2. Research for development in Namibia—from desert ecological research to sustainable development decision support

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Prologue: Early in the 1990s, as the Desert Research Foundation of Namibia (DRFN) was restructuring itself from an ecological research unit to a national-level non-governmental organisation in support of sustainable development, Professor Samir I. Ghabbour agreed to serve as an international member of the Board of Trustees. His contribution to establishment of the DRFN as a national and southern Africa regional institution integrating research and training into decision making for sustainable development is greatly appreciated.

SUMMARY

Research in Namibia has adapted and responded to specific needs of this developing country, boosted by the several UN environmental conventions. Under Namibia's programme to combat desertification and biodiversity programme, research addressed the role of termites as a dominant component of the soil fauna in arid to semi-arid Namibia. Results of this research contributed to policy and decision-making at several levels. Of primary importance in this and related research is

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the overall process that involves international and local researchers and students interacting with resource users and managers. Communication of research results in an understandable format for use by resource users, managers and decision-makers is considered a primary component of the research process.

Keywords: drylands, research communication, termites, UNCCD

INTRODUCTION

The face of "research" has changed over the past decade, especially since the United Nations Conference on Environment and Development (UNCED, also known as the 'Earth Summit') was held in Rio de Janeiro in 1992 (UNCED 1992). Whereas in the 1950s and 1960s research focused on basic studies of climatology, geomorphology and biology, as little was known about major world ecosystems and their components, in the 1970s and 1980s focus shifted more to ecological connections, studying for example eco-physiological peculiarities and adaptations of organisms to their environment (Seely 1990a). Since the early 1990s, environmental research embraced concepts such as biodiversity, climate change and desertification and explores human-environmental linkages. The long-term history of Gobabeb (Figure 1), a research and training centre situated in the Namib Desert, and the Desert Research Foundation of Namibia, originally based at Gobabeb, reflects this evolution of the nature of research in a dryland, developing country context (Seely *et al.* -2000 a).

This Chapter provides an overview of how research in Namibia has adapted and responded to specific development needs of this country, and outlines future potential developments. To pay tribute to the specific topic of this Festschrift "soil animals and sustainable development", we include excerpts from a case study that was conducted under the auspices of Namibia's Programme to Combat Desertification (NAPCOD), supported by the National Biodiversity Programme. In an attempt to develop reliable local level monitoring systems of range condition in northwestern Namibia, the potential of soil related fauna, *i.e.*, termites and tenebrionid beetles, to serve as bioindicators, was assessed. The likely role of termites in maintaining soil resilience was studied in some detail. As termites are amongst the dominant soil fauna in arid to semi-arid Namibia, the focus was upon their function as translocators and processors of organic matter and mineral light fractions into the soil carbon pools. Outcomes from this research contributed to policy and decision-making.

In addition to the research results, the research process itself was considered of primary importance. A team of international and local students worked as counterparts in this research. The project was directly linked to an ongoing national programme and financed by international development cooperation. Potential for skills transfer and exchange was guaranteed for all participants. Furthermore, research was designed so that

it could be integrated into ongoing community-work under NAPCOD while the research team benefited from close interactions with local farmers. Close communication interactions developed between research students and local communities and information transfer was intense. Strengths and opportunities as well as difficulties of this approach are highlighted in this Chapter.

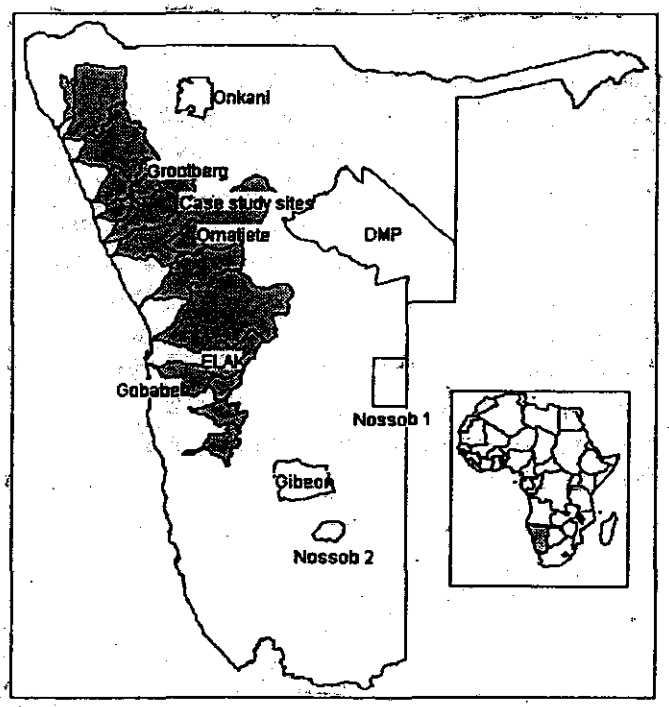

Figure 1 – Study sites in Namibia where soil-related and other studies are undertaken.

Potential linkages between research and development are illustrated. Furthermore, case examples are tied in with requirements and guidance provided through multi-lateral environmental agreements, *i.e.*, the work programme for biological diversity in dry and sub-humid lands under the Convention on Biological Diversity. Examples of work undertaken at Gobabeb and by the DRFN elsewhere in Namibia provide 'lessons-learnt' for application of similar approaches.

EVOLUTION OF RESEARCH IN THE NAMIB DESERT OF NAMIBIA

Environmental research has had a long history in Namibia (Seely *et al.* 2000 a). Since the discovery of such unusual arid-adapted organisms as *Welwitschia* (Hooker 1863; Bornman 1978), early observations of high biodiversity of Namib Desert tenebrionid beetles (Koch 1950), and long-term interest in deserts of Africa (McKee 1979), Namibia, and particularly the Namib Desert, has received more than passing attention from the global research community. The decade since independence of Namibia in 1990 has seen a redirection and more focused application of past and new

environmental research (Seely 1990 b; Jacobson and Jacobson 1997). This brief review of research in four applied areas focuses predominantly on work undertaken by associates of the Desert Research Foundation of Namibia (Ward and Malan 1990; Henschel and Henschel 2002) while including that from other sources where results or applications help converge.

Climatic Variability and its Influence on the Environment:

Namibia is an arid country; hence hydrological variability is a key component of the prevailing climate. As early as 1914, the Drought Commission of South Africa undertook an investigation in Namibia. They recognised the variability of rainfall and made recommendations for coping with it. More recently Seely and Louw (1980) and Seely (1990 c) documented effects of an unusually high rainfall event (one of only three in the past century) on the Namib dune ecosystem. Documentation and research on Namibia's climatic variability and its interpretation (Seely 1999) have extended over most of the 20th century. Namibia ratified the UN Framework Convention on Climate Change, an outcome of UNCED, and prepared a country study (DRFN 1999). This first Country Study highlighted extensive existing knowledge about vulnerability to climate change, based on a broad spectrum of previous research and concluded that vulnerability to climate variability and change is our greatest concern.

Ephemeral Rivers

Namibia has no perennial rivers within its boundaries (Heyns *et al.* 1998), yet little research has been done on ephemeral rivers upon which so many people depend. Past research either focused on the riparian environment as a habitat for game (*e.g.*, Viljoen 1989) or used geological and geomorphological records to understand past climates and geomorphological forces shaping the landscape (*e.g.*, Vogel 1982; Ward 1987, 1988). In 1985, Huntley (ed.) published an overview of the ephemeral Kuiseb River for use as a baseline to monitor change in the riparian environment. Up to that time, most studies focused on development of ephemeral rivers as water supplies for urban settlements. The first environmental impact assessment (EIA) in Namibia investigated potential impacts of an artificial-recharge enhancement dam in the lower Omaruru River (EEU 1991).

In the past decade, the importance of ephemeral rivers and their catchments (or basins) was recognised. Marsh and Seely (1992) published a review of environmental status and dynamics of the ephemeral Cuvelei wetlands. The Kuiseb River was revisited by several student research groups to investigate water use (Dauseb *et al.* 1994), to model the environmental reserve (Amoomo *et al.* 2000), and to model impacts of upstream dams on overall water balance (Akawa *et al.* 2002). Jacobson *et al.* (1995) published research results on ephemeral rivers of northwestern Namibia where up to 20% of Namibia's population depends on alluvial aquifers of these basins. The importance of integrated,

sustainable use throughout the catchments was elaborated in all these studies and has been taken up in the environmental learning and action in the Kuiseb programme of the DRFN as a pilot development of the Basin Management Committees (Botes 2003).

Soils in ephemeral rivers consist of organic-rich silts inter-stratified with fluvial and aeolian sands deposited during river flow (Jacobson *et al.* 2000). Soils accumulate downstream with decreased water flow causing increased proportions of silt associated with organic carbon, nitrogen and phosphorous. At the same time, silt deposition influences moisture availability and plant rooting, thereby creating and maintaining microhabitats for various organisms. Structure, productivity and spatial distribution of biotic communities are strongly affected by ephemeral flow patterns.

Desertification

The term 'desertification' had not been coined when the Drought Commission of 1914 described its symptoms in drought-prone Namibia. Since at least 1962, various projects investigated basic dynamics of arid environments forming a platform from which to understand their use and degradation. Agricultural oriented research investigated aspects of land use and degradation without labelling it as research on desertification. Prominent amongst this work are those of Bester (*e.g.*, 1996) who investigated effects of bush encroachment, particularly in commercial farming areas, and of Kruger and Rethmann (1999) who investigated livestock grazing approaches in dry grasslands. Quan *et al.* (1994) estimated that over US$25 million per annum in beef exports is lost due to bush encroachment. Similar amounts are lost due to a combination of deforestation and decrease of soil fertility, in communal farming areas in Namibia.

A variety of topics, such as effects of infrastructure development on the biophysical environment (Nghitila 1996), effects of illegal fencing on the environment (Kerven 1997), development options in western Otjozondjupa (Shilomboleni *et al.* 1999) and differing impacts and opportunities associated with the presence of elephants for communal and commercial farmers (!Guidao-Oab *et al.* 1996), have been addressed by student groups working with the DRFN in communal farming areas. This research not only identified interesting questions and provided some results but also served as a training ground for over one hundred tertiary-level students in environmental research methodology. An example of desertification research is elaborated in the following section.

Long Term Ecological Research

Long Term Ecological Research (LTER) in southern Africa is inextricably linked to climate studies, to land use and to biodiversity (Henschel *et al.* 2003). Biodiversity of soil-dwelling organisms in the Namib Desert was the first research topic to attract international scientists (Koch 1950). When Gobabeb was established as a

research centre in 1962, long-term gathering of climatological data commenced. Within several years, long-term research on tenebrionid beetles was initiated (*e.g.*, Holm 1970). Many publications ensued, investigating geomorphological, climatological and ecological aspects, particularly population dynamics and community composition of the Namib Desert soil fauna and other organisms (Seely and Ward 1998; Henschel *et al.* 2000). Long term data gathering served as the basis for research ranging from fog harvesting (Henschel *et al.* 1998; Mtuleni *et al.* 1998) to !nara production along the lower Kuiseb River (Henschel *et al.* 2004). Results of this long-term research serve to interpret variability in arid and semi-arid regions (*e.g.*, Marsh and Seely 1992). Other long-term data sets, for example from Sandveld Agricultural Research Station (Kruger and Rethmann 1999), support planning for sustainable use of Namibia's renewable natural resources, now and in the future.

Research Training and Application of Research Results

Much of the research described above is done in a participatory fashion with local natural resource users. Information gathered during the past decade is often published in an accessible format targeted at various potential users (Seely *et al.* 1999 a). Application of research results for informed decision making (e.g. Seely *et al.* 1999 b), for example in land use planning and land reform as well as natural resource management, is possibly the most fruitful outcome of basic research application in the development context of Namibia. The ongoing research contributes to relevant, adaptable programmes for capacity-building at Gobabeb through courses and in-service training, and provides hands-on examples for future researchers to gain appropriate skills and experience.

A CASE-EXAMPLE NAMIBIA: LINKING SCIENCE AND COMMUNITY RESEARCH, FROM NORTH-WESTERN AND RESEARCH TRAINING

Research

Namibia's National Programme to Combat Desertification (NAPCOD) was launched in 1994 (Wolters 1994). Since inception, it was designed as a development and community-based natural resource management programme with emphasis on supporting local level management action and national level policy making with sound and relevant research (Seely and Jacobson 1994). The programme was to reflect the specific ecological and societal conditions prevailing in Namibia. A key aspect of NAPCOD was development of reliable natural resource monitoring systems that would allow local farmers to reliably track their resource base and consequently take adaptive management decisions (Klintenberg 2002; Zeidler 2000 c). Traditionally, range condition is assessed based on vegetation indicators, however these are considered of limited value under highly variable climatic conditions (Behnke and Scoones 1993) such as those found in

north-western Namibia. In most years soils appear denuded while after adequate rainfall vegetation cover flourishes. Under such conditions areas have been mistakenly classified as degraded and desertified, when they were resting under natural conditions of prolonged dryness. Subsequent management and policy interventions are often inappropriate. Instead of accepting natural ecosystem variability, an outcry is heard from farmers and government alike that large areas are desertified. To support local farmers in longer-term management decisions it is essential that they can clearly distinguish between lands that are functional and lands that are degraded.

Range condition can be measured using a number of different indicators. Most common are vegetation-based indicators (*e.g.*, Milchunas and Lauenroth 1993; Milton 1994; Schlesinger *et al.* 1990; Ward and Olsvig-Whittaker 1993). However, in highly variable environments it may be less conspicuous underlying factors, such as the soil environment and resident biota, which provide a more reliable assessment. Especially important is the link between soil properties and soil biota. The latter, through physical and chemical interactions, maintain important soil structural, soil chemical and especially nutrient levels of soils (*e.g.*, Anderson 1988 a and b, and 1995, Swift *et al.* 1979, Whitford 1996). Usually, a set of macro-, meso- and micro-fauna and flora, including bacteria and fungi, interact while maintaining soil-related ecosystem functions, such as nutrient breakdown and cycling. In dryland systems, such as the north-western part of Namibia, termites dominate the soil macrofauna complemented in some areas by fishmoths (Crawford and Seely 1994, and Zeidler *et al.* 2002 a). Berlese samples indicate that the mesofauna is not very well established and mites, for instance, although generally species rich, are not very abundant (André *et al.* 1997, Nghitila 1995). Preliminary investigations assessing microbial activity suggest that such organisms are temporally extremely variable and may only be "active" after good rainfall events. As these organisms recycle material that is already broken down, the role of termites, as translocators of organic material from the soil surface underground, and of nutrients from underground to the surface, is expected to be important.

Tenebrionid beetles are a focus of long-term ecological research in Namibia (Henschel *et al.* 2001), co-ordinated and carried out at Gobabeb. High relative diversity of this taxon, measured in species richness and endemism, in arid and semi-arid Namibia, suggests that they may have useful indicator characteristics for devising biomonitoring programmes. Additionally, tenebrionid beetles are relatively easy to capture and identify, as long as parataxonomic reference collections exist and are accessible to local farmers and other interested persons (Parenzee *et al.* 2000).

In this context, the current study examined the indicator potential of termites and tenebrionid beetles on three farms of differing land tenure regimes and on each farm at sites of relatively high and low land use intensity (Parenzee 2001, Zeidler *et al.* 2002 a and b). The possibility of using an "Index of Biological Integrity", based on such biotic measures and relating them to other environmental parameters, was investigated (Zeidler

et al. 1999 a). Additionally, scientific assessment methods were compared to parallel assessments done by local farmers, based on "traditional" or "common" range assessment practices (Zeidler 2000 a, Zeidler *et al.* 1999 a).

Overall it was found that: 1) Vegetation measures commonly used for range assessments did not discriminate between areas that were more or less degraded, as indicated by soil and soil-biota parameters; 2) Selected soil parameters, especially the light faction and organic carbon levels and their transformation into active, passive and slow carbon pools, provided insight into the long-term resilience of soils at the study sites; 3) Termite diversity measures, including characterisation of functional groups and/or feeding guilds, have potential as useful indicators of range land integrity (however, termite populations are extremely difficult to measure and even bio-inventory studies are elaborate and require reliable taxonomic, biological and ecological understanding); 4) Selected tenebrionid beetle taxa seem to display taxon specific responses to land use intensity, and, if their biology is relatively well known, they may be good indicators of long-term *versus* shorter-term variability and degradation; 5) A composite set of indicators, *e.g.*, amalgamated in an Index of Biological Integrity, was found to be superior to selecting and measuring individual indicator taxa; 6) The outcomes of the scientific site assessment differed from the mostly intuitive assessment by local farmers. Farmers generally are aware of vegetation-based indicators that have been promoted through the Ministry of Agriculture, Water and Rural Development. However, these indicators are not applied systematically, nor do they seem to sufficiently assess range condition.

Process

Research was conducted at long-term NAPCOD sites. This enabled the research team to actively engage with the local farming community (Seely *et al.* 2000 b). Farmers and community members were involved as local experts and exchanged information with researchers, *e.g.*, through participatory rural appraisals, which complemented the basic research components of this study (Zeidler *et al.* 1999 a and b, and Zeidler 2000 b). Moreover, basic research results were communicated to the farmers and discussed. Although this important longer-term relationship was extremely valuable, shortcomings are acknowledged. NAPCOD itself was only involved for four years at identified pilot sites, and moved to other sites during the subsequent programme phase. After four years of inter-active exchanges, longevity could not be guaranteed, not even by attaching this research project to a national programme. More equitable research "contracts" need to be developed to assure viable and useful interactions between scientists and local people. Linkage is essential for deriving useful research results, however it is often difficult to rapidly portray the use and benefits of research results to people involved in the process. Expectations for improved livelihoods are raised but seldom can be fulfilled, even in "good" settings and with "good" intentions.

During the course of this research, the NAPCOD programme joined with three other donor funded programmes and government service organisations to establish a Forum for Integrated Resource Management (FIRM) at a second NAPCOD site (Kruger 2001). This took the process one step further by putting the local community, organised as a Farmers' Association and Wildlife Conservancy, in the lead for planning and implementation of their own development. After several years, FIRM is requesting research, and longer-term benefits and improved livelihoods are expected. This research, conducted under the auspices of NAPCOD, was a support project financed by the German Government through the German Agency for Technical Co-operation (GTZ 2003). The project leader pursued Ph.D. studies whilst one Namibian M.Sc. student and two diploma students from the Polytechnic of Namibia also benefited. Additionally, a number of research technicians, without any formal education, were partners in this project. Research students from South Africa participated in field research and subsequent analysis and documentation. Close interaction among the team, also with their university professors, expert staff from the Gobabeb Centre and DRFN, as well as other national and international scientists and practitioners, allowed the team to thrive and profit from this research process. Much personal dedication, but also professional interaction, assured that all team members gained new experiences and good value from the interactions.

Because this research study has been, from the beginning, well integrated into national research and development processes, maximum spin-off and integration of the research results and process were achieved (Seely and Zeidler 2002, and Seely *et al.* 2003). Outcomes contributed to development of research components of the follow-on phase of NAPCOD. Counterpart teams are engaged in NAPCOD III and other related projects. With the Gobabeb Centre as a "hub" supported by the DRFN, research results are housed at a long-lived national institute where accessibility to results is guaranteed. Many lessons learnt have been communicated through the SADC-wide desertification network, supported through the Gobabeb Centre, the designated SADC centre of excellence for desertification research, training and information networking, and through the SADC-DRFN Desertification Interact project. Aspects of this research process have been incorporated into development of the National Biodiversity Strategy and Action Plan of Namibia (NBSAP) (Government of the Republic of Namibia 2002).

The process also has contributed to peer-reviewed formal publications to communicate with the international science community. Process documentation is less easily transmitted through traditional science review channels, however, it is by no means less important than "hard core science". A number of international scientific journals have accepted to publish "local" studies. Additionally, publication of case-studies and best practices has become a widely used tool to disseminate "non-scientific" information to fellow-decision makers and practitioners. Integration amongst these various information-sharing forms needs to be critically examined.

RELATIONSHIPS TO MULTI-LATERAL ENVIRONMENTAL AGREEMENTS

The Gobabeb Centre, DRFN, NAPCOD, the National Biodiversity Programme and many other activities underway in Namibia, particularly in partnership with the Ministry of Environment and Tourism, contribute to effective implementation of multi-lateral environmental agreements (MEAs), especially the United Nations Convention to Combat Desertification (CCD), Convention on Biological Diversity (CBD), and the Framework Convention on Climate Change (FCCC). Although Namibians adopt a position emphasising that MEA's are only a means and framework for achieving environmental sustainability in Namibia, and do not accept prescriptive global legislation, they nevertheless acknowledge that international agreements harbour potential for sustainable development. Namibia can, for instance, rely on a number of donor countries and organisations that have pledged support in the implementation of their global responsibilities at national and local levels. NAPCOD, the National Biodiversity Programme and other programmes have received long-term financial and human resource support from bi- and multilateral donors. Currently, this intensive international commitment for co-operation seems to be an essential ingredient for success of certain interventions. National commitment to the natural resource sector, in line with national development needs, should be fostered as well, while international agendas must continue to be formulated, confirmed, renewed and renegotiated.

Although not designed specifically to fulfil any international obligations, the above outlined research for development process, is an essential ingredient. From supporting long-lived research and development organisations to individual studies associated with national programmes, it is an example of how research activities fit into national requirements. It is also an example of a contribution to the work programme on dry and sub-humid lands under the CBD and the Joint Work Programme between the CBD and UNCCD (CBD 2003 a). The research approach and contributions to capacity building are highly relevant to implementation of the conventions and represents a replicable case-study. Table 1, reproduced from a negotiating document of the CBD (CBD 2003 b) and tied to this case study, indicates important ways and means for tying together the MEA framework including work programmes, science and research and community action and local level management intervention. The case study illustrated in this Chapter provides implementation examples for general application.

CONCLUSION

Research in a developing country such as Namibia must tie in with capacity-building at all levels and with practical application of the results. In this Chapter, the example of the case study of soil arthropods being applied as indicators of biological diversity contributes to understanding of arid environments by researchers, resource users and managers alike. Such research can be supported by and should contribute to the

various UN environmental conventions and their implementation in support of national and global objectives.

Table 1. *Examples of ways and means for implementing work programme activities on dry and sub-humid lands under the Convention on Biological Diversity (CBD, 2003). Many of these suggested ways and means are integrated and implemented in environmental programmes in Namibia,* e.g., *at the Desert Research Foundation of Namibia and at the Gobabeb Training and Research Centre.*

Ways and Means	General Examples (2)	Specific Namibian Examples (http://www.drfn.org/)
(i) Capacity-building	Training (*e.g.*, regional training workshops on biodiversity management and sustainable use; research training for university students, exchange visits between communities)	Formation of research teams as illustrated in this case study; specific field training programmes, *e.g.*, the environmental problem solving for sustainable development course of the DRFN
	Institutional support/strengthening (*e.g.*, strengthen zoos and seed banks, especially national and regional centres of excellence; technology development centres, institutions for conflict resolution in land tenure)	Support from SADC for the Gobabeb Training and Research Centre as a centre for research, training and networking under the UNCCD
	Education (*e.g.*, mainstreaming of key biodiversity issues into school and tertiary education curricular; agricultural and conservation technicians to include biodiversity conservation measures into programmes)	The Enviroteach programme for teachers-in-training (see Sguazzin and du Toit, 1995) and the Support for Environmental Education in Namibia Programme, implemented by DRFN, the latter in collaboration with Ibis
	Public awareness (*e.g.*, dry and sub-humid lands biodiversity year)	Support for World Water Day, Environment Day, Desertification Day and, in 2002, the World Summit on Sustainable Development
(ii) Demon-stration sites	Selection of sites and best practices (*e.g.*, for integrated catchment management, appropriate technology development and applications, natural resource management for livelihood improvement, traditional knowledge systems demonstration)	Gobabeb Centre as an example of appropriate building and energy technologies; FIRM at Grootberg, Gibeon and Onkane for natural resource management and livelihood improvement
	Exchange visits and training modules (*e.g.*, between and for communities, decision makers, practitioners)	Exchange visits supported by FIRM, NAPCOD and other programmes, within Namibia and with neighbouring countries
	Documentation and dissemination of best practice information	Publications as listed in the bibliography of this Chapter; http://www.drfn.org/

(iii) Case-studies	Projects (*e.g.*, testing measures and approaches to conservation and sustainable use of biodiversity resources for sustainable livelihoods)	FIRM at Grootberg, Gibeon and Onkane as well as Halt, Weerlig and Olifantputs as illustrated in this Chapter
	Best practise and management guidelines (e.g., effective protected areas networks, invasive alien species, in- and ex-situ conservation, economic valuation)	Natural resource economics as undertaken by the Directorate of Environmental Affairs
	Documentation and dissemination (*e.g.* development of best practice guidelines, evaluation of case-studies, support for write-up, establishment of accessible dissemination channels)	Publication of guidelines, *e.g.*, for community exchange, of case studies, *e.g.*, on FIRM for SDDI, of hand-books, *e.g.*, for local-level indicators and their monitoring
	Up-scaling, policy implementation (*e.g.*, guidelines for up-scaling of case-study lessons learnt, mainstreaming into policy development, support for policy implementation)	Preparation of Environmental Updates for the Namibian Parliament; support for policy development, *e.g.*, Drought Policy and Strategy and its popularisation; policy analyses in relation to CCD, CBD
(iv) Improved consultation and information sharing	Participation and exchange of information (*e.g.*, between local communities, communication to national level decision makers, Focal Points, international level)	Support for exchange of information horizontally and vertically within SADC, among local communities and with service providers
	Information networks (*e.g.*, UNCCD TPNs, databases, expert groups)	SADC-DRFN Desertification Interact to support government and NGO focal points in SADC
	Technology transfer (*e.g.*, guidelines, policies, incentives)	Guidelines and demonstrations of appropriate technology at Gobabeb
(v) Enhanced interactions between CBD and UNCCD	Regular consultation between the secretariats of the CBD and UNCCD (*e.g.*, joint liaison group, side events at the Conference of the Parties, joint work programmes)	In Namibia, both conventions fall within the ambit of the Directorate of Environmental Affairs; Steering Committees, Task Forces that involve government and non-government participants; joint programmes
	Synergy workshops	Planned synergy training with support from the UNCCD secretariat
	Joint projects (*e.g.*, on rehabilitation, sustainable resource management)	FIRM and similar joint projects with communities in Namibia and neighbouring countries
(vi) Partner-ships	Documentation of successful cases (e.g. establishment of participatory processes, student tandem systems, research collaboration, public/private-partnerships)	Public/private partnerships for training, research collaboration and publication

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