

# **APPLIED INTERDISCIPLINARY RESEARCH AND TRAINING ON NATURAL RESOURCE MANAGEMENT: A SITUATION REPORT FOR SOUTHERN AFRICA**

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## Abstract

*This report is part of initiatives to strengthen transdisciplinary collaboration in training and research on natural resource management within southern Africa. The report is based on an assessment of capacity covering twelve institutions (mostly universities) from six countries of the region. The major shortcomings in current research and training activities include: disparities in capacity across countries and universities; duplication and gaps in coverage of issues; lack of continuity in research and training activities; lack of transdisciplinary interaction; lack of regional collaboration; and, reliance on informal and passive methods of ensuring that research findings influence policy. The report also includes recommendations on how the identified shortcomings can be addressed.*

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## Introduction

Considerable groundwork has been covered, since 1995, in promoting applied interdisciplinary research and training in natural resource management within the SADC region (Anon., 1995; Zeil-Fahlbush and Moyo, 1995; Harraway *et al.* 1996). The interest in interdisciplinary work is based on the recognition that insular intradisciplinary approaches reinforce rather than solve problems at the human-environment interface. Preliminary workshops identified a number of points central to the lack of fit between problems and approaches adopted to solve them. These points form part of the conceptual framework to the present report.

### *Setting the problem*

In the preliminary workshops there was consensus that:

- There is degradation of the environment in the SADC region and that this stems from a diverse range of environmental problems;
- In terms of nature and extent, the problems are not disparate and isolated phenomena, being often pervasive, interlinked and transboundary;
- From the intellectual problem-solving viewpoint, the problems are not discrete. They do not separate neatly into distinct biophysical phenomena amenable to hypothetico-deductive inquiry, neither do they aggregate into distinct social phenomena best understood through inductive inquiry. The environmental problems span the interface between traditional disciplines - biophysical and social sciences.

And yet it was noted that researchers in the region are largely seeking independent and insular solutions to the problems.

### *Towards a solution*

It was agreed that an association - The Southern African Consortium for Applied Interdisciplinary Research (SACAIR) - be formed to:

- Ensure that countries in the region benefit from regionally conceptualised and implemented research and training initiatives since they share common problems in natural resource management;
- Promote collaborative transdisciplinary research and training to bridge the gap between biophysical and human systems, since every environmental problem has a human dimension and many human problems have environmental dimensions.

However, before this could be done the need for information on what is currently in place within the region was noted. The current report is intended to fill this need.

### *Terms of reference*

The terms of reference of the current study were:

- To conduct a survey of regional academic institutions in terms of:
  - training initiatives (post-graduate courses and short courses) relevant to applied interdisciplinary research in natural resource management; and
  - major research programmes in natural resource management that employ interdisciplinary approaches
- To provide a synthesis report of the above activities, indicating the strengths and weaknesses of current initiatives.
- To investigate the impact of current activities at the policy level, and to make proposals on how the proposed Consortium initiatives can impact policy
- To make recommendations as to the role the Consortium should play in the development of a

regional programme on applied interdisciplinary research.

### Fact Finding Mission

Logistical constraints restricted the number of countries and institutions that could be visited during the fact finding mission. The fact that other institutions with excellent interdisciplinary initiatives were not visited should not be interpreted as attempts to marginalise them from Consortium activities. The countries and institutions visited are listed in Appendix A. A more comprehensive directory on training activities within the region is now out (Harraway *et al.* 1996). The checklist of questions in Appendix B aided data collection. Additional information was obtained from information brochures collected during the visits.

### Situation Report

The following words are extensively used in the report: intradisciplinary, multidisciplinary, interdisciplinary, cross-disciplinary and transdisciplinary. The first is insular, usually describing activities (involving approaches and techniques) done by practitioners of single discipline. Activities in which practitioners from different disciplines work independently with minimal interaction will be considered multidisciplinary. The last three will be taken to mean the same thing; activities involving practitioners from different disciplines interacting in most aspects of the activity.

The report focuses on training and research. For training the report will consider short courses and post-graduate programmes. Undergraduate programmes were

not considered since they tend to be more diffuse in terms of content and coverage of topics.

### Training

Why consider training? There are two related answers to this question: (a) the complex nature of environmental problems requires a new genre of problem solvers and transdisciplinary practitioners, and (b) transdisciplinary initiatives need to be sustained and there should be a concrete core from which future activities can draw expertise.

### Short courses

A wide array of short courses with environmental components is in place in institutions of the region (Table 1). On the basis of available data the following pattern is evident in terms of coverage: a bias towards courses focusing on socio-economic development and the environment, and on pollution; a fair representation of courses covering spatial decision support systems, environmental economics and techniques; and, under-representation of jural and policy courses.

Accessibility to the courses is a function of two major selection criteria: prior experience and professional foundations. Categorisation of the courses into biophysical and social science groups (Table 1), indicates the following: (a) numerically, there appears to be a balance between the biophysical and social science courses. It should, however, be noted that the later category had heavy representation from socio-economic and economics courses; (b) about half of the short courses are restricted to trainees with a background in

**Table 1:** Range of short courses offered within some universities of the SADC region and disparities in capacity across the countries.

Course	RSA	Botswana	Zimbabwe	Mozambique	Zambia	Malawi	Total
Socio- economic development and environment *	3	1	1	-	-	-	5
Environmental economics *	2	-	1	-	-	-	3
Pollution **	-	2	-	1	-	-	3
Environmental management **	3	-	-	-	-	-	3
Quantitative environmental management techniques **	2	1	-	-	-	-	3
Statistics & modelling **	2	-	-	-	-	-	2
EIA **	-	-	2	-	-	-	2
Communication skills *	2	-	-	-	-	-	2
Biodiversity conservation **	1	-	-	-	-	-	1
Environmental law *	1	-	-	-	-	-	1
Tourism & environment *	1	-	-	-	-	-	1
Environmental history *	1	-	-	-	-	-	1
Project planning & evaluation **	1	-	-	-	-	-	1
Environmental policy *	-	-	1	-	-	-	1
TOTAL	19	6	3	1	0	0	29

\* Social science courses

\*\* Courses having a strong biophysical component

biophysical sciences, just less than half are fairly open while very few are restricted to persons from social science disciplines; and, (c) access to most of the social science courses is fairly open (usually prior exposure only); while access to the biophysical courses is more restricted to the discipline (training and/or relevant exposure) (Table 2).

Disaggregation of the short courses across countries reflects regional disparities in capacity. South Africa has many courses followed by Botswana, Zimbabwe and Mozambique. Malawi and Zambia currently do not offer any short courses (Table 1). For South Africa, disaggregation of the courses across universities also shows inter-university disparities in capacity. For instance, the School of Environment and Development at the University of Natal (Pietermaritzburg) alone, gives more than 10 of the 19 courses offered by the three South African universities enumerated.

A planning initiative to put in place a short course on human and social dimensions of the environment is under way in Mozambique. This course is expected to run in tandem with a similar one offered in Zimbabwe by the Centre for Applied Social Sciences (CASS) and IUCN-ROSA. The Mozambican initiative is mainly aimed at addressing language barriers on the current CASS-IUCN course. Mozambique is a Lusophone country but the CASS-IUCN course is conducted in English.

The frequency at which the courses are offered largely depends on availability of resources.

**Table 2:** Transdisciplinary accessibility of short courses offered in some institutions of the SADC region.

Course category	Transdisciplinary accessibility			Total
	Restricted to persons from biophysical sciences	Restricted to persons from social sciences disciplines	Open to both	
Biophysical science course	12	-	4	16
Social sciences courses	-	3	10	13
<b>TOTAL</b>	<b>12</b>	<b>3</b>	<b>14</b>	<b>29</b>

Disaggregation of the short courses according to the frequency at which they are held shows that: a considerable number are offered as free standing course units from a menu of courses on post-graduate degree programmes; just more than half are held on a regular basis; and, very few of the short courses are offered on a one-off basis (Table 3). On face-value these figures are deceptively optimistic with regards to continuity. It should be noted that the first category of courses is offered by only one institute of a single university (School of Environment and Development, University of Natal, Pietermaritzburg) out of all the departments of universities that were assessed. Furthermore, most of the short courses held on a regular basis are not much more secure than those conducted on a one-off basis. Whether the so called "regular courses" are conducted or not, is often a function of availability of financial resources. Besides the above typology of categories of frequencies at which short courses are conducted there is also another category; tailor-made consultancy courses which

**Table 3:** Range of short courses offered in some universities of the SADC region and the frequency at which they are held.

Course	Held on regular basis	Free standing unit from post-graduate courses	Held on one-off basis	TOTAL
Socio-economic development and environment	4	1	-	5
Environmental economics	1	1	1	3
Pollution	3	-	-	3
Environmental management	2	1	-	3
Quantitative environmental management techniques	2	1	-	3
Statistics & modelling	1	1	-	2
EIA	2	-	-	2
Communication skills	1	1	-	2
Biodiversity conservation	-	1	-	1
Environmental law	-	1	-	1
Tourism & environment	-	1	-	1
Environmental history	-	1	-	1
Project planning & evaluation	-	1	-	1
Environmental Policy	-	-	1	1
<b>TOTAL</b>	<b>16</b>	<b>11</b>	<b>2</b>	<b>29</b>

are offered on demand especially at the University of Botswana.

Sadly enough, while all the courses that are offered in Botswana and virtually all for South African universities (16 out of 19) are self financing, the few that are offered in Zimbabwe and Mozambique currently depend on external funding. This does not allow for continuity.

### *Post-graduate programmes*

Postgraduate training can be entirely through research (thesis training) or through a variety of combinations of research and taught components. Thesis training involves fewer numbers of students focusing on disparate topics. Data on thesis training was not easily amenable to the type of analysis done for this report. Henceforth, in this report, postgraduate programmes refer only to those which usually involve greater numbers of students and have taught components. These almost invariably were MSc and postgraduate diploma programmes.

Notwithstanding the fact that most South African universities were not visited, regional imbalances in postgraduate programmes with environmental components are apparent. In terms of numbers of programmes and the range of environmental issues covered by the programmes, South Africa dominates (Table 4). Little duplication is apparent, except for Conservation Biology (duplicated within South Africa) and Environmental Science (South Africa and Botswana). However, analysis of the range of courses offered under each degree programme indicates that, in terms of content, each programme, to a greater or lesser extent, duplicates

another.

Some of the programmes look at the environment in a broad sense while some are more focused (Table 5). For the focused programmes: the conservation biology programmes mainly centre on the applied aspects of population and community dynamics in natural systems; the environmental geochemistry programme mainly looks at environmental quality in relation to various forms of pollution (especially industrial); and, the tropical resources programme has emphasis on both the physical and socio-economic dimensions of soil, woodland and wildlife systems. It may be easier to promote transdisciplinarity in the broader courses which have social science components than the more focused courses which have higher discipline specificity.

A number of postgraduate degree programmes are being planned by universities within the region. It is unlikely that the content and focus of the planned courses will vary much from those currently running:

(a) MPhil and DPhil degrees in Environmental Science, with coursework components, are being designed by the Department of Environmental Science, University of Botswana. The coursework component is likely to be narrower in focus than the MSc programme offered by the same department.

(b) An MSc in Conservation Biology is being planned by the Department of Biology, Chancellor College, University of Malawi. At a regional level the programme is likely to duplicate those currently on offer in South Africa.

(c) No duplication is envisaged in the Master's degree targeted at community-based development practitioners

**Table 4:** Postgraduate programmes offered in some universities of the SADC region and imbalances in capacity across countries.

Postgraduate programme	Country							TOTAL
	RSA	Zimbabwe	Botswana	Zambia	Malawi	Mozambique		
MSc in conservation biology	2	-	-	-	-	-	2	
MSc in environment and development	1	-	-	-	-	-	1	
MSc in environmental science	1	-	1	-	-	-	2	
MSc in environmental geochemistry	1	-	-	-	-	-	1	
Masters in environmental policy and planning	-	1	-	-	-	-	1	
MSc in tropical resource ecology	-	1	-	-	-	-	1	
Postgraduate diploma in GIS	-	-	1	-	-	-	1	
<b>TOTAL</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9</b>	

being planned by the School of Rural Community Development, University of Natal (Pietermaritzburg).

(d) The applied ecology aspects of the MSc in Applied Ecology and Microbiology degree being planned by the Department of Biology, University of Botswana, is likely to duplicate the ecology components of other courses e.g. University of Zimbabwe's tropical resources ecology programme.

To assess the interdisciplinarity of the programmes, in terms of course content, the following typology was generated: biophysical courses - courses covering the life or physical sciences with a small or no social science component; social science courses - those mainly covering human and social dimensions of the environment; and, interdisciplinary courses - those that link the biophysical to the social systems. There are more discipline specific courses (48 out of 74) than those that seek to link human activities to the environment (26 out of 74) (Table 5). There are substantially fewer social science courses than biophysical science courses.

Differences between courses are more evident when we consider the disciplines from which the programmes draw core and peripheral support for resource persons for their formal training activities: only one programme draws core support from a wide range of disciplines (MSc in Environment and Development); while for most programmes core work is only done by members of the department/discipline in which the programme resides. With regards to the overall contribution of individual disciplines, the dominance of the biophysical sciences is evident. The jural discipline is under-represented, offering core support in only one of the seven programmes considered in this analysis, the above-mentioned MSc (Table 6).

Compartmentalisation of the degree programmes according to disciplines and departments extends to the recruitment of students. Most programmes (5 out of 7), draw candidates from within their departments or disciplines (usually an honours degree) (Table 7). Recruitment on the basis of prior experience without a foundation in the said discipline of the course is limited (usually by the need for departmental scrutiny before approval).

Learning in all but one of the institutions assessed is in the multidisciplinary mode, not the inter-disciplinary mode. Lectures are shared out to lecturers who conduct their lessons individually during the allocated time slots.

**Table 5:** The loading, across disciplines, of courses offered on postgraduate degree programmes (with an environmental component) offered in some universities of the SADC region.

Postgraduate programme	Discipline categories			TOTAL
	Biophysical science courses	Social sciences courses	Inter-disciplinary courses	
MSc in conservation biology	*	9	1	11
MSc in environment and development	**	5	5	14
MSc in environmental science (UCT)	**	4	4	11
MSc in environmental science (UB)		7	1	15
MSc in environmental geochemistry	*	7	1	12
Masters in environmental policy and planning	**	0	0	4
MSc in tropical resource ecology	*	4	0	7
Postgraduate diploma in GIS	*	-	-	-
<b>TOTAL</b>		<b>36</b>	<b>12</b>	<b>26</b>

Note: \* Courses that are more restricted in terms of the aspect of the environment they focus on; \*\* Courses looking at environment in broader sense. UCT-University of Cape Town, UB-University of Botswana

An interdisciplinary presence, in terms of expertise, in lessons may be impracticable and it may make sense to restrict the exercise to core inter-disciplinary topics done by all the students.

### *Interaction in training*

The following could not permit detailed analysis of patterns of interaction using the small data set available: (a) multiple loci of interaction (intra-institutional or inter-institutional interaction at national or regional levels); (b) multiplicity of types of interaction (intradisciplinary, multidisciplinary and interdisciplinary); and, (c) multiplicity of the institutions which interact. Nevertheless, on an overall basis, there are considerable schisms with regards to interaction between disciplines with the bio-physical discipline tending to be a lot more insular than the social science discipline.

**Table 6:** Disciplines from which postgraduate programmes (with an environmental component) offered in the SADC region draw core and peripheral resource persons in teaching activities.

Postgraduate programme	Supporting discipline	
	Biophysical sciences	Social sciences
MSc in conservation biology	c	p
MSc in environment and development	c	c
MSc in environmental science (UCT)	c	c
MSc in environmental science (UB)	c	p
MSc in environmental geochemistry	c	p
Masters in Environmental Policy and Planning	p	c
MSc in tropical resource ecology	c	c
TOTAL		
Core	6	4
Peripheral	3	1
None	0	0
Overall	7	7

Note: c = providing core support in teaching,  
p = providing peripheral support

The following are among the modes of interaction used in institutions of the region: staff exchanges and collaborative teaching; external supervision; student exchanges; joint student activities; seminars and workshops; collaborative planning; and, twinning relationships between universities. The interaction can be formal or informal and it can be practised at a number of levels; within institutions and between institutions at the national, regional or global levels. Unfortunately the data collected could not easily be disaggregated across all the above categories for all the institutions assessed but it supported the following statements: (a) interaction appears to be more vibrant at the broader global level - usually in form of formal twinning relationships, but interaction becomes more reified at the regional, inter-institutional and intra-institutional levels; (b) much of the interaction in training is informal, usually fostered through individual peer-links; (c) the interaction is usually in intradisciplinary than in transdisciplinary mode (d) exchanges and joint activities are usually limited to the staff and not students.

## Research

### Research projects

A wide range of multi- and interdisciplinary research projects are in place within institutions of the region, with South Africa again dominating. The focus across nations, tends to be patterned according to the nature of

**Table 7:** Disciplines from which students can be enrolled to various postgraduate programmes offered in some universities of the SADC region.

Postgraduate programme	Discipline				TOTAL
	Biophysical	Social science (narrow sense)	Geography & environment	Jural	
MSc in conservation biology	*	-	-	-	1
MSc in environment and development	*	*	*	*	4
MSc in environmental science (UCT)	*	*	*	*	4
MSc in environmental science (UB)	*	-	*	-	2
MSc in environmental geochemistry	*	-	-	-	1
Masters in Environmental Policy and Planning	-	-	*	-	1
MSc in tropical resource ecology	*	-	-	-	1
TOTAL	6	2	4	2	14

\* Indicates the programme enrolls students from the discipline and, - indicates that the programme does not enrol students from the discipline.



**Table 8:** The focus of some of the major environmental research projects pursued by institutions of the SADC region.

Research area	Country						TOTAL
	RSA	Zimbabwe	Botswana	Zambia	Malawi	Mozambique	
Irrigation	2	-	-	-	-	1	3
Wildlife systems	7	1	-	-	-	1	8
Woodland systems	10	2	-	-	1	2	15
Soils	-	1	-	-	-	-	1
Fisheries	-	1	-	-	1	-	2
Multi-species system	1	-	-	-	-	-	1
Inland water resources	3	-	-	-	-	1	4
Pollution	3	-	-	-	1	1	5
Wetlands	3	-	1	-	1	-	5
Agrarian & land issues	2	-	-	1	-	-	3
Coastal estuarine & inland flooding	3	-	-	-	-	1	4
Endangered species	1	-	-	-	-	-	1
Desertification & arid environment	-	-	1	-	-	-	1
Small mammals	-	1	1	-	-	-	2
Sanitation & agriculture projects	20	-	-	-	-	-	20
Impact assessments	2	-	-	-	-	-	2
<b>TOTAL</b>	<b>59</b>	<b>6</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>5</b>	<b>78</b>

the resource base: e.g. fisheries in Malawi, desertification in Botswana, and estuarine research in South Africa and Mozambique (Table 8).

In terms of overall coverage of issues, there is a focus on wildlife systems, woodland systems, inland water resources and rural development projects (Table 8).

There is a reasonably even distribution of research attention across tenure categories. Of the research projects enumerated approximately: 38% are in rural areas; 30% in protected areas; 12% in urban/peri-urban environments; 10% in buffer areas; and 10% are spread across a number of tenure categories.

There is considerable interaction among institutions within a university for any one research project. There is less interaction among different universities or government departments, and regional interaction is particularly lacking (Table 9).

Notable areas of inter-institutional interaction are: (a)

**Table 9:** Levels of interaction in major environmental research projects within some universities of the SADC region.

Project area	Number of projects			
	Total	With interactions among departments of same university	With interactions to institutions outside the university	Involving regional interaction
Irrigation	2	2	1	1
Wildlife systems	8	8	1	1
Woodland systems	15	15	5	1
Soils	1	1	-	-
Fisheries	2	2	-	-
Multi-species systems	1	1	1	-
Inland water resources	4	4	4	1
Pollution	5	5	-	-
Wetlands	5	5	-	-
Agrarian & land issue	3	3	-	-
Coastal estuarine & inland flooding	4	4	3	-
Endangered species	1	1	-	-
Desertification & arid environments	1	1	-	-
Small mammals	2	2	-	-
Sanitation and agriculture projects	20	15	-	-
Impact assessment	2	2	2	2

Kruger National Park Rivers Research Programme, involving collaborative research between Witwatersrand University and the Institute of Natural Resources (INR) (University of Natal); (b) estuarine research involving INR and the universities of Port Elizabeth, Durban-Westville, Transkei, Zululand and Western Cape; and, (c) estuarine research conducted by a consortium of Cape universities.

In spite of the fact that some environmental problems are of a transboundary nature, collaborative research between nations is woefully underdeveloped (Table 9). The Mozambique-South Africa Rivers Research Programme involves international collaboration. The programme centres on water quality and quantity of rivers that flow from South Africa into Mozambique. Joint research on socio-economic issues in the Richtersveld National Park is done by some Namibian institutions and the Environment and Geography Department at the University of Cape Town. The Richtersveld is a transboundary national park between South Africa and Namibia. The INR has also been

involved in international contract research involving socio-economic impact assessments in Mozambique and Mali.

Focusing on the intra-university level, where there seems to be considerable interaction, to what extent is the interaction transdisciplinary? Considering 25 projects for which transdisciplinarity could be easily assessed, only about half (49%) involved transdisciplinary interaction. The rest are either multi- or intradisciplinary.

The interaction that occurs is often in the multidisciplinary mode and not in the interdisciplinary mode. Two thirds of the 18 departments involved in active research on the environment have research programmes which involve both the biophysical and social science disciplines right from the design stages of the research. For the rest there is no interdisciplinary collaboration in the design stages of the projects.

Patterns of communication and networking in research are closely related to the vibrancy of interaction in research. Only three departments of universities out of all those visited appeared to have vibrant networking

involving the setting up of formal organising bodies. For the rest of the institutions networking is still weak and is either informal and passive, usually involving seminars, workshops, publications and other personal consultations.

### *Impact of research on policy*

For purposes of analysis the following typology of research was used: policy oriented research - involving generation of information that will presumably be used in policy making; action-oriented research - research that directly feeds into management action usually at the local level; educational research - or thesis training, which is research done as part of formal educational training; and contract research - commercial research done upon request by a specific user of the information (Table 10).

Much of the research in the institutions assessed is policy oriented. Action oriented, contract and the educational research (thesis training) are under-

**Table 10:** The focus of research projects conducted within some institutions of the SADC region

Research area	Research goals				TOTAL
	Policy oriented research	Action oriented research	Contract research	Thesis training	
Irrigation	*	*	-	-	2
Wildlife systems	*	*	*	*	4
Woodland systems	*	-	*	*	2
Soils	*	-	-	*	2
Fisheries	*	-	-	-	1
Multi-species systems	*	-	-	-	1
Inland water resources	*	-	*	*	2
Pollution	*	-	*	*	3
Wetlands	*	-	*	-	2
Agrarian & land issues	*	-	-	-	1
Coastal estuarine & inland flooding	*	*	*	-	3
Endangered species	*	-	-	-	1
Desertification & arid environments	*	-	-	-	1
Small mammals	*	-	-	-	1
Sanitation & agricultural projects	*	-	*	-	-
Impact assessment	*	-	-	-	1
<b>TOTAL</b>	<b>14</b>	<b>4</b>	<b>6</b>	<b>5</b>	<b>29</b>

\* Indicates a project is classified under that category of research; and - indicates that the project does not fall under that category of research.

**Table 11:** Some of the means by which institutions of the SADC region drive their research findings towards influencing policy

Means of influencing policy	Number of institutions using it (n = 18)
<b>(a) Formal and active means</b>	
Formal networking and liaison officers	5
Formal collaborative committees to push research towards policy	2
Collaborative research with government	3
<b>(b) Informal semi-active means:</b>	
Briefing papers for government and parliamentarians	3
Workshops, seminars and conferences	11
Information provision to lobbyist organisations	2
<b>(c) Informal passive means:</b>	
Reports and publications	18

represented and restricted to fewer environmental issues.

Assessing the impact of policy-oriented research on policy is a difficult exercise. Among the most commonly mentioned indicators of whether research is having an impact on policy were: increased or continued donor funding for the project; shift in positions or perceptions among interest groups; expansion of the project; and, adoption of the project or project ideas by others. On the basis of these criteria about half of the institutions said their initiatives were having a significant impact on policy, while the other half felt there was little impact.

Very few institutions have adopted active ways of ensuring that their research findings influence policy; the majority of the institutions rely on passive, semi-active and ad hoc methods of influencing policy (Table 11).

## Synthesis

### Short courses

The wide array of short courses with environmental components in the region suggests considerable capacity, but may in fact be misleading. There are national and inter-university disparities in capacity, South Africa being by far the most dominant in spite of the fact that the majority of its institutions were not assessed. There is also duplication and gaps in the short courses. Duplication arises because of: (a) lack of collaboration; (b) lack of awareness of what is happening elsewhere; (c) course planners being aware of duplication but needing to establish their own courses for institutional or egoistic reasons, and (d) course planners needing to establish courses in their own languages (e.g. the Mozambican initiative).

Availability of financial, material and human resources affects security and continuity of the current short courses. There are two areas of positive significance in current initiatives: (a) some courses particularly in South Africa and Botswana are self-funded (commercialised), (b) The School of Environment and Development (University of Natal, Pietermaritzburg) offers some of its Masters courses as free-standing units which other professionals can take as short courses. This latter strategy alleviates the problem of lack of resources and guarantees continuity. The major shortcoming of most courses is that they are donor-funded and are thus not very secure, often being offered on an irregular or one-off basis.

Overall, courses that recruit trainees from both the social and biophysical disciplines are still under-represented. Transdisciplinary accessibility to some of the short courses, particularly those with a strong biophysical orientation, is difficult. Accessibility is easier for the social science courses.

### Post-graduate programmes

There is a wide mix of postgraduate programmes in the region. In terms of focus and orientation of the programmes there is a healthy mix between those that have a broader perspective and those that are more focused. International imbalances in capacity are apparent, with South Africa dominating and many countries offering no postgraduate programmes.

There is duplication of programmes and course units among existing programmes, and the duplication is likely to be reinforced by programmes being planned in the region. Unfortunately, courses offered within the programmes tend to be discipline specific and few attempt to link biophysical and human systems. There is little transdisciplinary support in teaching activities. Most of the programmes are biophysical and draw core support from biophysical disciplines usually with peripheral support from the social science disciplines. Recruitment of students is compartmentalised according to discipline, and transdisciplinary recruitment is limited. Learning in most of the programmes is usually in the multidisciplinary mode, rather than in the interdisciplinary mode.

### Interaction in training

Interaction in training appears to be more formalised and vibrant at the broader international level, usually in form of formal twinning relationships, involving financial packages to benefit universities of the region, than at the regional and national level. Interaction tends to be more reified and less formal at regional, inter-institutional and intra-institutional levels.

The interaction, at regional and lower levels, is more in the intradisciplinary mode than the transdisciplinary mode. Much of the interaction is informal, usually fostered through peer-links at an individual level. The interaction is mainly restricted to external supervision

and staff exchanges. Joint student activities and student exchanges are very limited.

### **Research**

The situation suggests that there is capacity in research on natural resource management but it may be insufficiently transdisciplinary to have much of an impact. In terms of number of research projects, there are disparities in capacity, with South Africa being by far the most dominant, notwithstanding the fact that most of its institutions were not assessed. The focus of the projects reflects duplication of some issues and under-representation of others. There is reasonable balance in research focus across land tenure categories, with considerable research being done in rural areas, which are both major centres of poverty and human-environment problems.

There is considerable intra-institutional interaction in research projects but much of it is still in an intradisciplinary and multidisciplinary mode rather than in a transdisciplinary mode. Conceptualisation or design stages of the majority of the research projects often lack genuinely representative disciplinary balance. Support is often co-opted at later stages of a research project.

Collaborative research between institutions or countries of the region does exist in some areas, but it is insufficiently comprehensive and often too localised to address the full repertoire of the region's pervasive and transboundary problems. In addition, much of the collaborative research initiatives are still largely in a multidisciplinary mode and not in an interdisciplinary mode. Modes of communication and networking of research activities are woefully under-developed being mainly informal and passive.

### **Impact of research on policy**

There are a number of weaknesses as regards the relationship between current research activities and policy. The efficacy of research on policy depends on the goals of research. Research initiatives encountered during the surveys falls into the following categories: policy-oriented, action-oriented, educational (academic) and contract research. Demand driven contract research and action research are under-represented at the expense of research that envisions influencing policy.

There is lack of clarity among the practitioners of policy-oriented research as to the extent to which their research impacts policy. Very few of the practitioners of policy-oriented research have adopted active and elaborate ways of ensuring that their research influences policy. The majority rely on passive, semi-active and *ad hoc* means. Some of the institutions mentioned the following as factors which curtail the impact of research on policy: (a) bureaucratic centralism by governments of the region which slows down the pace at which decisions are made; (b) mistrust between governments and researchers; and, (c) tendency by governments to

sideline local researchers in favour of expatriate expertise when it comes to research contracts.

### **Recommendations**

#### **Overall recommendation**

The report recommends that the Consortium should formalise collaboration in interdisciplinary research and training on natural resource management at both the institutional and the regional level. The details of how this can be done are covered under appropriate sections below.

#### **Training**

Shortage of finance and expertise are the major constraints to current teaching activities across most institutions. The Consortium should establish a regional data-base on available expertise and develop long-term strategies for using the expertise in regionally-oriented training activities. The training activities should ideally be done under the auspices of the Consortium. However, options for the sharing of expertise should be established especially in local level training where this is more appropriate.

The Consortium should reduce duplication in training activities where ever possible in view of above-stated constraints. A comprehensive regional data base of short courses and post-graduate programmes should be established to reduce duplication arising from lack of information on what is happening elsewhere (Harraway et. al. 1995). Duplication arising from the need to address language barriers is largely unavoidable while that arising from the quest for intellectual authorship of courses is largely unnecessary. The Consortium should therefore work towards reducing duplication while still maintaining a fair amount of competition, especially at local levels.

The balance between reducing duplication and maintaining a healthy amount of competition can be addressed together with the problem of the skewed coverage of issues. To this effect the Consortium should adopt a parsimonious approach with respect to regional and local level issues by: (a) identifying issues of regional significance which can then receive direct Consortium attention possibly through a Regional School of the Environment taught by a core of Consortium expertise and run by a Training or Educational Unit ; and, (b) restricting its role to an advisory one with regards to local level issues (provincial and national) to allow for a fair amount of competition, to reduce costs to the Consortium, and to ensure that training activities are more relevant and responsive to the multiplicity of local level contexts. At lower levels emphasis should therefore be restricted to encouraging transdisciplinary interaction between universities.

Interaction in training activities between universities at more localised levels needs to be encouraged. The scope for expanding the activities, making them inter-disciplinary and extending them to students must be explored. Presently the interaction either involves sub-disciplines of a single discipline or is limited to staff exchanges and external supervision and does not involve much in the way of joint student activities.

The Consortium should also consider setting up a special transdisciplinary Curriculum Unit (or making it a sub-unit of the Educational Organ) to advise universities and the Consortium itself on curricular matters. For instance, curricula of post-graduate programmes not only need to be responsive but also balanced. Balance has to be struck by not making the courses too focused and at the same time not too diffuse, and by having appropriate mixes of biophysical courses, social science courses and courses that link the human and biophysical systems. This will reduce the pitfalls highlighted by Chambers (1985: p180): "Hyper-specialisation can result in people knowing more and more about less and less....., and the corollary is - far from illuminating, a full battery of disciplinary searchlights may serve only to dazzle and confuse....., resulting in people knowing less and less about more and more".

Insularism and compartmentalisation in recruitment and teaching of post-graduate programmes are major problems which require structural changes in universities of the region. The Educational Unit or Curriculum sub-unit of the Consortium should put in place strategies which will bring a gradual shift away from the present compartmentalised departmental approach. A good example of a broader approach is that of the School of Environment and Development at the University of Natal. In the approach, students from different backgrounds share interdisciplinary core courses but may end up specialising in an area of their interest. Programme administrators (Deans and Co-ordinators) plan and co-ordinate training activities allowing for an appropriate mix of transdisciplinary experts drawn from different department of the university to work together and share in the activities. The approach has the following advantages: enables transdisciplinary recruitment; fosters cross-fertilisation within a transdisciplinary pool of students and lecturers; makes it easier to teach in inter-disciplinary mode; achieves cost-effective use of limited resources (financial and expertise).

Recruitment to short-courses on the basis of prior exposure fosters transdisciplinary accessibility. Recruitment on the basis of prior training, which is usually insular, curtails transdisciplinary accessibility to the short courses. The Consortium should therefore encourage that both criteria be given equal weighting in universities or in future Consortium training activities.

National and inter-university disparities in capacity in short courses and post-graduate programmes imply that South Africa, which is by far the dominant force,

has to adopt a conciliatory approach, particularly in the formative stages of the Consortium. But this may necessitate the restructuring of previous institutional arrangements i.e. SADC was formed to reduce dependence on South-Africa. Geo-political changes may necessitate that the environmental and other portfolios of SADC (successor of SADCC) be restructured or relocated.

The Consortium should explore ways of reducing the dependence of some of the short courses on external funding to ensure security and continuity of the courses. One option would be to encourage gradual shifts towards the commercialisation of the courses. Offering some courses in post-graduate programmes as free-standing short courses which can be taken by professionals has several advantages: cost effectiveness with respect to financial resources and expertise, allows sharing and interdisciplinarity between full-time students and the professional part-timers from various backgrounds, reduces the costs to the participants and guarantees continuity of the courses. The Consortium should therefore vigorously promote the adoption of this approach in universities of the region or in training activities which may fall under its ambit in future.

### **Research projects**

There were biases in research focus, research coverage across tenure categories and in the scale of research. The solutions to these problems require parsimony. Local level issues are responsive to local level processes and should be left to local-level attention possibly under the guidance of a Consortium Research Advisory Unit. The Consortium is better disposed to make far-reaching impacts on regional level problems. Collaborative research on regional issues should ideally be preceded by a scoping exercise to come up with a comprehensive catalogue of regional problems which may require focused Consortium attention.

To develop this capacity, the Consortium should work towards the reduction of unnecessary duplication of research effort and encourage collaborative activities where ever possible. Strategies for enhancing collaborative activities build into each other and should be interlinked as outlined in the next sections.

A comprehensive directory of research projects as well as interested and Consortium-affiliated transdisciplinary practitioners should be incorporated in the Consortium data-base.

The data-base should exist under and be managed by a Unit with Clearance and Networking services. This unit will reduce duplication and encourage collaboration in the following ways: (a) providing information on what is happening elsewhere within the region; (b) receive proposals from interested and Consortium-affiliated researchers and check and clear them of duplication; (c) use the data-base to network prospective collaborators to appropriate partners and projects; and, (d) ensure that potential transdisciplinary research

partners get together in the critical (design stages) of research projects which limits duplication arising from the desire to be credited for intellectual authorship of the research projects.

The Consortium Clearing House stands to consolidate collaboration among Consortium-affiliated institutions. Strategies to make the Consortium grow and expand on its activities should be put in place. One conceivable plan would be to lobby research councils of various countries to accept projects with team-work, ideally in an interdisciplinary mode.

However, most of the preceding recommendations require adequate funding on the part of the Consortium. Collaborative research on regional environmental problems should give the Consortium greater access to donor funding. Towards this end a Consortium Fund Raising Unit should therefore be put in place. The Consortium should, however, adopt long-term strategies of reducing dependence on external funding. Three options come to mind: (a) subscription fees from Consortium-affiliated institutions/ persons; (b) commercialisation of Consortium-run training activities; and, (c) establishment of a Consultancy Unit which will bid for contract research and sub-contract the assignments to inter-disciplinary teams of Consortium-affiliated researchers and charge royalties. The teams should have an international flavour to spread capacity across the region as some countries have limited capacity. Again, South Africa would have to adopt a conciliatory stance in view of its dominance.

### ***Impact of research on policy***

Demand-driven contract research and action research are disposed to make a more immediate impact at the desired level but these are under-represented at the expense of policy-oriented research. The Consortium should therefore explore strategies of increasing the complement of research projects focusing on the former two. Integration of thesis training into contract research activities is also recommended where ever possible. Students stand to gain experience and widen their experiences if they are included in transdisciplinary research teams.

Current research activities in the region are based on a "Strategy of Hope" - researchers generate information and hope that it will be used, while information users and policy makers hope that they will get usable information. The Consortium should therefore adopt formal and active methods of driving research towards policy. Some of the ways by which the link can be dynamised include the following: (a) encouraging the setting up of formal networking, liaison and collaborative structures recommended earlier at both regional and local levels; (b) incorporating policy-makers in the Consortium Research Unit and encouraging research councils of countries of the region to do likewise; (c) arranging briefing series with government and parliamentarians; and, (d) ensuring

sufficient transdisciplinary and interest group presence in all stages of the research particularly in the conceptualisation stage. The last three recommendations will also address mistrusts between governments and researchers and the tendency by governments to sideline local expertise in favour of expatriates.

To improve the policy relevance of research the Consortium should encourage researchers to identify the criteria through which they can assess the impact of their research on policy. Researchers should also be encouraged to be clear on what aspects of what policy they plan to influence.

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**Appendix A: Countries and institutions covered by fact finding mission.****South Africa***(a) University of Witwatersrand:*

Department of Zoology

Centre for Water in Environment (Department of Botany)

*(b) University of Cape Town:*

Department of Geology

Department of Zoology

Percy-Fitzpatrick Institute of African Ornithology

Environment and Geography Department

*(c) University of Natal (Pietermaritzburg):*

School of Rural Development

School of Environment and Development

Institute of Natural Resources

**Botswana***(a) University of Botswana:*

Department of Environmental Science

Department of Biology

**Mozambique***(a) Eduardo Mondlane University*

Department of Civil Engineering

*(b) University of Pedagogics:*

Geography Department

*(c) Department of Rural Development (INDER)**(d) Department of Research (ARPAC)***Malawi***(a) Chancellor College (University o*

Department of History

Department of Biology

*(b) Malawi Polytechnic*

Department of Applied Science

**Zambia***(a) University of Zambia*

Department of Biology

Department of Geography

**Zimbabwe***(a) University of Zimbabwe*

Department of Biological Sciences

Centre for Applied Social Sciences

Department of Geography

Institute of Environmental Studies

University Lake Kariba Research Station

## **Appendix B: Checklist of questions asked during the fact-finding mission on applied interdisciplinary training and research in the SADC region**

### ***Training***

- 1 What is currently in place? For instance:
  - (a) short courses
  - (b) post-graduate courses
- 2 What aspect(s) of NRM do current initiatives cover or focus on?
  - (a) short courses
  - (b) post-graduate courses
- 3 What are the interacting disciplines/sub-disciplines
- 4 What is currently in place in terms of interaction and networking in interdisciplinary training?
  - (a) National
    - (i) Intra-institutional
    - (ii) Inter-institutional
  - (b) International

### ***Interdisciplinary research***

- 1 What is currently in place in terms of interdisciplinary research projects?
- 2 What aspect(s) of natural resource management do current interdisciplinary research initiatives focus on?
- 3 What are the interacting disciplines or sub-disciplines?
- 4 What are the interdisciplinary research methods, approaches or techniques employed in current initiatives?
- 5 What is in place in terms of communication and networking (modes of) with respect to interdisciplinary research initiatives and findings?
  - (a) National (i) intra-institutional (ii) inter-institutional
  - (b) International
- 6 The impact of current inter-disciplinary research initiatives at the policy level?
- 7 What aspects of natural resource management policy the research initiatives are directed towards? (wildlife, forestry, water etc.).
- 8 A repertoire of activities done by the actors in order to influence policy.
- 9 The strengths and weaknesses of present transdisciplinary research/training initiatives:
- 9 (a) Interdisciplinary training:
  - (i) course missions/ content and focus
  - (ii) transdisciplinary accessibility
  - (iii) interacting disciplines
  - (iv) communication and networking at the various levels
- 9 (b) Interdisciplinary research
  - (i) project focus and orientation
  - (ii) number interacting disciplines/ sub-disciplines
  - (iii) transdisciplinary (iv) communication and networking at the various levels
  - (v) impact on policy
  - (vi) activities done to influence policy
- 10 Recommendations for the strengthening of regional capacity in applied inter-disciplinary research and in training in NRM.





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