

An adaptive learning process for developing and applying sustainability indicators with local communities

Mark Reed, Andy Dougill & Evan Fraser

Sustainability Research Institute, School of Earth & Environment, University of Leeds.

Email: mreed@env.leeds.ac.uk

Abstract

Sustainability indicators based on local data provide a practical method to monitor progress towards sustainable development. However, since there are many conflicting frameworks proposed to develop indicators, it is unclear how best to collect these data. The purpose of this paper is to analyse the literature on developing and applying sustainability indicators at local scales to develop a methodological framework that summarises best practice. First, two ideological paradigms are outlined: one that is expert-led and top-down, and one that is community-based and bottom-up. Second, the paper assesses the methodological steps proposed in each paradigm to identify, select and measure indicators. Finally, the paper concludes by proposing a learning process that integrates best practice for stakeholder-led local sustainability assessments. By integrating approaches from different paradigms, the proposed process offers a holistic approach for measuring progress towards sustainable development. It emphasizes the importance of participatory approaches setting the context for sustainability assessment at local scales, but stresses the role of expert-led methods in indicator evaluation and dissemination. Research findings from around the world are used to show how the proposed process can be used to develop quantitative and qualitative indicators that are both scientifically rigorous and objective while remaining easy to collect and interpret for communities.

Keywords: Sustainability indicators, Community empowerment, Stakeholders, Local Participation

1. Introduction

To help make society more sustainable, we need tools that can both measure and facilitate progress towards a broad range of social, environmental and economic goals. As such, sustainability indicators are fast becoming an integral part of national and international policy. However, it is increasingly claimed that existing sustainability indicators provide few benefits to local users who, as a consequence, rarely apply them (Innes and Booher, 1999; Carruthers and Tinning, 2003).

Empirical research from around the world shows the benefits of engaging local communities in sustainability monitoring. The indicators developed have often been shown to be as accurate as (and sometimes easier to use than) indicators developed by experts. However, there remain important ways in which the skills of the expert can augment local knowledge. Although qualitative indicators developed through participatory research can promote community learning and action, it is not always possible to guarantee the accuracy, reliability or sensitivity of indicators. For this reason, monitoring results may not be as useful as they could be, or they may even be misleading. What is needed is to find a balance between bottom-up and top-down approaches (Reed *et al.*, 2006a).

2. The Process

Table 1 shows how both these approaches to indicator development follow four basic steps. Figure 1 incorporates these steps into a conceptual framework that describes the order in which different tasks fit into an iterative sustainability assessment cycle. The process does not prescribe tools for these tasks. Instead, it emphasises the need for methodological flexibility and triangulation, adapting a diverse sustainability toolkit to dynamic and heterogeneous local conditions. The process can be used by anyone engaged in local-scale sustainability assessment, from citizens groups, community projects and local planning authorities to NGOs, businesses, researchers and statutory bodies.

If sustainability indicators are relevant to local people, and the methods used to collect, interpret and display data can be easily and effectively used by non-specialists, then sustainability indicators can go far beyond simply measuring progress. They can stimulate a process to enhance the overall understanding of environmental and social problems, facilitate community capacity building, and help guide projects and policy.

Table 1: Two methodological paradigms for developing and applying sustainability indicators at local scales and how each approach approaches four basic steps

Methodological Paradigm	Step 1: Establish context	Step 2: Establish sustainability goals & strategies	Step 3: Identify, evaluate & select indicators	Step 4: Collect data to monitor progress
Top-down	Typically land use or environmental system boundaries define the context in which indicators are developed, such as a watershed or agricultural system	Natural scientists identify key ecological conditions that they feel must be maintained to ensure system integrity	Based on expert knowledge, researchers identify indicators that are widely accepted in the scientific community and select the most appropriate indicators using a list of pre-set evaluation criteria	Indicators are used by experts to collect quantitative data which they analyse to monitor environmental change
Bottom-up	Context is established through local community consultation that identifies strengths, weaknesses, opportunities and threats for specific systems	Multi-stakeholder processes to identify sometimes competing visions, end-state goals and scenarios for sustainability	Communities identify potential indicators, evaluate them against their own (potentially weighted) criteria and select indicators they can use	Indicators are used by communities to collect quantitative or qualitative data that they can analyse to monitor progress towards their sustainability goals

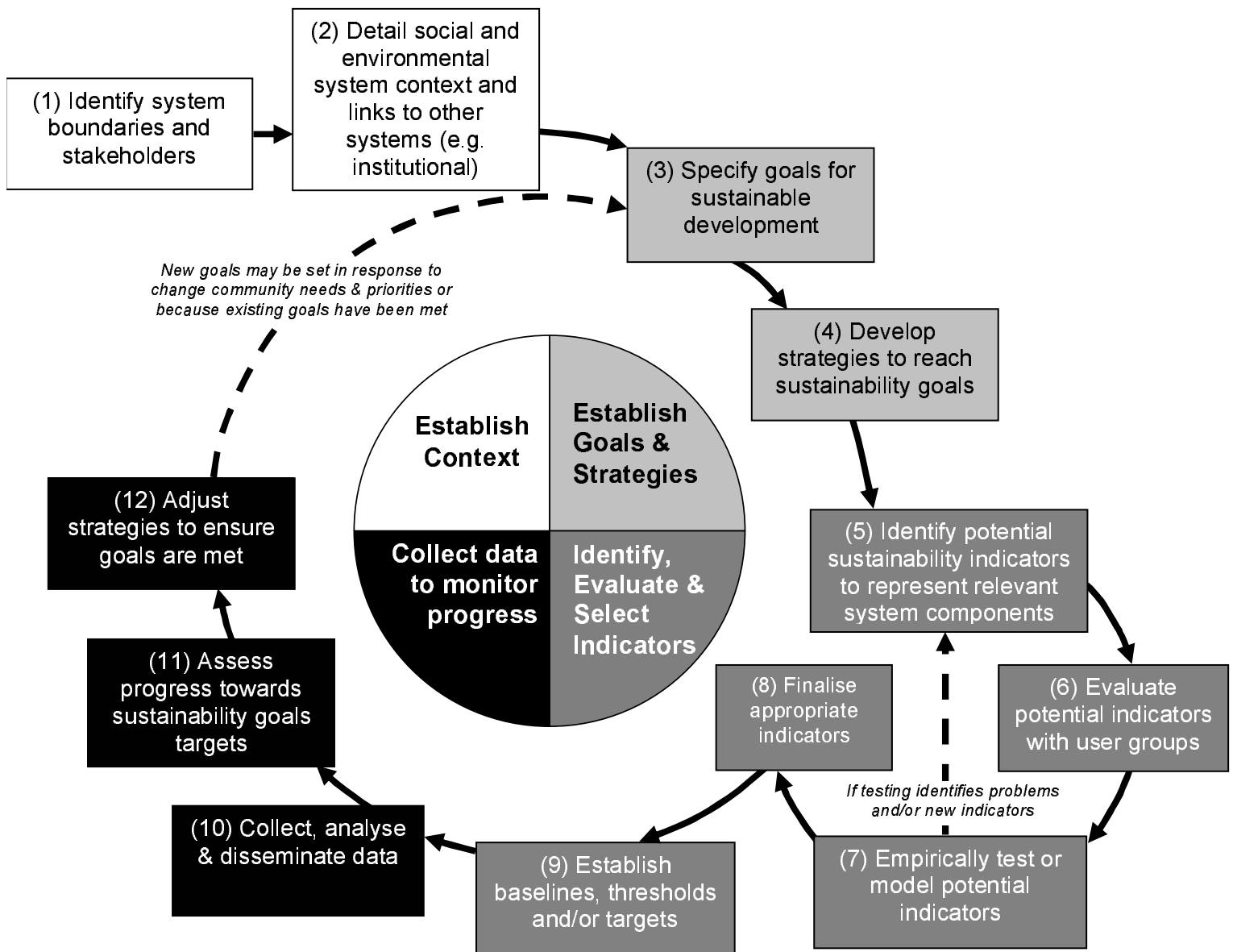


Figure 1: Adaptive learning process for sustainability indicator development and application

3. Application

The process has been tested and refined with Kalahari pastoralists, Swaziland smallholders and UK upland stakeholders. It is now being applied in an international land degradation remediation project:

Southern Africa

The process was initially developed with farming communities in Botswana (Reed & Dougill, 2002; Reed *et al.*, 2005; Dougill & Reed, 2005, 2006; Fraser *et al.*, 2006; Reed *et al.*, 2006a,b; Reed *et al.*, in prep.) and Swaziland (Stringer & Reed, 2006). Communities identified a wide range of sustainability indicators, the majority of which were validated through field-based research. The process identified a range of innovative management options that could prevent, reduce, reverse or help rangeland stakeholders adapt to land degradation. By building on local knowledge, the indicators and management options were familiar to land users who could apply them without specialist training or equipment. Indicators and management options were integrated in a manual-style Decision Support System designed to help land managers easily monitor progress and adapt management to reach sustainability goals. For more information, see: www.env.leeds.ac.uk/~mreed/IVP.

UK Uplands

The process was adapted to UK uplands in an ongoing project funded by the UK Government Research Councils with DEFRA and SEERAD (Reed *et al.*, 2005; Dougill *et al.*, 2006; Stringer *et al.*, 2006). The project uses the process to help upland stakeholders better recognise, monitor and respond to rural change. This work involves a much wider range of stakeholders, including *inter alia* water companies and recreation interests in addition to farmers and policy-makers. The project uses Social Network Analysis to avoid marginalising stakeholders and select influential participants who may be able to diffuse ideas and attitudes through a wide network. The project uses integrated biophysical, economic and agent-based modelling to explore the likely impacts of future scenarios. Sustainability strategies are then evaluated quantitatively through modelling and qualitatively through focus group discussions of model outputs to make recommendations for policy and practice. For more information, see: www.env.leeds.ac.uk/sustainableuplands.

DESIRE: A global approach for local solutions

The process is now being applied internationally through an EC-funded project based in northern, southern and Sahelian Africa, southern Europe, USA, Australia, China and South America. Desertification Mitigation & Remediation of Land (DESIRE) aims to establish promising alternative land use and management strategies based on close collaboration between scientists and stakeholders in degradation hotspots around the world. For more information, see: www.env.leeds.ac.uk/~mreed/DESIRE.html.

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