

# INTEGRATING COMMUNITY AND SCIENTIFIC SUSTAINABILITY INDICATORS TO FACILITATE PARTICIPATORY DESERTIFICATION MONITORING AND SUSTAINABLE RANGELAND MANAGEMENT IN BOTSWANA

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## 1. INTRODUCTION

The United Nations Convention to Combat Desertification emphasises the importance of action by local communities, through the development of "integrated sets of physical, biological, social and economic indicators" which are "pertinent, quantifiable and readily verifiable" (UNCCD 1994, Article 8 (d)). Sustainability indicators are key tools for community-based desertification monitoring as they can be used to capture complex information easily and rapidly. However, the identification, selection and participatory use of appropriate indicators remains a key research priority with many practical difficulties.

This paper explores the potential for indicator-based tools to facilitate participatory desertification monitoring. This is examined in the context of sustainable rangeland management in Kgalagadi District, south-west Botswana.

The paper builds on a framework for participatory indicator selection (Reed & Dougill 2002), and extends this work by:

- Incorporating field testing of community indicators and integration of management options into rangeland degradation assessment manuals
- Providing a comparative analysis of secondary sources against local knowledge to assess the validity of community-based indicators
- Exploring the potential for indicator-based tools to facilitate grass-roots desertification assessment, monitoring and response

## 2. RESEARCH METHODS: FRAMEWORK AND APPROACHES

Following the proposed framework (Figure 1 – the following numbers in parentheses refer to stages in the framework), pastoralists were asked in semi-structured interviews to determine the objectives they would like sustainability indicators to meet, and the criteria they would use to choose effective indicators (1). Given the range of criteria perceived by different land users (Reed & Dougill 2002), wide-ranging community participation in the evaluation of indicator suitability is essential. This was done through semi-structured interviews and village-level focus groups.

Once evaluation criteria had been defined, components of each pastoralist's livelihood were assessed to examine differences in indicator knowledge and ensure indicators would meet the needs of all sectors in the community (2). This followed a sustainable livelihoods approach (Scoones 1998). Consistent with the holistic, people-centred nature of the SL approach, semi-structured interviews, oral histories, rangeland walks/ drives and time-line discussions were used to examine dynamism in natural resources, social systems, physical infrastructure, labour availability and access to financial capital.

In the absence of consensus over a precise operational definition of 'sustainability', eliciting sustainability indicators from local communities can be problematic. However, operational definitions of land degradation are well-established (UNEP 1997), and eliciting degradation indicators from communities is relatively straightforward (Stocking & Murnaghan 2001; Reed & Dougill 2002). As the antithesis of sustainability, degradation indicators elicited from communities may be reversed to derive sustainability indicators. In this work, pastoralists were therefore asked to identify signs of detrimental change in the condition of their rangeland, from which sustainability indicators were derived (3). Indicators identified by pastoralists were then combined and compared with sustainability indicators from the literature, developed in comparable environments (4). By systematically evaluating community-based indicators against the literature, it was possible to determine the reliability of community-based indicators and minimise later data collection requirements (6), thereby improving the efficiency of indicator development

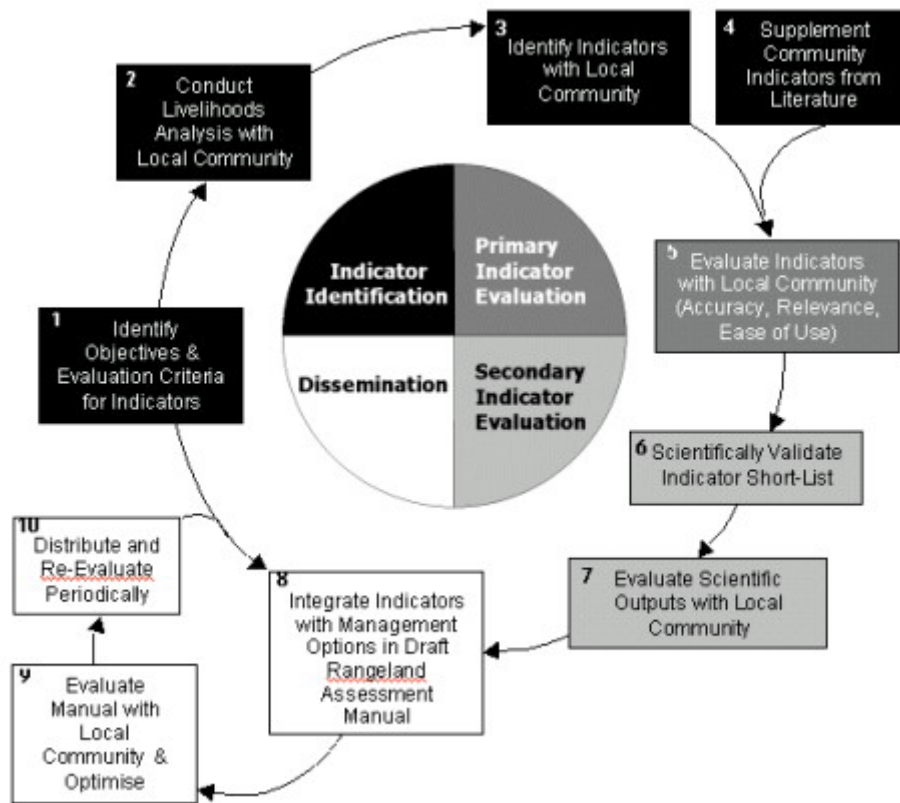


Figure 1. A framework for participatory indicator development.

The resulting combined indicator list was then evaluated by pastoralists in village focus groups, according to their accuracy, relevance and ease of use (5). These criteria summarise evaluation criteria elicited from Kalahari communities themselves. Focus groups also tested the consistency of information collected in individual interviews.

Given the number of community-based indicators with no parallel in the literature, it is necessary to test the reliability and applicability of indicators, using ecological and/or soil-based techniques (6). This is done by assessing the extent to which indicators characterise degraded ecological and soil states. Degradation status was assigned using measurements in sites with different trends in secondary production, using livestock census data. This classification is based on the definition of land degradation as "an effectively permanent decline in the rate at which land yields livestock products" (Abel & Blaikie 1989).

The results of empirical work will next be discussed by communities in key informant interviews and targeted focus groups (7). The resulting list of indicators will then be integrated with information about management strategies that can prevent or reverse rangeland deterioration to form rangeland assessment manuals (8). Strategies will be developed from existing literature and local knowledge to provide a range of options to suit different land users. Manuals will be evaluated by pastoralists to optimise them prior to publication and distribution (9). Periodic evaluation will be necessary to ensure that manuals remain relevant to dynamic pastoralist needs and resources (10).

### 3. SCIENTIFIC VERSUS COMMUNITY-BASED SUSTAINABILITY INDICATORS

It has been suggested that the use of indicators by non-specialists will inevitably involve a trade-off between meaningful participation and scientific rigour (Abbot & Guijt 1997). Sustainability indicators developed in the literature for semi-arid ecosystems were compared with those elicited from Kalahari communities. The considerable overlap between scientific and local knowledge (Figure 2) shows that the majority of community-based indicators have an empirical basis. This suggests that a trade-off between participation and rigour is by no means inevitable.

Further research is required to determine the validity of community-based indicators not found in the literature. The number of new indicators elicited is a key advantage of the new approach. A total of eleven indicators elicited from the community had no parallel in the literature from comparable environments.

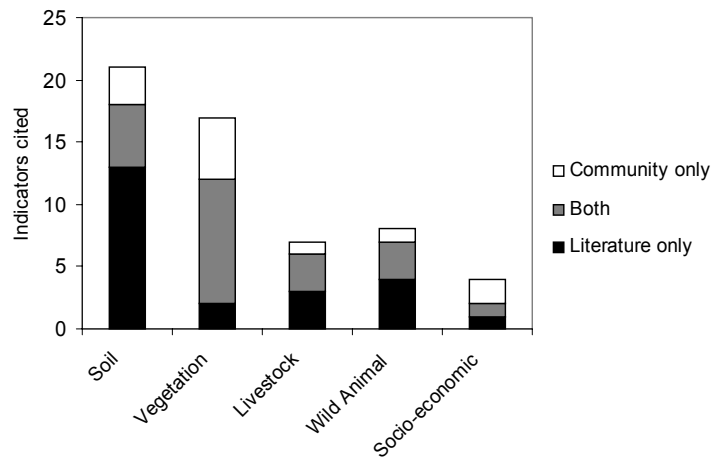


Figure 2. Sustainability indicators in different categories cited by Kalahari communities (Reed & Dougill 2002), peer-reviewed literature and by both.

There is evidence that reliance on a narrow range of indicators may produce misleading results for degradation assessment (Stocking & Murnaghan 2001). However, the range of indicators elicited using this research framework was far broader than any of the published indicator lists, encompassing vegetation, soil, livestock, wild animal and socio-economic indicators.

Although most of the indicators cited by communities are found in the literature, communities often provided more meaningful interpretations of existing indicators, with non-technical means of measuring complex variables. Although more qualitative, pastoralist experience shows information from such surrogates is sufficiently accurate to support management decisions.

Many indicators from the literature were not cited by pastoralists. Discussions in village focus groups showed that most of these were considered too difficult to measure. This included soil crusts and fertility patterns, which have been used as indicators of rangeland condition in manuals targeted at land users elsewhere in the region (Milton *et al.* 1998).

In some instances, communities took issue with indicators from the literature. For example, contrary to literature citing increased soil infiltration rate as a sustainability indicator (e.g. Tongway 1995), communities associated this with degradation, indicating loose sand with low organic matter content. This may be due the consistently high proportion of fine sands in Kalahari soils.

#### 4. CONCLUSION

Evidence from the Kalahari, Botswana, suggests that participatory indicator development has the potential to generate reliable, accurate indicators that can be used easily, cheaply and rapidly by land users to monitor dryland degradation. By linking sustainability indicators to rangeland management through the development of rangeland condition assessment manuals, it may also be possible to empower communities to respond to desertification threats in a more appropriate and timely way.

#### 5. ACKNOWLEDGEMENTS

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