see section 3 above). Spooner (e.g. 1987, 1989 and Spooner and Mann 1982) was one of several individuals who, during the post-UNCOD period, questioned the predominance of an environmental slant in deliberations over desertification. For example, in 1989 he noted:

Physical and biological scientists either ignore the social and cultural components or attempt ..a definition that would ignore them. Social scientists generally do not appreciate the significance of the natural processes involved. In fact [both physical and social dimensions] are inseparable, because the natural situation is the product of the local human history..
(Spooner 1989:134).

Lack of specific consideration of the social context permeated desertification agendas in the decade after UNCOD. A 20 year plan to solve the desertification problem was set in 1978 (UNEP-UNCOD 1978). Solutions were largely seen to rest at the national or international level, often via environmental or technical programmes (Odingo 1990). Even if people were considered as the cause, they were also seen as the passive victims, with those most directly affected excluded from direct involvement in solutions, especially in the developing world. In many situations, people were also seen as the cause through their use of traditional resource use practices viewed (in the west and by those attempting to expand the agricultural base of developing countries); as environmentally degrading (e.g. see Mace 1991); economically unproductive (Livingstone 1977) and as an obstacle

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

to development. Additionally, generally applicable solutions to desertification were considered (Thompson 1988) without adaptation to or awareness of local situations, despite the complexities of causality and outcomes in the local context (see Barraclough 1995).

These outcomes are not really surprising when it is considered that UNCOD was largely a meeting of scientific and national government representatives. Thus government-to-government discussions, aid and solutions were inevitably to provide a top-down perspective on desertification. Simplistic assessments could only be reinforced by the limited understanding of dryland environmental systems.

The lack of a voice for rural peoples in the most directly affected developing world countries may well have had an important impact on the post-UNCOD direction of anti-desertification activities. Even at UNCOD though, a relationship was recognised between desertification and rural poverty, particularly in an African context. But as noted by Spooner (1989), for political reasons the desertification-poverty link was brought to the fore as a subset of the desertification problem, whereas desertification in many African contexts is more realistically considered as a subset of the general poverty issue.

During the 1990s, the position of desertification as an issue has been challenged and changed. Debates about its nature, extent and solution have been considerable (e.g. Binns 1990; Hellden 1991; Thomas 1993) and rebuttals of those criticising earlier efforts sometimes furious (e.g. Stiles 1995). A consequence of such debates has been the re-emergence, after a period of doubt and diminishing international interest, of desertification within the more considered and integrated post-UNCED era of environmental issues. Several reasons can be identified for reanalysis and reconsideration of desertification (Box 3), all of which have had a bearing on the CCD and the

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

recognised relationships between people and the environment in drylands. Indeed Article 5 of the CCD gives especial emphasis to the need to pay particular attention to socio-economic factors contributing to desertification. Thus, a research project considering natural resource management and its links to poverty in a dryland context, cannot effectively do so without incorporation of desertification issues and consideration of the role of the CCD, since these factors are heavily entwined. Some of these points are considered further in the sections that follow.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Box 3. Factors contributing to changing perceptions of desertification and its causes and solutions

- a) Lack of materialisation of funds in UNEP's Special Account, thus prohibiting significant UN-derived top-down action;
- b) Top-down projects, funded by e.g. the World Bank and donor North governments, proving expensive and lacking the support and interest of directly affected local peoples (e.g. see Zaal *et al.* 1998);
- c) Improved research-derived understanding of the nature and dynamics of dryland environments (see Box 2), including awareness of significant temporal and spatial variability (e.g. Hulme 1992; Thomas 1993; Warren 1995) and the inapplicability of environmental paradigms directly transferred from temperate environments (e.g. Behnke *et al.* 1992);
- d) equivalent challenges to accepted (western derived) orthodoxies about people-environment relationships (especially in Africa: e.g. Leach and Mearns 1996), including the use of open access systems that had previously been seen as disorganised by western eyes (Woodhouse 1997).
- e) awareness of the richness of local peoples' knowledge and experience of their environments, and their resourcefulness in the face of difficulties (e.g. Adams 1995; Tiffen 1995; Scoones *et al.* 1996; Deme 1998)
- e) awareness of the complex milieu of social, political and economic circumstances affecting local peoples behaviour and relationships with the environment and natural resources, including interactions between livelihoods, poverty/wealth levels and structural changes associated with post-colonial changes in African countries (see e.g. Barraclough 1995).
- f) awareness of the holistic nature of many environmental problems: the realisation of links between different environmental issues world-wide and social-environmental issues in Africa (e.g. Cardy 1997; Squires and Glen 1997), resulting in benefits being ascribed to multi-pronged and multi-directional approaches, analyses and solutions.

5. Desertification, sustainable resource use and poverty

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Many debates now identify clear linkages between environmental degradation, poverty and unsustainable resource use. Great significance can be attached to poverty (however it is defined), and authorities such as Pearce and Warford (1993) suggest that it is the key agency through which a myriad of other factors can lead to environmental degradation. This was reflected in the Rio declaration, which notes that removing poverty is an essential requirement for sustainable development (DFID 1998). The DFID white paper on poverty (DFID 1997) indicates how policy makers (in this case in a North, potential donor, context) have responded to these points such that:

We shall refocus our international development efforts on the elimination of poverty...through support for international sustainable development targets and policies which create sustainable livelihoods for poor people....and conserve the environment (DFID 1997 section 1:1).

DFID (1997) identifies land degradation and desertification as one of several issues that any poverty-alleviating activities need to tackle. The CCD definition of desertification itself also implicitly indicates that desertification is linked to unsustainable natural resource use practices in drylands. Thus anti-desertification activities, with the exception of any that might totally remove human activities from a degraded/susceptible area, either remedial or preventative, are effectively linked to sustainability/development debates in Africa. Within the CCD's consideration of actions necessary for the prevention and combating of desertification, Article 10 identifies the importance of integrated national policies for sustainable development, within which sustainable agricultural practices and the need for alternative livelihood activities for rural people at times of environmental stress is highlighted. This last point integrates both recent thinking on the importance of flexible rural livelihoods and recognition of various linkages between desertification, welfare and poverty.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

Within the poverty-sustainability linkage, it is also recognised that desertification may cause poverty (if there is not a rich livelihood base at times of stress) and that poverty may cause desertification (as a lack of flexibility may cause particular resource use activities to continue to an unsustainable level) (e.g. Rogers 1997).

Changing emphases (among 'experts', some policy makers and NGOs) about the roles of indigenous practices and local knowledge, as noted in Box 3 and expressed in many sources (e.g. throughout chapters in Leach and Mearns 1996), are highly relevant to the above issues of linkage. Barraclough (1995) has highlighted key points particularly well:

Facile generalizations are always plagued by multiple exceptions....explanations of desertification assuming peasant ignorance and shortsightedness were especially in vogue with colonial administrators. These have been largely discredited by research illuminating traditional peasant farming and social systems and the processes disrupting them such as land alienation, surplus extraction and commercialisation. (Barraclough 1995:33).

Traditional systems are seen as having several important attributes that inhibit desertification and thus make them sustainable users of dryland resources. These attributes include being shaped by local knowledge and interests; being flexible and therefore responsive to environmental variability; and in many instances by being non-exclusive, allowing communal use of resources which many be particularly important if flexibility is to occur (adapted from Swift 1994). The importance of these attributes, all of which are recognised as important within the CCD, is that they effectively allow risks to be diminished or avoided (Barraclough 1995), thereby reducing, or eliminating, poverty and degradation.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

At the same time as traditional systems, or modern variations of them, have been seen as environmentally and socially friendly, so moves towards commercialisation of dryland agriculture and pastoralism, in some cases indirectly supported by international trade agreements that are intended to be part of development strategies², have increasingly been seen to contribute to desertification (e.g. Scoones 1994). A cautionary voice is however provided by Barraclough (1995), who notes that the endorsement of traditional practices should not simply lead to their replacement with another scapegoat for desertification, since

explanations assuming short-term profit maximisation by commercial farmers who can escape the costs of land abuse...are also incomplete. (ibid:33).

A key reason for this, and one that is central to some of the aims of PANRUSA, is that non-sustainable resource use practices, traditional or introduced, commercial or substance, are commonly influenced by policies or institutions over which practitioners have little or no direct control (Barraclough 1995).

6. Desertification, policies and institutions

Within the CCD significant emphasis is placed on enhancing the control of local peoples over their own destinies, since this would allow local knowledge and expertise to contribute better to sustainable practices. Allied elements in the CCD are the importance attached to bottom-up actions and processes, and the role of NGOs, with Article 5 obliging affected countries that are party to the

² e.g. the Lome Convention, which effectively subsidises Botswana's cattle industry while at the same time requiring various husbandary and veterinary practices that have been used to support the establishment of fenced ranches in areas previously used for indigenous pastoralism: see Thomas and Sporton (1998) and others

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

CCD to establish plans and policies that combat desertification and mitigate the effects of drought within a framework of sustainable development. There is also a need to incorporate local communitys views and knowledge within decision making processes, which is an obligation in South Africa (Van Rooyan 1998). As Barraclough (1995) notes, rural peoples can in effect only operate natural resource use strategies within the policy constraints that prevail. An implication of this is that any analysis of levels of poverty and environmental degradation and actual resource use practices needs to be conducted within an understanding of the policies that influence or control local actions. Previous research in the Kalahari, summarised by Thomas and Sporton (1998) has however identified that key policies affecting access to and use of resources may not always have equal impact in all situations under their remit. Thus it is not only policy constraints and facilitations that require assessment, but also the 'chains of communication' (Blaikie 1989) that determine the actual impacts and interactions that occur.

Summary

Desertification is a complex and sometimes controversial environmental issue. The CCD provides a framework for tackling desertification that embodies current thinking on the environmental and societal components of the issue. These include the need to understand the impact of national and international policies on people's behaviour towards the environment, awareness of the links between poverty, natural resource use and degradation, and the importance of recognising indigenous people's knowledge, environmental sensitivity and rights.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

References

- Adams, W.M. 1996. Irrigation, erosion and famine. In Leach and Mearns (1996): 155-167.
- Barracough, S. 1995. Social dimensions of desertification: a review of key issues. In D.Stiles (ed.) *Social aspects of sustainable dryland management*. Wiley, Chichester: 21-79.
- Behnke, R., Scoones, I. and Kervaen, C. 1992. *Range ecology at disequilibrium*. ODI, London.
- Binns, T. 1990. Is desertification a myth? *Geography* 75: 106-13.
- Blaikie, P. 1989. Explanation and policy in land degradation and rehabilitation in developing countries. *Land Degradation and Rehabilitation* 1, 23-37.
- Cardy, F. 1997. Biological diversity in the susceptible drylands. In Middleton and Thomas (eds) *World Atlas of desertification* 2nd edn, Edward Arnold, London: 134-5.
- Deme, Y. 1998. Natural resource management by local associations in the Kelka region of Mali. *IIED Issue Paper* 74.
- DFID (1997) Eliminating world poverty: a challenge for the 21st century. White Paper on International Development. <http://www.dfid.govt.uk/public/news/fulltext2.html>
- DFID (1998) Development awareness Issues Paper 6: making development sustainable. http://www.dfid.govt.uk/working/dpfissues_6.html
- Hellden, U. 1991. Desertification: time for an assessment? *Ambio* 20: 372-83.
- Hulme, M. 1992. rainfall changes in Africa: 1931-60 to 1961-90. *International Journal of Climatology* 12: 685-99.
- Leach, M. and Mearns R. (eds) 1996. *The lie of the land: challenging received wisdom on the African Environment*. James Currey, Oxford.
- Livingstone, I. 1977. Economic irrationality among pastoral peoples: myth or reality. *Development and Change* 8: 209-30.
- Mace, R. 1991. Overgrazing overstated. *Nature* 349: 280-1.
- Mainguet, M. 1991 *Desertification. Natural background and human mismanagement*. Springer-Verlag, Berlin.
- Pearce, D. and Warford, J.J. 1993. *World without end*. OUP, New York.
- Rogers, M. 1997. Poverty and degradation. In Middleton and Thomas (1997): 155-6.
- Scoones, I. (ed.) 1994. *Living with uncertainty: New directions in pastoral development in Africa*. IT publications, London.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

- Scoones, I., Reij, C. and Toulmin, C. 1996. Sustaining the soil: indigenous soil and water conservation in Africa. *IIED Issue Paper 67*.
- Spooner, B. 1987. the paradoxes of desertification. *Desertification Control Bulletin* 15: 40-45.
- Spooner, B. 1989. Desertification: the historical significance: on the association of desertification with drought, famine and poverty in Africa in the late twentieth century. In R. Huss-Ashmore and S.H. Katz (eds) *African food systems in crisis. Part one: microsystems*. Gordon and Breach, New York: 111-162,
- Spooner, B. and Mann, H.S. (eds) 1982. *Desertification and development. Dryland ecology in social perspective*. Academic Press, London.
- Squires, V and Glenn, E. 1997 Carbon sequestration in drylands. In N.J. Middleton and D.S.G. Thomas (eds) *World Atlas of desertification* 2nd edn, Edward Arnold, London: 140-3
- Stiles, D. 1995 An overview of desertification and dryland degradation. In D.Stiles (ed.) *Social aspects of sustainable dryland management*. Wiley, Chichester: 3-20.
- Stocking, M 1996- in Grove book
- Swift, J. 1994. Dynamic ecological systems and the administration of pastoral development. In Scoones (1994).
- Thomas and Middleton 1994. *Desertification: exploding the myth*. Wiley, Chichester..
- Thomas D.S.G. and Sporton, D. 1997. Understanding the dynamics of social and environmental variability: the impacts of structural land use change on the environment and peoples of the Kalahari, Botswana. *Applied Geography* 17, 11-27.
- Thomas, D.S.G. 1993. Sandstorm in a teacup: understanding desertification in the 1990s. *Geographical Journal* 159: 318-31.
- Thomas, D.S.G. 1997a. Science and the desertification debate. *Journal of Arid Environments* 37: 599-608.
- Thomas, D.S.G. 1997b. Desertification: the uneasy interface between science, people and environmental issues in Africa. *Review of African Political Economy* 74: 583-589.
- Thompson, M. 1988. Uncertainty and its uses. in P.M.Blaikie and T. Unwin (eds) *Environmental crises in developing countries*. IBG Developing areas Research group Monograph8: 125-41.
- Tiffen, M. 1996. L and capital: blind spots in the study of the 'resource poor' farmer. In Leach and Mearns (1996): 168-185.
- UN 1992. *Report on UNCED, Malaysia draft resolution*. UN General assembly 47th session, second committee, agenda item 79, 20 November.

DRAFT DOCUMENT: These are preliminary analyses and findings and are subject to change. They should not be cited as definitive outputs from the PANRUSA project - please seek permission first from the authors.

- UNEP-UNCOD 1978. *UNCOD, 29 August-9 September 1978. Round-p, plan of action and resolutions*. UN, New York
- van Rooyen, A.F. 1998. Combating desertification in the southern Kalahari: connecting science with community action in South africa. *Journal of Arid Environments* 39, 285-297.
- Vertraete, M.M. 1986. The United nations Organisation and the issue of desertification. In F. El Baz and M.H.A. Hassan (eds) *Physics of desertification*. Martins, Nijhoff, Dordrecht, 42-51.
- Warren, A. 1995. Changing understandings of African pastoralism and environmental paradigms. *Transactions, Institute of British Geographers* 20: 193-203.
- Warren, A. and Agnew, C. 1988. An assessment of desertification and land degradation in arid and semi-arid areas. *IIED Paper* 2.
- Woodhouse, P. 1997. Governance and local environmental management in Africa. *Review of African Political economy* 74: 537-547.
- Zaal, F., Laman, M. and Sourang, C.M. 1998. Resource conservation or short term food needs? Designing incentives for natural resource management. *IIED Issue paper* 77.