Concepts of sustainable land management

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ABSTRACT

Reports about the status of and changes in natural resources indicate that there is a problem of land degradation at a global scale. The concept of sustainable land management (SLM) offers solutions that go beyond technologic recommendations by including aspects of social participation and policy dialogue. The recently proposed "multi-level stakeholder approach to SLM" provides for local participation and also allows the inclusion of other stakeholders in the planning of activities that have been negotiated by common agreement. Because poorer countries face the challenge of reducing poverty and attaining sustainable development at the same time, they have a particular need to benefit from solidarity at the global scale. Geo-information has the potential to be an important tool for negotiating settlement of land use conflicts, if it is used in a way that is interactive and perceptible to all involved.

Land degradation is a central challenge to sustainable development. The latter has been defined as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" [9]. This was accepted as a common goal at the UN Conference on Environment and Development (UNCED) in 1991.

At the global scale, key problems threatening natural resources and the sustainability of life support systems are: (1) soil degradation, (2) the availability of water and (3) the loss of biodiversity [8]. These occur in virtually all socio-cultural and economic contexts worldwide. However, there are great differences in the abilities of countries to cope with the problem of land degradation [3]. For example, North America and the Sahel exhibit diametric differences in their socio-economic dispositions to cope effectively with desertification, although both show similar symptoms of desertification in their dryland areas [8].

Problems of land degradation exist in many parts of the world. The following natural resources may be affected:

(1) soils: about one third of the world's agricultural land has been damaged, mostly by soil loss caused by water erosion [6]

(2) water: problems of quality and quantity, as well as spatial and temporal interdependence (highland-lowland effects)

(3) natural vegetation: problems of quality, quantity and biodiversity

(4) wildlife: problems of protected areas, wildlife corridors, controlled hunting and poaching.

The perception of these problems, however, varies greatly—between land users and other stakeholders, among these groups, and with time. From an economic perspective, for example, an environmental problem might be assessed in terms of its short-term costs, and the economic viability of technologies at the household or societal level, which may be very different. On the other hand, the social perspective may take account of poverty issues, social differentiation of affected groups, or societal and political effects, but disregard economic considerations. Finally, the ecologic perspective may consider only the effects of land degradation on nature, *ie*, wildlife, vegetation and ecologic processes, disregarding both social and economic problems. Figures 1 to 4 illustrate typical degradation case studies in different countries.

Natural resources can potentially be used in a sustainable way if appropriate land management technology, regional planning and the policy framework complement one another in a purposeful way, in accordance with the principles and concepts of sustainable land management (SLM). At the center of this thinking is the concept of "ecosystem balance", and especially the questions of irreversibility of ecologic (and socio-economic) processes, resilience of ecosystems, and the spatial and temporal scales to be considered at the landscape level. It is here that the relevance of geo-information to SLM can be seen. Sustainable land management has been defined as "a system of technologies and/or planning that aims to integrate ecological with socio-economic and political principles in the management of land for agricultural and other purposes to achieve intra- and intergenerational equity" [3, 1]. SLM is thus composed of the three development components technology, policy and land use planning.

While knowledge is generally considered the key factor for achieving better land management, it will not succeed if efforts to create better knowledge are made exclusively here, *ie*, by using only a scientific approach. It should be noted that actors' strategies are influenced by a multitude of factors, including perceptions, attitudes, and societal frame conditions such as economics, politics and power structures (*cf* [7]). If geo-information is to assist in improving the sustainable use of natural resources, it must have four major orientations: it must be target-oriented, client-oriented, process-oriented and transdisciplinary. The same applies to the concept of

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The Centre for Development and Environment (CDE) is a university-based institution, which focuses on SLM and has been active in a number of partner countries for over 20 years, supporting national monitoring, research, and training networks in different African and Asian countries and specific problem settings. CDE's primary assets are: long-term monitoring databases, ongoing research programmes, methodologic and conceptual instruments for better planning, *eg*, SDA, on-farm technologies such as soil and water conservation [10], and practical tools for participatory analysis, training and community development, which can be used in support of initiatives to promote sustainable land management and regional development.

SLM, in contrast to earlier approaches such as the framework for land evaluation [2], which focused on expertise and used a standardized, fixed methodology.

A NEW APPROACH TO SUSTAINABLE LAND MANAGEMENT

A "multi-level stakeholder approach to sustainable land management" has been developed for finding feasible, acceptable, viable and ecologically sound solutions at local scales (Figure 5; *cf* [4]). Today, many international programmes and bilateral cooperation projects have started using such approaches, either explicitly (as in the case of UNCDF) or at least implicitly.

In this approach, "management" is defined as an activity on the ground, using appropriate technologies in the respective land use systems. Following the sustainability paradigm, "appropriate" would require that a technology

FIGURE 1
Ecologic sustainability in Switzerland can only be attained through an enormous effort on the part of society, which supports up to 70 percent of a farmer's income

photo:
M Zimmermann, 1984

FIGURE 2
Lack of land security and economic alternatives will force land users in Madagascar's tropical rainforest to continue slash-and-burn practices unless the global community is willing to take responsibility as a stakeholder

photo:
H Hurni, 1987

follow five major pillars of sustainability, namely, be (1) ecologically protective, (2) socially acceptable, (3) economically productive and (4) economically viable, and (5) reduce risk. A technology would thus have to respond to particular, *ie*, "respective", land use systems, as it would unlikely be applicable everywhere. "Land" refers to spatial units where ownership, resource availabilty, boundary conditions and the policy and economic environments play an important role. "Sustainable" has to be seen in all its dimensions, particularly the economic, social, institutional, political and (above all) ecologic dimensions. "Approach" is defined as the ways and means used to realize SLM. The main questions are: For whom will SLM be realized, for what, by what means, and with what impact? "Stakeholders" are interest groups or dependent groups, *ie*, categories of people or institutions who share a common interest in a piece of land, be it an individual plot, the territory of a communi-

FIGURE 3
Sustainable land management in Nepal is a delicate process in a harsh mountain terrain, which requires continuous work inputs and cooperation by land users to stabilize slopes

photo: U Bosshart, 1988

FIGURE 4
Emigration of the main labour force in Yemen may lead to neglect of the centuries-old terrace systems, and thus to their collapse within a few decades

photo: H Hurni, 1977

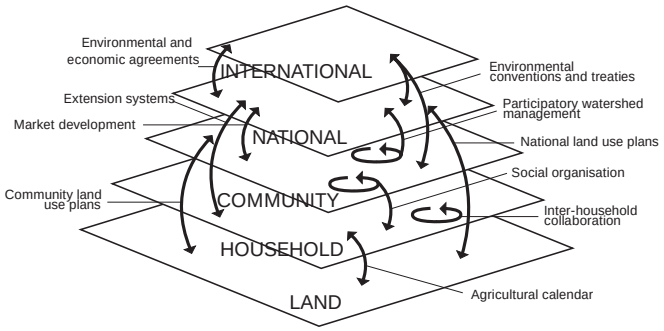

FIGURE 5 Intervention levels and activities in a multi-level stakeholder approach to sustainable land management (source: [4])

ty, or a national conservation area. Finally, "multi-level" indicates that not all stakeholders are farmers, but that off-site categories such as administrators, researchers and international organizations are included as well.

When adopting the multi-level stakeholder approach to SLM, the various dimensions of sustainability have to be weighed against one another in a negotiated, *ie,* participatory, approach that does not discriminate against, or favour particular actor categories. For example, scientific information must be coupled with indigenous knowledge to offer a better basis for decision making in the negotiation processes. Here again, applied geo-information may serve as an appropriate tool to facilitate communication in negotiation processes. Experience worldwide has already demonstrated the multi-level dimensions that have to be considered in order to attain long-lasting solutions. The real strength of the approach is that it does not provide a predetermined concept, but offers a framework and a procedure for working towards a common point of view and defining the next steps to take. Figures 6 and 7 illustrate this flexible approach.

FIGURE 6 Tobacco companies as external stakeholders induced individual tobacco growers to use hedgerow systems for fear of damage to their reputation if international customers became aware that tobacco causes land degradation in Sri Lanka

photo: H Hurni, 1993

FIGURE 7 Conflict between local land users cultivating land inside a national park in the Simen mountains and the international community trying to preserve what it defined as a world heritage site necessitated international assistance to improve land management in the buffer zone

photo: G Schwilch, 1994

THE CHALLENGES OF SUSTAINABLE DEVELOPMENT TO POORER ECONOMIES

Sustainable development requires due consideration of specific environmental, socio-cultural and economic conditions found in a particular location. Poorer economies are particularly challenged because of their two-fold curse: socio-economic poverty and environmental degradation of the resource base. Increased efforts should be made in such economies to:

(1) invest selectively in areas with a high potential for specialized agricultural production in order to enhance economic growth in the agricultural sector

(2) support the regeneration of agriculture in potentially sustainable areas and, where appropriate, use land management technologies to minimize actual degradation

(3) introduce land use changes in areas where there are opportunities for nature and biodiversity conservation or where there is insufficient economic potential for agricultural development and regeneration.

However, widespread poverty and lack of development necessitate support strategies in particularly needy regions, even if sustainability is not immediately enhanced by these activities.

Sustainable development analysis (SDA) (Figure 8) is a supportive tool that can be potentially used to achieve participatory land management solutions at community level. SDA is preferably carried out by interdisciplinary teams working with local and external stakeholders in a transdisciplinary manner, *ie*, using both scientific and local knowledge to arrive at shared views on needs, options and constraints in order to be able to collaborate in efforts to promote sustainable development.

Part I: Participatory assessment

- Problem formulation
- Definition of development goals
- Spatial typology (land use, ownership, resources, etc)
- Actor typology (use groups, wealth strata, institutions, etc)
- Interactions between and among units and actors
- Dynamics of change (population, degradation, improvements, etc)
- Assessment of sustainability (according to selected social, ecologic and economic indicators)

Part II: Participatory development evaluation

- Development visions as seen by different stakeholders
- Needs, options and constraints as seen by stakeholders
- Development synthesis
- Recommendations for action

FIGURE 8 Overview of the steps to be taken in analyzing sustainability in a regional context, using sustainable development analysis (SDA) (source: [5])

There are a number of challenges and opportunities for research at problem-oriented levels. Stakeholder institutions include national and international research and development organizations, local and international NGOs, as well as programmes that aim at improving sustainable land management and fostering enabling policy frameworks. Better integration and coordination of these activities would greatly enhance the potential to improve efficiency and avoid duplication of effort in strategic and applied research. While the SDA process has to start from the level of perceived problems, a crucial question is: Who defines the problems? Here, enhanced communication of all available information will be an important prerequisite. Multiple decision-support systems, including GIS and technology databases such as the WOCAT database for soil and water conservation, provide excellent tools for negotiation processes at community levels and beyond.

The first part of the SDA focuses on a participatory assessment of the present status of a spatial unit such as a community area. Here, it is important to present, in a complementary way, a scientific interdisciplinary assessment together with the local and other knowledge of stakeholders. The goal of the assessment is to define a common knowledge base to serve as a starting point for development planning. The analytical steps are the formulation of commonly perceived problems in the area, and statements of various intentions about how to achieve a common goal. This is followed by a step-by-step analysis of spatial units, based on common criteria such as resource status, land use types, access types, etc, and a description of different actor categories such as land users, wealth categories, ownership categories, or external interest groups who have a claim on certain resource units.

A detailed analysis of interactions among spatial units, among actor categories, and between spatial units and actor categories is the most important step of the assessment stage. Changes over time, such as degradation processes, land use changes, ownership changes, etc, play an essential role. The first part of the SDA concludes with a synthesis of the overall sustainability of the area, using socio-cultural, economic and ecologic indicators.

The above sustainability assessment [5] serves as a basis for negotiations on development in the second part of the SDA (*cf* Figure 8). Actor categories will develop their own visions of development in a first step, which will have to be compared with other visions in order to arrive at a shared vision as a common platform for development. The needs, potentials and constraints of each category or group of actors will be expressed in the process of discussions, and again differentiated according to spatial units within the community or area. The synthesis of the different development options will not necessarily be similar for all stakeholders involved, but will certainly help to clarify diffuse ideas and potential conflicts at an early stage. The SDA is thus a tool for better land management in a specific case study, and can be applied in situations where external and scientific groups are invited to assist local groups in developing their areas in a more sustainable way.

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RESUME

Des rapports sur les conditions et les changements dans les ressources naturelles indiquent qu'il y a un problème de dégradation des terres à l'échelle mondiale. Le concept d'une gestion durable des terres (SLM) offre des solutions qui vont au-delà des recommandations technologiques en y incluant des aspects de participation sociale et une politique de dialogue. Une "approche des intéressés à plusieurs niveaux du SLM" pourvoit une participation locale et permet aussi l'inclusion des autres intéressés dans la planification des activités ayant été négociées par une entente commune. Les pays plus pauvres, devant faire face au défi de réduire la pauvreté et atteindre un développement durable en même temps, ont particulièrement besoin de bénéficier de la solidarité à l'échelle mondiale. L'information géographique a le potentiel de représenter un outil important pour négocier le règlement des conflits d'utilisation des terres, à condition que celle-ci soit utilisée de manière interactive et perceptible par tous ceux qui y sont impliqués.

RESUMEN

Informes sobre el estado y los cambios de los recursos naturales indican que hay un problema de degradación de tierras al nivel global. El concepto de manejo sostenible de las tierras (SLM) ofrece soluciones que van más allá que las recomendaciones tecnológicas, ya que incluyen aspectos de participación social y de diálogo en el establecimiento de políticas. La reciente proposición de "enfoque participatorio a niveles múltiples para el manejo sostenible de las tierras" facilita la participación local y también permite la inclusión de otros participantes en el planeamiento de actividades que han sido negociadas por común acuerdo. Los países más pobres tienen una necesidad particular de beneficiarse de la solidaridad al nivel global, ya que enfrentan el reto de reducir la pobreza y al mismo tiempo alcanzar un desarrollo sostenible. La información geográfica tiene el potencial de ser una herramienta importante para negociar arreglos en conflictos de uso de las tierras, si se usa de tal manera que sea interactiva y perceptible a todos los involucrados.