

Expression of Interest

Ecosystem Services and Poverty Alleviation Research Programme: Situation Analysis for Semi-Arid sub-Saharan Africa

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1 Statement of intent

The ‘*Consortium for Ecosystems and Poverty in semi-arid Africa*’ is interested in conducting a situation analysis of the relationship between ecosystem services and poverty in semi-arid Africa, to help shape a research programme supported by NERC, ESRC and DFID aimed at changing policy. We propose a conceptual framework that draws on the Millennium Ecosystem Assessment framework (Millennium Ecosystem Assessment 2005), and which includes elements of the Sustainable Livelihoods framework (Carney 1998) and the ‘Desertification and Development’ paradigm (Reynolds and Stafford-Smith 2002). We have put *human well-being* at the centre of our framework and we focus on four aspects: a) the *changes* in human well-being, in particular material well-being, livelihoods, health and security, linked to changes in ecosystems; b) the anthropogenic and biophysical ‘*drivers*’ of social-ecological change; c) changes in the *provisioning services* of ecosystems, focusing on water, fibre, agricultural production, pasture and fodder; and, d) changes in the *regulating services* of ecosystems, particularly disease, flood and drought regulation. Throughout, in addition to asking how poverty affects ecosystem services, we will be asking how projected changes in ecosystem services will affect the well-being of the poor. In particular, we will interpret results in the context of global climate change.

We will evaluate the capacities of human populations to manage ecosystem productivity, diversity and sustainability, how these are changing across the region, and how such changes are affecting ecosystems and the well-being of the poor. We propose six linked activities: a) sub-regional literature assessments; b) sub-regional workshops for project development; c) sub-regional syntheses; d) assessment of regional trends in bioproductivity from remotely sensed data, climate modelling and global surveys (subject to outcomes of sub-regional workshops); e) region-wide synthesis; and f) communication and outreach (including a web-based information system).

To achieve the objectives of the situation analysis, we will produce nine outputs:

1. An inception report.
2. Three sub-regional inception workshops, attended by members of the project team, their sub-regional scientific networks, sub-regional policy makers and other stakeholders
3. Three sub-regional reports, including workshop reports, summarized country studies, sub-regional data sets and narratives. These reports will follow a similar conceptual framework and will be based on a similar set of key questions, discussed later in the proposal.
4. A sub-Saharan Africa synthesis report, separated into five sections: a) Ecosystem services and their links to the well-being of the poor; b) Drivers of change in ecosystem services and human well-being; c) Capacities to manage ecosystems sustainably, and the development of adaptive capacity; d) Knowledge systems; e) Policies, interventions and responses. Each section will assess research priorities, capacity development needs and knowledge gaps.
5. A Summary for Decision Makers, consisting of key messages; research priorities; knowledge gaps; capacity needs; lessons learnt; and a summary of contacts and networks in the Region.
6. A literature database.
7. A database of role players and networks.
8. A web-based ‘Document News and Discussion Forum’, where electronic publications and databases will be archived in easily accessible format, and where role players can engage in organized electronic discussions.
9. Monthly reports to NERC ESRC and DfID.

2 Capability statement

The Consortium for Ecosystems and Poverty Alleviation in sub-Saharan Africa (CEPSA) consists of five partner institutions:

- 1) **African Institute for Community-Driven Development** (Khanya-aicdd) (the Lead Organization), a not-for-profit (Section 21) company in Bloemfontein, South Africa, and active since 1998. Khanya-aicdd seeks sustainable African solutions to African problems, while learning from best practice elsewhere. Its mission is to promote sustainable livelihoods and community-driven development to address poverty in Africa. To do this we work in action-learning processes linking government, civil society and business and providing advice, facilitation, action research, implementation, sharing of experience and training, while drawing from global development thinking. Khanya-aicdd has worked in 15 African countries and has offices in South Africa and in Lesotho.
- 2) **Rhodes University**, an academic institution in Grahamstown, South Africa, active since 1904;
- 3) **SOS-Sahel International-CRAC-GRN**, an NGO based in Zinder, Niger, active since 1985, in association with **Michael Mortimore** and his research group from Drylands Research;
- 4) **The International Institute for Environment & Development** (IIED), an NGO / charity organization based in London, UK, active since 1971;
- 5) **IUCN – The World Conservation Union**, a Union of more than a thousand member organizations, both governments and NGOs with headquarters in Gland, Switzerland and with 62 country offices worldwide, active since 1948;
- 6) **An international Scientific Advisory Panel**, consisting of six to eight leading international academics in the field of ecosystems and poverty alleviation. Dr Ian Scoones, Dr Mike Acreman, Dr Fred Owino, Dr Momodou Njie, and Dr Stephanie Herrmann have agreed to serve on our Panel. Dr Jeremy Swift, Prof Bill Adams, and Dr Kojo Amanor have been invited but have not yet responded.

Prof. Christo Fabricius is the project manager for the project. He will be working under the auspices of Khanya-aicdd for the duration of this project, in terms of an Agreement of Association with Khanya. Prof Fabricius has 16 years' experience as research coordinator and has international as well as regional insights and experience. He would oversee the technical work of the project, manage the workstreams and coordinate the activities and over-all synthesis. His CV is provided on P. 5. **Dr Vincent Hungwe** is the responsible Director in Khanya for the project. He would provide management support, high level advice on institutional and governance issues and strategic support to ensure the relevance of the work, and its embedding in African institutions.

Combined, these institutions (excluding the Scientific Advisory Panel) are committing 24 highly skilled researchers, with an *average professional per capita experience* of 19 years to the project, and with 13 PhD and six Masters degrees amongst them. The consortium has in-depth knowledge of ecosystem services, human well-being and poverty in southern Africa, West Africa, the Sahel and East Africa and, through its international members, has very good insights into global concepts, practice and trends. Our team includes systems ecologists; dryland specialists; aquatic ecologists; rangeland scientists; forestry scientists; social scientists; resource economists; community-based natural resource management specialists; GIS specialists; and institutional specialists. Our members have in-depth knowledge and experience in: integrated ecosystem assessments; climate change studies; sustainable livelihoods research; resource valuation; analysis of political economy and governance issues; policy development.

2.1 Profiles of consortium organizations

Table 1. Details of consortium organizations

African Institute for Community-Driven Development (Khanya-aicdd)	
Type of organization:	Section 21 Company (not for profit)
Year in which registered:	1998 (precursor company – Khanya-managing rural change); 2005 – African Institute for Community-Driven development
Country where registered:	South Africa
Core business:	Action-research, consultancy, training and knowledge sharing around sustainable livelihoods approaches and community-driven development in Africa
Name:	Dr Vincent Hungwe (Project Director), PhD, 25 years' experience
Key area of expertise:	Regional planning, management, local government, agriculture and lands
Name:	Professor Christo Fabricius (Project manager), PhD, 22 years' experience
Key area of expertise:	Social-ecological systems; community-based natural resource management;

Name:	Rahel Otieno, MSc, 7 years' experience
Key area of expertise:	Knowledge management – management of websites and publications
Rhodes University	
Type of organization:	Academic
Year in which registered:	1904
Country where registered:	South Africa
Core business:	Academic teaching and research within spirit of community development
Name:	Dr James Gambiza, PhD, 26 years' experience
Key area of expertise:	Ecosystem management; rural livelihoods; ecosystems and human well-being
Name:	Mr Matt McConnachie BSc Honours, 2 years' experience
Key area of expertise:	GIS, environmental science
Name:	Prof. Etienne Nel, PhD, 22 years' experience
Key area of expertise:	Rural development, economic geography
Name:	Prof. Charlie Shackleton, PhD, 23 years' experience
Key area of expertise:	Rural livelihoods, natural resource management, savanna ecosystems
SOS Sahel International : CRAC-GRN¹	
Type of organization:	Non Governmental Organisation
Year in which registered:	Initially in 1985 and then re-registered in 2000
Country where registered:	Niger
Core business:	Management of common property natural resources, Capacity building through facilitation, Cutting Edge Action Research in NRM
Name:	Michael Mortimore, MA, 30 years' experience
Key area of expertise:	Environmental management by smallholders in African drylands; climate change
Name:	Kees Vogt, BSc, 20 years' experience
Key area of expertise:	Facilitation of Collaborative Action Research Processes in NRM
Name:	Gill Vogt, MA, 17 years' experience
Key area of expertise:	Facilitation of Collaborative Action Research Processes in NRM
Name:	Amadou Bachir, Ingénieur des Techniques Forestières 15, years' experience
Key area of expertise:	Facilitation of Collaborative Action Research Processes in NRM
Name:	Elh Saley Gambo, Ingenieur des eaux et forêts, 15 years' experience
Key area of expertise:	Facilitation of Collaborative Action Research Processes in NRM
Name:	Joseph Ariyo, PhD, 30 years' experience
Key area of expertise:	Rural development in Nigeria
Name:	Boubacar Yamba, PhD, 20 years' experience
Key area of expertise:	Land tenure, institutions, ecosystems in Niger
Name:	Charles Nzioka, PhD, 20 years' experience
Key area of expertise:	Sociological analysis rural communities Kenya
Name, Key area of expertise	Adama Faye, PhD, 20 years' experience, Livestock and project interventions, Senegal
International Institute for Environment and Development (IIED)	
Type of organization :	Charity and non-governmental body
Year in which registered:	1971
Country where registered:	UK, London and Edinburgh
Core business:	Policy research for more sustainable and equitable global development. IIED works globally through a wide range of long-standing relationships with partners across the developing world. Methods include collaborative research, multi-stakeholder platforms, local and national learning groups, policy oriented training and engagement, information materials and tools, and support for advocacy coalitions.
Name:	James Mayers, MSc, 18 years' experience
Key area of expertise:	Governance of natural resources, rural livelihoods, sustainable forestry, climate change
Name:	Ced Hesse, MSc, 16 years' experience
Key area of expertise:	Drylands of Africa, decentralised natural resource management, pastoralism.
Name:	Sonja Vermeulen, PhD, 11 years' experience
Key area of expertise:	Ecosystems and biodiversity assessment, tools for natural resource governance
Name:	Ivan Bond, PhD, 16 years' experience
Key area of expertise:	Economics of land, water and natural resource management, common pool land

¹ CRAC-GRN or Cellule de Recherche Action Concertée pour la Gestion des Ressources Naturelles [Collaborative Action Research Unit for the Management of Natural Resources]

IUCN – The World Conservation Union	
Type of organization :	Union, with a membership of 83 States, 110 government agencies > 800 NGOs.
Year in which registered:	1948
Country where registered:	Switzerland, with Regional and Country Offices in 62 countries worldwide
Core business:	IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. It does this through partnerships and projects which bring together knowledge and innovation in environmental management, economics and social development. IUCN's work bridges grassroots projects and policy making at the highest levels. It has a network of Regional and Country Offices that extends throughout sub-Saharan Africa.
Name:	Simon Rietbergen, MSc, 21 years' experience
Key area of expertise:	Forest management, poverty reduction
Name:	Mark Smith, PhD, 20 years' experience
Key area of expertise:	Water resources, climate change, agriculture, forestry and livelihoods.
Name:	Ed Barrow, PhD, 28 years' experience
Key area of expertise:	Social policy, anthropology, integrated conservation & development
Name:	Masego Madzvamuse, MA, 9 years' experience
Key area of expertise:	Dryland ecosystem management, social sciences, CBNRM

Table 2. Examples of similar projects which consortium members have lead

Date	Lead agency	Project title	Client/funder
1999-2000	Khanya-aicdd	<i>Research into Institutional Support for Sustainable Rural Livelihoods in Southern Africa</i>	DFID
2001-4	Khanya-aicdd	<i>Linking micro-meso level - Action-research into community-based planning in S Africa, Ghana, Zimbabwe and Uganda</i>	DFID
2004-7	Khanya-aicdd	<i>Linking micro-meso level - Action-research into community-based worker systems in S Africa, Lesotho, Kenya and Uganda</i>	DFID
2006-9	Khanya-aicdd	<i>S/E Africa programme improving capacity of rural development interventions to manage impact</i>	IFAD
Current	Rhodes	<i>The contribution of municipal commonage to local livelihoods and poverty alleviation</i>	SANPAD
2004-2006	Rhodes	<i>Natural resource commercialisation for poverty alleviation</i>	SANPAD
2005	Rhodes	<i>The impacts of alien invasive species on rural livelihoods</i>	GISP
2002-2003	Rhodes	<i>Local level assessment for the Ecosystem Millennium Assessment for the Gariiep catchment</i>	Millennium Assessment
2001-2004	Rhodes	<i>Winners and losers in natural product commercialisation</i>	DfID
2005-2006	SOS-Sahel	<i>Climate change adaptation synthesis based on RNRRS NR research (1995-2006)</i>	DFID
2001-2007	SOS-Sahel	<i>Projet Appui à la Gestion Conjointe des ressources Sylvo-Pastorales²</i>	DANIDA
1999-2001	SOS-Sahel	<i>Policy implications of environmental change in Kenya and Senegal</i>	DFID
2004-2006	SOS-Sahel	<i>Drylands case study of the ecosystem approach, Niger and Nigeria</i>	IUCN/Netherlands Govt
2001-2007	IUCN	<i>Water and Nature Initiative</i>	DGIS, DFID
2007-2011	IUCN	<i>Livelihoods and Landscapes Initiative</i>	DGIS
2002-2004	IUCN	<i>Poverty and conservation learning project</i>	IUCN
2004-2006	IUCN	<i>Dryland ecosystem services valuation analysis</i>	Italy-DGCS
2006-2007	IIED	<i>Water ecosystem services and poverty reduction under climate change: research scoping</i>	UK DFID
2003-2005	IIED	<i>Improving response options for the Millennium Ecosystem Assessment</i>	UK DFID
2005- 2010	IIED	<i>Making Decentralisation Work: action-research and capacity building for sustainable natural resource management and pro-poor development in the Sahel</i>	Sweden SIDA
2003- 2007	IIED	<i>Developing markets for watershed protection services and improved livelihoods</i>	UK DFID

² The support project for collaborative management of Sylvo-Pastoral Resources

2.2 CV of Project Manager

Prof. Christo Fabricius

Highest qualification

PhD, University of Cape Town, South Africa (1997).

Recent Employment

1998–present: Dept of Environmental Science, Rhodes University, Grahamstown, South Africa. *Professor (2004-present); Associate Professor and Head of Department (1998-2003)*.

1996–1998: International Institute for Environment & Development (IIED), London. *Senior Researcher and Coordinator - Community Wildlife Management*.

1982-1996: Nature Conservation Scientist (Northern and Eastern Cape, S. Africa); Project leader, CSIR (South Africa)

Examples of Experience: Project management and coordination

2006: Lead a team which developed the South African National Parks (SANParks) Resource Use Policy.

2006: Coordinated the development of a monitoring system for community-based natural resource management (CBNRM) funded by the GTZ Transform project.

2006-2006: Coordinated a project to document international lessons from People's Biodiversity Registers for the Swedish Biodiversity Institute (Swedbio).

2002-2005: Initiated and coordinated the community-based assessments for the Southern African Millennium Ecosystem Assessment Gariep Basin study.

2005: Coordinating Lead Author for the chapter *Communities, Ecosystems and Livelihoods* of the final Multi-Scale volume of the Millennium Ecosystem Assessment (www.maweb.org).

2004: Leader of a team to assess the feasibility of co-management of the proposed Blyde Canyon National Park for DEAT (S.A.).

2004: Coordinated the invasive alien ecology research policy on for the Dept of Water Affairs and Forestry.

1998-2003: Initiated and lead the Dept of Environmental Science at Rhodes University to become one of the largest and most productive in the Science faculty.

2003: Wrote the SANParks Social Ecology policy on contract to SANParks.

2003: Team leader for development of guidelines for Community-Based Natural Resource Management for the Department of Environmental Affairs and Tourism and GTZ Transform.

1996-2001: Coordinated the IIED Evaluating Eden project, and from 1998-2001 the southern African case studies and synthesis for Evaluating Eden.

2000-2006: Developed and coordinated training courses in Integrated Ecosystem Assessments, with funding from United Nations University; community-based natural resource management, funded by GTZ; community-based land use planning, funded by GTZ; community conservation, funded by SANParks.

International networking

- Member of the World Commission on Protected Areas.
- Member of the IUCN Commission on Ecosystem Management.
- Member of the Resilience Alliance www.resalliance.org
- Editorial Board member of *Ecology and Society* www.ecologyandsociety.org; former Assistant Editor of African Journal of Range and Forage Science
- Participant in the Millennium Ecosystem Assessment.

Professional experience in South Africa, Zimbabwe, Botswana, Namibia, New Zealand and the United Kingdom and have traveled extensively through Africa, Europe, the United States, Canada, Central America, South America, Australasia, Central Asia, South Asia, and South-East Asia.

Publications

Authored and co-authored 34 peer-reviewed academic papers and books; 14 popular articles; and 13 major policy contributions. Delivered 28 papers at international conferences, many of them as keynote speaker.

3 Technical proposal

Environmental degradation can devastate the lives of poor people, deepening poverty and making poverty harder to escape from. This leads to a loss of livelihood assets, and increases vulnerability, by making people more sensitive to external shocks, increasing the risk of disaster and exacerbating conflict. The Southern Millennium Ecosystem Assessment concluded: *“At least four of the eight Millennium Development Goals (reducing hunger and child mortality, combating diseases and ensuring environmental sustainability) will not be met in the southern African region unless decisive action is taken to stabilise ecosystem services”* (Biggs et al. 2004).

This is especially true in the semi-arid zones of sub-Saharan Africa because of the close dependency of livelihoods and national economies on natural resources, the number and strength of drivers of change in ecosystems, the extent and depth of poverty, and the severity of predicted negative impacts due to climate change (IPCC 2007). Despite these relationships, ecosystem management is not explicitly included among the MDG targets. The impacts and dangers of environmental degradation for poor people, however, demonstrate that better ecosystem management, and ensuring that it has a pro-poor focus, is an important tool for enabling poverty reduction.

Application of ecosystem management to support poverty alleviation is constrained by lack of knowledge and dissemination, research capacity, policies that do not work, and weak capacity to implement policies. As a result, policy on poverty reduction, national investment planning and environmental management is frequently not effective in enabling outcomes for poverty reduction through sustainable use of ecosystem services. This situation analysis is another step towards overcoming these weaknesses.

The over-all purpose of this project is to plan a research and information dissemination programme that will deliver advances in policy and practice needed to enable poverty reduction through sustainable management of ecosystems. Five objectives provide the impetus for this study:

- 1) Collect and analyse evidence on
 - the ecosystem services most important to the well-being of the poor
 - the main challenges to the ecosystems that provide these services
 - the key ecosystem management functions for maximising poverty alleviation.
- 2) Identify how these challenges can best be addressed through research to provide poverty alleviation outcomes.
- 3) Conduct an information and knowledge needs assessment with policymakers and other stakeholders involved in ecosystem management.
- 4) Assess the need for skills and knowledge exchanges to strengthen the capacity of regional research providers and research output users.
- 5) Present the analysis to a regional peer group and develop findings based on feedback and collective reflection.

To address these objectives, the project will be:

- Outcome-oriented, providing directions for research and action targeting poverty alleviation achieved through ecosystem services management.
- Designed to identify and respond to the needs of research users in both policy and practice at all levels.
- Able to integrate research, dissemination, adoption and implementation within the research strategy and information framework developed.

3.1 Conceptual approach

The conceptual framework for this assessment has its roots in three separate but related frameworks:

3.1.1 Drylands Development Paradigm

The **‘Drylands Development Paradigm’** (Reynolds & Stafford Smith 2001; Reynolds et al. submitted) is based on 5 principles:

- i. human-ecological systems are coupled, dynamic and co-evolving;
- ii. changes in these systems are determined by 'slow' biophysical and socioeconomic variables (which underlie 'fast' events);
- iii. these variables have 'thresholds' which, if crossed, can transform the system into a new state;

- iv. the dryland human-ecological systems are influenced by demographic, economic, political, economic and institutional factors operating at multiple levels or scales, and are also affected by the way different stakeholders pursue their objectives; and
- v. the key to the co-evolution of social and ecological systems is a functional body of local knowledge, and the bridging of different types of knowledge systems.

3.1.2 **Ecosystems and Human Well-being / Millennium Ecosystem Assessment**

The **Ecosystems and Human Well-being** framework (MA 2003) links human well-being and ecosystem services to several ‘drivers’ of change. The MA framework acknowledges that these drivers have their origins at several spatial scales (from global to local) and that *interventions* such as policies, local institutions, management strategies, knowledge systems and adaptations can ameliorate the magnitude and intensity of feedbacks between these drivers, ecosystem services and human well-being.

3.1.3 **Sustainable Livelihoods**

The **Sustainable Livelihoods** framework focuses on the vulnerability context, availability of capital in five dimensions, and the livelihood outcomes, particularly in terms of access to ecosystem services; the capacity to manage ecosystems; resilience to shocks and surprise; and material well-being (Carney 1998). This framework was more recently proposed as a framework for assessing the impacts of Integrated Conservation and Development projects (Garnett et al. 2007).

We deliberately steer away from neo-Malthusian concepts of spiralling degradation and desertification. We view ecosystem service dynamics as affected by a set of (mostly anthropogenic) drivers which have been interpreted as both negative (the “*vicious circle*” where ecosystem degradation - through diminished goods and services - increases poverty, and poverty - through an inability to invest in sustainable management - worsens degradation) and positive (the “*virtuous circle*” where poverty reduction - through increased investment - strengthens conservation, which in turn reduces or reverses degradation, further reducing poverty). Climate change (already evident) will drive adaptive future changes in ecosystem management.

3.1.4 **CEPSA Integrated conceptual framework**

These concepts are integrated into a single **coherent framework** for this project (Fig. 1). The integrated framework views ecosystem services and human well-being as integrated, and part of a single, complex human-ecological system. It focuses on the feedbacks between drivers of change, ecosystem services, and human well-being, and assesses how externalities, interventions and mitigating factors affect these relationships.

The **environmental externalities** component (**Box a**) assesses the external factors such as mean annual rainfall and variability; evapotranspiration; available nutrients from the underlying substrate; physical geography such as coastlines, lakes and rivers, and topography; and land availability.

The **anthropogenic drivers** (Nelson et al. 2006) (**Box I**) represent the underlying causes of ecosystem change, i.e. demographic factors; macro-economic issues; social and political interventions; land and resource access issues; cultural factors; and science and technology. These are mostly ‘slow variables’ which cause gradual change to the system until a threshold is reached (Walker & Meyers 2004), where the system changes to a different stable state which can be either more or less productive. Resilient systems take a longer time to reach a threshold than systems with low resilience (Holling 2004). These drivers operate at several spatial scales, from local (at the level of a village or municipality) to national and global levels.

These drivers influence the **capacity of ecosystems to produce services** (**Box II**), categorized as provisioning services (e.g. water, fuel-wood, protein and starch); regulating services e.g. protection and buffering against floods and droughts, disease regulation; cultural services such as sacred landscapes, biomedicines, and plants and animals used in rituals or acting as totems (Millennium Ecosystem Assessment 2005).

Ecosystem services and **human well-being** (**Box III**) are coupled through feedbacks and have co-evolved through mutual adaptations (Reynolds & Stafford Smith 2001; Folke et al. 2005). The constituents of human well-being are material well-being, health, security and freedom, and the *capacity* to respond to change, shocks and surprise. They also include access to natural, physical, human, financial and social capital, depicted as an ‘asset pentagon’ in Box III.

Policy and institutional factors (Boxes b and c) mitigate the intensity of interactions between the drivers, ecosystem services and human well-being. They are strongly influenced by prices and incentives, legal and regulatory systems (including resource tenure), management institutions, and knowledge systems.

We deliberately focus on **management strategies and practices** that aim to enhance the capacities of ecosystems to provide services on an ecologically and economically sustainable basis. These may operate at the international or national levels (conventions, policies, laws and regulations), the community level (common pool resources management, byelaws, customary grazing rights, etc.), or the household level (strategies to manage soil fertility, livestock management practices, water harvesting, etc.). Our framework will provide for an evaluation of the *capacity* of institutions at all these levels to manage ecosystems, in order to produce a regional capacity and information needs assessment. A key component of this will be an analysis of knowledge systems in terms of stakeholder interests (indigenous and local, institutional, formal and governmental, and scientific), with the aim of enhancing ecosystem management through more effective sharing mechanisms. This analysis will be translated into research priorities for the region.

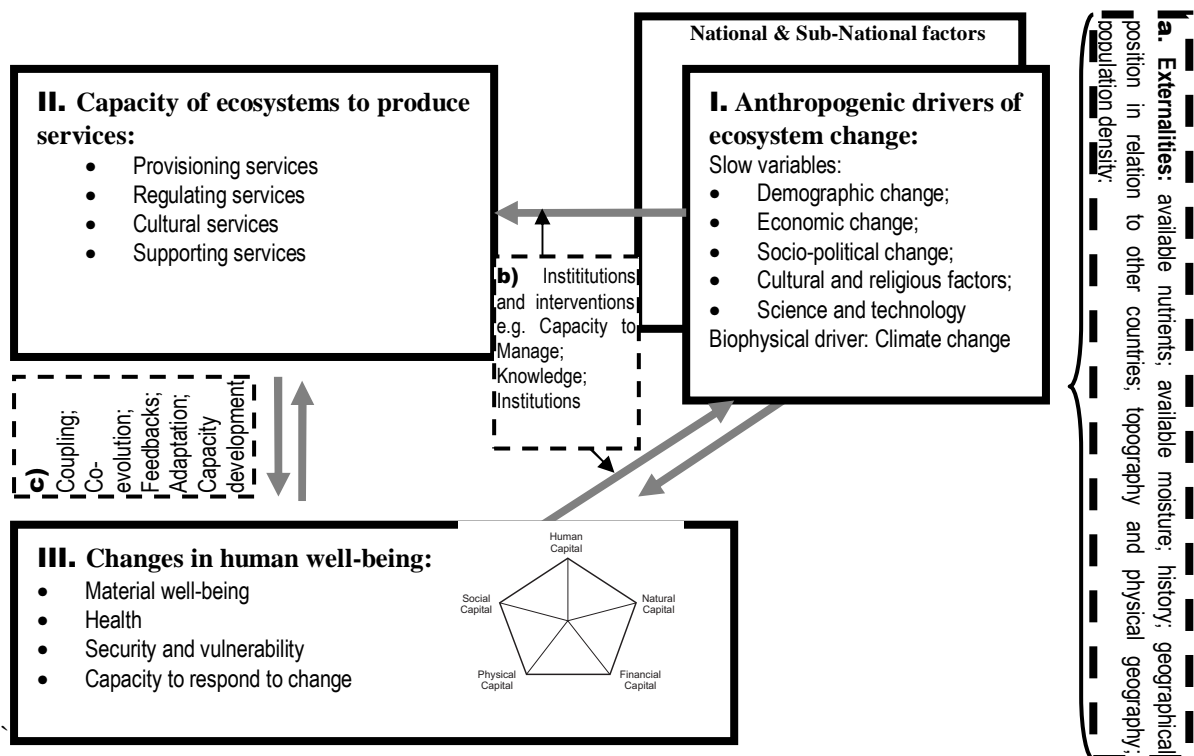


Figure 1. Conceptual framework for the project

3.2 Key Questions

Using the conceptual framework we will address five key questions, related to Objectives 1-4 in the Terms of Reference:

Objective 1. Collect and analyse evidence on the ecosystem services most important to the well-being of the poor, the main challenges to the ecosystems that provide these services, and the key ecosystem management functions for maximising poverty alleviation.

- i) Which ecosystem services primarily affect poverty and human well-being? How does this vary across the region, according to differing environmental externalities and drivers?
- ii) What are anthropogenic and biophysical drivers of ecosystem change and related changes in human well-being across the region? What have been the trends in ecosystem services, over relevant time-scales?

Objective 2. Identify how these challenges can best be addressed through research to provide poverty alleviation outcomes.

Objective 3. Conduct an information and knowledge needs assessment with policymakers and other stakeholders involved in ecosystem management.

- iii) How are *different types of knowledge combined* to make decisions, to improve ecosystem services and human well-being? What are the *best practices* and shortcomings? What are the *information and institutional needs*? What are the *research needs*?
- iv) What are the common properties of *strategies and interventions* that have succeeded in improving sustainably the contribution of ecosystem services to the well-being of the poor? What are the roles of policy, programmes and projects? What is the potential contribution of empowering institutions?

Objective 4. Assess the need for skills and knowledge exchanges to strengthen the capacity of regional research providers and research output users.

- v) What *capacities exist to manage* ecosystems sustainably while benefiting the poor, at all levels, and how have these changed over time? What are the *capacity development* needs for the future? In particular, what capacities exist and should be developed in response to climate change?

3.3 Activities

3.3.1 Sub-regional investigations

Information will be gathered at sub-regional level in West Africa and Sahel; East Africa; and southern Africa by sub-regional teams outlined in the capability statement.

Literature assessment

The first step is to assess sub-regional literature on changes in human well-being (as defined above) and changes in ecosystem transformation and productive capacity in West Africa and the Sahel; East Africa and southern Africa respectively. Our team hits the ground running on this since it consists of individuals familiar with key bodies of published and grey literature, and well able to synthesise them and to identify and explore key gaps. Some illustrative examples of key works to draw on are listed in at the end of the document.

Sub-regional workshops for project development

Work plans will be developed at inception workshops in: southern Africa; East Africa; and the Sahel sub-regions. At these, the institutions participating in the project (scientists, NGO staff) will interact with invited policy makers and other stakeholders, who will have an opportunity to influence the analytical, diagnostic and prescriptive agendas. Additional information sources will be shared, conceptual frameworks will be critiqued, and pathways developed for taking the objectives forward on an equitable basis (that is, taking full account of local or community, governance, project, policy and international stakeholder interests). These workshops will fulfil both an awareness raising and legitimizing function.

Subregional syntheses on key questions

Using a suite of country studies (whose selection and contributors is left flexible at this stage, in order to reflect the relative strengths of existing knowledge and expertise on semi-arid ecosystem management in the subregions), and following agreed workplans, syntheses will be prepared in each subregion addressed to the five key questions identified above. These syntheses will reflect the diversity in ecosystems and in the extent, trends and nature of poverty that is linked to ecosystem management, and the constraints and opportunities identified in the subregion. Where necessary, field visits will be used to consolidate synthesis, and active participation by policy, governance and project personnel, and by representative users of ecosystem services, will be sought. Researchers will be responsible for contributions based on their own areas of expertise. Coordination will be affected through subregional coordinators, consultations and electronic communication.

Assessment of regional trends in bioproductivity from remotely sensed data, climate modelling and global surveys

Remote sensing provides a relatively inexpensive and quick means of assessing state and temporal trends of ecosystem productivity across large areas at a coarse level of resolution. (e.g. Tucker et al. 1999; Eklundh and Olsson, 2003; Budde et al., 2004; Anyamba et al, 2005; Herrmann et al., 2005). Our assessment will include a remote sensing and modelling component, which will be contributed by Dr Stephanie Herrmann of Arizona State University, a member of the Scientific Advisory Panel.

3.3.2 Region-wide synthesis

For overall synthesis, five regional working groups will be based on the five key questions identified above, to work across the three subregions, with each working group being responsible for a chapter of the final report, which will summarise findings, identify information needs, and suggest research and action priorities.

Working Group 1: *Ecosystem services and their linkages with the well-being of the poor.* Questions may include

- Description of ecosystem services, their condition, and variation across the region
- Nature and management of linkages between ecosystem services, local stakeholder interests, and poverty reduction
- Prioritisation and ranking of services in terms of their contribution to the well-being of the poor
- Information needs
- Research needs

Working Group 2: *Drivers of change in ecosystem services and human well-being.* Questions may include:

- What are the key drivers of change in ecosystems and human well-being (see Fig 1) in semi-arid Africa?
- How are changes in ecosystem services and changes in human well-being coupled? What are the feedbacks between human well-being and ecosystem services?
- What developmental implications follow?
- Information needs
- Research needs

Working Group 3: *Capacities to manage ecosystems sustainably and the development of adaptive capacity.* Questions may include:

- A general assessment of capacities to manage ecosystems and human well-being at national, sub-national and local levels, consistently with producing goods and services
- Capacity development needs, including enhanced adaptive capacity to climate change

Working Group 4: *Knowledge systems.* Questions may include:

- An evaluation of existing knowledge systems at local, community, institutional, policy and international levels and mechanisms for sharing knowledge equitably
- What needs to be done to improve poor peoples' access to the best knowledge, through new or adapted institutions and mechanisms
- How to tailor scientific knowledge on ecosystem management to the needs of users at all levels

Working Group 5: *Policies, Interventions and Responses.* Questions may include:

- Which interventions (policies, institutions, management strategies) at global, national, community or local levels have been effective in optimizing the contribution of ecosystem services to poverty reduction? What are the best practices?
- Which interventions have 'backfired', i.e. have had unintended negative consequences?
- What are the trade-offs for ecosystems, when interventions aim to reduce poverty? What are the trade-offs for people, when interventions aim to conserve ecosystems?
- Prioritisation in policy

Web-based learning and information exchange system

A web-based learning system will be established, where participants from each sub-region can post information, exchange ideas and engage in discussion.

3.3.3 Validation and summarization

A *Scientific Advisory Panel* is in the process of being recruited to provide peer review, contribute insights, and comment on drafts. Validated findings may be summarized and posted on the Web. **Regional Synthesis, Summary for Decision-makers, and Lessons learnt** will be compiled by the Project Manager in consultation with partners.

3.3.4 Communication

Communication and outreach will take place from the early stages, by involving policy makers in workshops and engaging them in information gathering. Trust-building and establishing credibility will be continuous

over the entire seven months of the assignment. Lessons from the southern African Millennium Ecosystem Assessment (Biggs et al. 2004) have shown that outreach is less successful when decision makers are involved at the end of the process than when they contribute to the process from the beginning.

Communication and outreach will take place through:

- Sub-regional report-back workshops;
- Policy briefs;
- Summary brochures or posters;
- Electronic media such as the Web and CD / DVD.

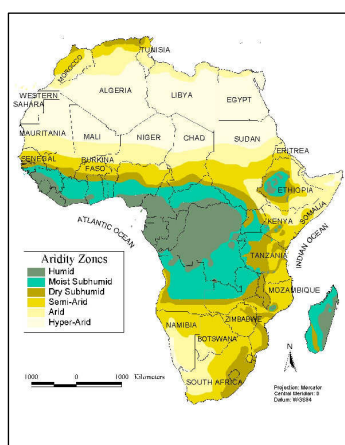
The Lead Institution (Khanya-aicdd) will be responsible for arranging feedback workshops, and production of dissemination materials such as policy briefs and electronic media.

3.4 Geographic focus

Our focus is on 25 countries in sub-Saharan Africa with >30% of their areas in hyper-arid, arid or semi-arid zones (Table 3).

Table 3. Sub-Saharan Africa countries with >30% of their areas classified as Hyper-arid, Arid or Semi-arid

Country	Area (km ²)	% Hyper-Arid	% Arid	% Semi-Arid
Botswana	499,596	0.0	19.3	80.7
Burkina Faso	227,487	0.0	12.1	67.0
Chad	1,068,043	42.8	23.6	20.8
Djibouti	18,011	22.4	77.6	0.0
Eritrea	101,428	0.0	57.8	42.2
Ethiopia	931,239	0.0	34.3	24.0
Kenya	479,650	0.0	34.5	41.8
Mali	1,059,725	46.1	26.9	18.4
Mauritania	891,449	59.5	37.9	2.6
Mozambique	665,160	0.0	0.0	64.1
Namibia	712,550	9.3	44.1	46.6
Niger	1,002,089	53.1	43.3	3.6
Nigeria	752,364	0.0	5.0	35.6
Senegal	164,681	0.0	10.4	52.0
Somalia	521,192	13.7	66.7	19.6
South Africa	1,097,288	0.9	29.8	44.4
Sudan	2,095,056	29.2	31.8	26.8
Swaziland	15,306	0.0	0.0	81.2
Tanzania, United Republic of	772,403	0.0	0.0	33.4
Zimbabwe	332,597	0.0	0.0	82.7



Arid and Semi-arid countries included in the study area are those with Aridity Indexes (ratios of Mean Annual Precipitation (PPT):Potential Evapotranspiration (PET)) of <0.05 (Hyper-arid); 0.05 to 0.20 (Arid); and 0.2-0.5 (Semi-arid) (UNEP/GRID 1991) (see adjacent map).

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