Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics: From Knowledge to Action

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Abstract

There is widespread acknowledgement that integrated landscape management will be possible only if local priorities and knowledge are incorporated in land use and conservation planning. This is especially true in rural landscapes that are outside of protected areas but partially covered by trees and forests. The World Agroforestry Centre (ICRAF) in collaboration with the Centre for International Forest Research (CIFOR) is implementing a project titled “Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics” in an effort to contribute to integration of improved livelihoods of rural communities and biodiversity conservation in a set of tropical landscape mosaics of high biodiversity conservation value. This novel project is implemented under a joint ICRAF-CIFOR Biodiversity Platform and is implemented in 5 landscapes in global biodiversity hotspot areas in Africa and Asia. The project is founded on a new paradigm for biodiversity management that integrates protected areas into broader landscapes of human use and biodiversity conservation. The landscape management approach is particularly important in mixed-use landscapes. The Landscape Mosaics project is a multi-site research initiative that aims to deliver approaches and lessons to better tackle the joint challenges of biodiversity conservation and livelihood improvement in the areas of high human use and high biodiversity value. In the end, the intent is to build standard approaches that can be applied to landscapes outside the project domain, as well as to generate valuable context-specific lessons and experiences through the application of those approaches.

Tanzania’s East Usambara mountain forests, which rank high among the most valuable conservation areas in Africa, is one of the project sites. Local partners in this site are the Tanzania Forest Conservation Group, WWF – Tanzania, and the Amani Nature Reserve, all of whom have related initiatives in the area. This paper presents the project concepts and the way that those concepts are being adapted to conditions and opportunities in the East Usambara site, with the aim of prompting discussion on the applicability of the tools and approaches for better integration of local livelihoods and biodiversity conservation in landscape management in the wider Tanzanian context.
Introduction
The Convention on Biological Diversity (CBD) defines biological diversity ("Biodiversity") as the variety of life on earth and natural pattern it forms. Indisputably biodiversity provides a large number of goods and services that sustain human lives and the biodiversity of today is the result of billions of years of evolution shaped by natural processes and increasingly by the influence of humans (CBD 2000). A consensus has been more or less reached within the CBD and the same is growing among development organizations and scientists that biodiversity conservation and human well-being cannot be segregated (Cunningham et. al. 2002). This was endorsed by high profile global decision makers in marking the 10th anniversary of the Convention on Biological Diversity (CBD 2004) and the main message from Kofi Annan, the former United Nations Secretary General, was "Biodiversity, which plays a critical role on sustainable development and poverty eradication is essential to our planet, human well-being and to the livelihood and cultural integrity of people". However, poverty alleviation and biodiversity conservation often involve trade-offs, especially if development is pursued through unsustainable patterns of consumption and use of environmentally unsound technologies that may undermine the ability of biological diversity to sustain ecosystem services. The Millenium Ecosystem Assessment (2005) identified habitat change (such as land use changes, physical modification of rivers or water withdrawal from rivers, loss of coral reefs, and damage to sea floors due to trawling) as the most important driver of biodiversity loss and ecosystem service change. Furthermore, lack of explicit approaches that ensure incorporation of local knowledge and interests in various conservation programs is a constraint to sustainable development and environment protection.

Responding to these challenges a number of governments and organizations are deploying more inclusive approaches in conservation programs and as such there is a shift from excluding people from protected areas to involving them in the conservation process (IUCN 2003). Another major shift is in spatial scales where landscape approaches are used in assessing performance of the entire landscape mosaic in providing flows of conservation and development benefits (Sayer et. al. 2006). This new thinking is changing the way conservation organizations are working both in research and development. Within the research fraternity the World Agroforestry Centre (ICRAF) and the Centre for International Forestry Research (CIFOR) joined hands in 2006 in a joint Biodiversity Platform, focusing on issues related to biodiversity conservation, sustainable use and equitable benefit-sharing in landscape mosaics. This paper describes the landscape approach to conservation and presents a global project under the CIFOR-ICRAF biodiversity platform, "Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics” which has the East Usambara mountains in Tanzania as one of the sites. The paper highlights the linkages between the expected project outcomes and Tanzanian national developments in implementation of the convention on biological diversity.

Landscape approach to conservation
The very first meeting of the CBD Subsidiary Body on Scientific, Technical and Technological Advice held in 1995, suggested use of an ecosystem approach in addressing biological diversity (http://www.cbd.int/recommendations/?m=sbstta-01). It is envisaged that the ecosystem approach is the best strategy to permit realization of all
the goals of the convention because it recognizes that humans are an integral component of ecosystems and the characteristics of ecosystem (complexity and resilience) demands the application of adaptive management principles (CBD 2004).

Globally, tropical forest landscapes have undergone significant changes over the past decades, resulting in landscapes consisting of mosaics of different types of forest and non-forest land cover rather than extensive undisturbed forests. Subsequently, it is now widely recognized that approaches beyond establishment of segregated protected areas are needed to ensure conservation of forest biodiversity and the associated ecosystem services. The idea of managing multifunctional landscapes is based on the premise of ensuring that production and protection functions are optimised at the level of the landscape (Zuidema & Sayer 2003).

It is within the landscape conservation paradigm that the joint ICRAF - CIFOR biodiversity platform is founded. The landscape approach takes cognizance of the interrelationships among different land-uses across the landscape matrix as shown in Figure 2 adopted from Cunningham (2002). Land uses typically found in tropical landscape mosaics include forests, patches of natural habitat, agroforests and plantations that provide both production and environmental services. Trees and forests outside of protected areas can play an important multifunctional role in rural landscape mosaics, central to addressing global challenges of poverty reduction, climate change and loss of biodiversity (Zuidema & Sayer 2003).

Figure 2. Forest biodiversity suitability in a landscape matrix (Cunningham 2002).
In terms of biodiversity conservation, the quality of the landscape matrix and the degree of connectivity it provides are important factors for sustaining the contribution of high quality habitat fragments to landscape-level conservation. However, the importance of these factors is species-specific – for example, tree diversity may not be significantly affected by disturbance such as selective logging, whereas the effect may be substantial to invertebrate species. Furthermore, landscapes are not static but continuously undergoing changes of land use and land cover. Currently, notable gaps remain in our understanding of the landscape-scale retention of biodiversity in entire dynamic, multifunctional landscapes that contain both forests with different use-intensities and non-forest areas (Zuidema & Sayer 2003).

Another important aspect of a landscape approach to conservation is the need to balance conservation and development. The main argument is that reducing poverty while conserving biodiversity involves trade-offs and biological diversity generally decreases as demands on resources to support human livelihoods increases (MA 2005). There is therefore a call for research to find out where and under what circumstances can a better balance be reached, in order to base the trade-off decisions on sound knowledge. There is a quest for principles, approaches and practices that will promote sustainable use and equitable sharing of biodiversity services and goods; issues which are addressed by the Landscape Mosaics project presented in this paper.

Integrating Livelihoods and Multiple Biodiversity Values in Landscape Mosaics – ‘Landscape Mosaics’ Project

The goal of the Landscape Mosaics Project is to contribute to integration of improved livelihoods of rural communities and biodiversity conservation in a set of tropical landscape mosaics of high biodiversity conservation value. The project has been designed to deliver four outputs that are necessary to achieve the above mentioned goal:

1) A replicable and tested multidisciplinary research and development framework;
2) A comparative set of multilevel assessments on landscape patterns, livelihoods and biodiversity values;
3) Applied experiences in the development and analysis of multifunctional landscape management scenarios, including facilitation of multistakeholder collaboration focusing on biodiversity aspects important for improving livelihoods and on landscape patterns enabling biodiversity conservation, and
4) Dissemination of findings, experiences and the research and development approach across multiple scales and for various audiences.

Based on a flexible research and development framework useful for comparisons and monitoring, the project will assess local and external values and management schemes as well as spatial patterns and dynamics of the selected landscapes. A key output (output 3) will be the participatory development and negotiation of alternative scenarios for landscape management. This will involve the engagement of partners and local communities in describing and developing future desirable states of multifunctional
landscapes. This is central to helping all stakeholders to anticipate the potential future outcomes of their decisions.

Coordinated by the CIFOR-ICRAF Biodiversity Platform, the project focuses on five selected field sites in Africa and Southeast Asia located in biodiversity hotspots (Table 1). The comparative framework and analysis is one of the innovative aspects of this project. It will contribute to solving problems close to those of development agencies. Thus the project addresses questions of practical relevance.

Table 1. Landscape Mosaics project sites and their characteristics

<table>
<thead>
<tr>
<th>Country</th>
<th>Sites</th>
<th>Hotspots</th>
<th>Protected area, corridor</th>
<th>Habitats/ Land uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td>East Usambara</td>
<td>Eastern Arc Mountain range</td>
<td>Nature and Forest reserves</td>
<td>Lowland and submontane forest, tea / sisal plantation, spice farming, homegarden combining fruits, banana, cassava, yams and maize growing</td>
</tr>
<tr>
<td>Indonesia (Sumatra)</td>
<td>Jambi</td>
<td>Sundaland</td>
<td>Kerinci Seblat National Park</td>
<td>disturbed forests, degraded forests; shifting dryland rice, intensive paddy cultivation along monoculture rubber and oil palm, and mining</td>
</tr>
<tr>
<td>Cameroon</td>
<td>Takamanda-Mone, South West Cameroon</td>
<td>Congo</td>
<td>Takamanda and Mone forest reserves</td>
<td>High forest, hunter-gatherer</td>
</tr>
<tr>
<td>Madagascar</td>
<td>Manompana corridor, Soanierana-Ivongo District, Madagascar</td>
<td>Madagascar</td>
<td>Manompana corridor</td>
<td>Mountain forest, Clove tree plantation, shift cultivation for upland rice</td>
</tr>
<tr>
<td>Laos</td>
<td>Vieng Kham, Luang Prabang Province, Northern Laos.</td>
<td>Indo-Burma</td>
<td>-</td>
<td>Undisturbed forest, rubber plantation</td>
</tr>
</tbody>
</table>

A further innovation of the project lies in its approach and organizational framework. The project has been designed to be transdisciplinary in that it combines several
disciplines, addresses practical field-level problems, takes ethical values into account and facilitates the participation of various stakeholders, academic and otherwise. At each site, the project builds on the strengths of the existing organization of the local partners and targets locally relevant impact pathways, selected by the research and development partners, to influence policies - instead of creating new parallel organizations or processes. It aims to engage the stakeholders of landscape management in information exchange and dialogue through a Participatory Action Research (PAR) approach to land use planning at local and landscape levels, for more integrated and sustainable outcomes in land use management for biodiversity conservation and local livelihoods that reflect the desires of and the compromises between the various stakeholders.

**Participatory Action Research (PAR) approach**

The “facilitation, or action research” facet of the Landscape Mosaics project will attempt to facilitate communication, negotiations and agreements for landscape management between local communities and other stakeholders in the project landscapes (project output no. 3). This will involve several stages, which begin with identifying the relevant stakeholders in the landscape and then the visioning of a future for managing the landscape by local communities and other stakeholders. This will be followed by an empowerment and collective planning and action stage. The final stages will involve developing action plans and negotiating commitments for realizing these visions as well as, when possible, institutionalizing the decisions in order to ensure their long-term sustainability.

The overarching approach to this phase of the project is based on Participatory Action Research (PAR) principles. PAR is described as: “A family of research methodologies which pursue action (or change) and research (or understanding) at the same time. In most of its forms it does this by using a cyclic or spiral process which alternates between action and critical reflection and in the later cycles, continuously refining methods, data and interpretation in the light of the understanding developed in the earlier cycles. It is thus an emergent process which takes shape as understanding increases; it is an iterative process which converges towards a better understanding of what happens. In most of its forms it is also participative and qualitative. Among other reasons, change is usually easier to achieve when those affected by the change are involved” (Dick 1999).

Box 1 presents how the PAR approach is operationalized through a locally relevant impact pathway, the village land use planning process, at the East Usambaras site.

**Multidisciplinary assessments for site comparability**

In addition to supporting and facilitating locally relevant multifunctional landscape management scenarios, an important objective of the project is to develop and test a broadly applicable research-development framework. This includes a set of flexible methods for studying and supporting improved land use planning and for comparing different landscapes in terms of livelihood needs and biodiversity values, which will be tested through a series of multidisciplinary assessments at each of the five project sites.

The key steps applied across all the five project sites include
- Analysis of spatiotemporal trends and identification of past driving forces of landscape changes;
- Identification of the characteristics of external stakeholders’ biodiversity values and the strengths and weaknesses of land use regulations affecting local resource management;
- Analysis and appraisal of local livelihoods, perceptions of biodiversity and traditional knowledge related to biodiversity, traditional and formal regulatory frameworks and how they affect resource management;
- Field biophysical surveys of patterns and dynamics of biodiversity as defined through local and external values.

The methods used in the assessments build on existing tools and methods that have been developed by CIFOR, ICRAF and their partners, but they are also adapted to the site-specific conditions, and locally applied complements are developed as needed.
Box 1. Example of the Participatory Action Research approach in practice: village land use planning in the East Usambaras

At the East Usambara site, one of the key activities of the East Usambara Forest Restoration (EU FLR) project of TFCG and WWF is supporting village land use planning in key forest gap areas. Within the broader framework of promoting a multi-functional landscape, the importance of village land use planning is in finding locally suitable balances in land use between protection, management and restoration of forest and trees on village land and other land uses important for local livelihoods.

The land policy in Tanzania acknowledges village land, where customary land tenure arrangements for both individual and communal holdings are recognized and authority over land tenure decision making is vested in the village governments (Land Act 1999 and Village Land Act 1999). The District Planning Offices and District Natural Resources Offices have responsibilities related to assisting village-based land-use planning and the conservation of natural resources outside protected areas on both village and general lands. The village land use planning process is carried out by a village-based team with the facilitation of a team of district staff who provide expert recommendations (WWG 2004).

To the Landscape Mosaics project, village land use planning represents an opportunity to test and monitor the direct influence of the PAR approach on the outcomes of on-going local negotiations over biodiversity conservation and livelihoods. Experiences and outcomes of the participatory land use planning at village level may be used to inform landscape management planning and implementation towards more integrated multifunctionality. Ultimately, it may also provide a channel to influence pertinent national policies through feed-back from the experience of the East Usambaras for the improvement of the national level guidelines on village land use planning. Therefore, supporting the communities and Muheza district in the village land use planning together with the EU FLR project was chosen as a priority impact pathway for the facilitation of multistakeholder scenarios of land use management by the project at the East Usambara site.

The Landscape Mosaics project is working in three pilot villages out of a total of four where the EU FLR project is providing financial support to village land use planning in the East Usambaras in 2008. The PAR approach has translated into the following main activities in the village land use planning process in the pilot villages:

a) capacity-building in PAR, facilitation skills and participatory research and planning techniques of district staff that support village land use planning;

b) application of additional participatory techniques such as a variety of Participatory Rural Appraisal tools and participatory visioning and pathways analysis in the diagnostic phase of the planning, for the incorporation of local knowledge in the formulation of the plans;

c) active promotion of the participation of a broader range of community stakeholder groups in all steps of the planning;

d) support to the village and district land use planning teams in all steps of the planning by a full-time PAR facilitator hired by the project. Following finalization and official approval of the land use plans, the facilitator will continue to work with community groups to provide them support in the implementation of the plans.

It is envisaged that all of the above will contribute to achieving enhanced and more sustainable outcomes of local land use management in terms of better integration of local livelihoods and biodiversity conservation on village land outside of protected areas.
East Usambara site and relevance of project results to biodiversity conservation plans at landscape and national levels

The East Usambara mountains are located near the northeast coast of Tanzania in Tanga region. They form part of the Eastern Arc mountain range that stretches from the southern part of Kenya across the eastern part of Tanzania (Map 1). The Eastern Arc constitutes a globally recognized biodiversity hotspot which has the highest ratio of endemic flora and fauna per 100 km² of all biodiversity hotspots in the world.

The East Usambara mountain forests rank among the most valuable conservation areas in Africa in terms of unique biodiversity values; namely the remarkably high degree of endemism of flora and fauna. More than 100 species of plants and animals are endemic to the forests of the East Usambara, some confined to particular altitudinal bands; many of them are threatened by extinction (Burgess et al. 2007). Despite this very high level of biodiversity, the East Usambara area is also home to thousands of smallholder farmers and large-scale commercial tea production. It thus epitomizes the tensions around landscape management in a multiple-use landscape.

Map 1. Eastern Arc Mountains.

The major ethnic group in the East Usambaras is the Shambaa that are considered the traditional inhabitants of the area. During the past decades, other groups have migrated into the area, attracted by the favourable climatic conditions and job opportunities in the tea plantations.
Small-scale farming consists of rotational and continuous cultivation of food and cash crops, whereas commercial estate farming focuses on tea and sisal. A much-quoted scenario describes the local farmed land-use pattern as dynamic: in both submontane and lowland forests cash crops (mainly cardamom in the highlands) are first cultivated under forest, followed by the gradual clearing of the agroforestry systems for more open cultivations of maize and beans, and finally cassava and sugar cane as land fertility is exhausted (Stocking & Perkin 1992). Recently, tea plantations have been perceived to be expanding in the highland areas. In a survey of 1995, forests constituted about 50% of the total land use in the area compared to 43% agricultural land (Johansson and Sandy 1996), but the ratio has been estimated to be changing rapidly as more forest is cleared. The possibilities of wage employment as well as differing biophysical conditions, however, imply varying livelihood opportunities in different villages. This may in turn translate into different trajectories of cropping systems and land use and land cover changes in different parts of the landscape (Bullock, unpublished data).

It has been estimated that the forest cover in the East Usambaras has reduced by 50-70% from the original cover, and is now highly fragmented. Most of the remaining forests are found within the government Catchment Forest Reserves and the Amani Nature Reserve. Some forests also remain on village land, available to conversion to farmland through farmer decisions and village land allocation systems. Fire is a major threat to forests both outside and inside the reserves due to burning of adjacent fields. In 2004, a new threat to the forests and water reserves emerged in the form of a considerable increase in small-scale mining (www.easternarc.or.tz; October 2008).

Despite the well-documented biodiversity values of the East Usambaras, international development cooperation in the area began in the late 1970s through the development of commercial forestry, harvesting and saw milling industries. Following an outcry from the international conservation community, in the mid 1980s the objective was geared towards catchment forestry and nature conservation. The long-term support from the Government of Finland and the European Union to the Government of Tanzania ended in 2002 as the East Usambara Conservation Area Management Programme (EUCAMP) came to an end. During its implementation, considerable advances were made in mapping the biodiversity values of the area including the creation of a biodiversity database, enlarging the protected area network including the establishment of the Amani Nature Reserve and the establishment of participatory forest management. Since the mid-1990s more attention has been paid to the livelihood needs and participation of the local population (Woodcock 2002).

Since 2004, the Tanzania Forest Conservation Group (TFCG) has been implementing the East Usambara Forest Landscape Restoration (EU FLR) project in critical corridor areas of the East Usambaras in partnership with the Worldwide Fund for Nature (WWF). The EU FLR project aims to reduce the loss of globally important biodiversity, improve local livelihoods and restore a multi-functional landscape in the area through a number of activities including the establishment and management of village forest reserves, diversification of income generating activities, and conservation knowledge and skills development both at village and district levels. The strong thematic synergies between the two projects have been harnessed through a close collaboration where the research
and development activities of the Landscape Mosaics project seamlessly contribute to the implementation of the conservation and development activities of the EU FLR project latter.

The Landscape Mosaic project will contribute to the 2006 Eastern Arc Mountain Forest strategy which envisions that “the unique biodiversity values of the Eastern Arc Mountain forest ecosystems of Tanzania are conserved, sustainably managed and providing equitably shared benefits and services for local, national and international stakeholders” (MNRT 2006). The expected findings will be useful for designing biodiversity-friendly development activities in areas of high biodiversity conservation value, such as around forest protected areas or in forest or wildlife corridors. The findings will be fed into crucial current policy dialogues for landscape management such as land allocation, land use and forest zoning as well as community forestry processes. The 3rd National Report of the Government of Tanzania on the implementation of CBD point out a number of areas which require concerted efforts from within and from development partners, such as increasing awareness and effective participation of indigenous and local communities, and developing incentive measures that ensure that traditional knowledge, innovations and practices are respected, preserved and maintained (URT 2006). The Landscape Mosaic project outputs, which include knowledge and appropriate approaches and practices will contribute to the national CBD implementation.

In addition to core field activities, importance will be given to documenting the project approach in order to discuss and provide tangible information about the research and development process as well as the application of the landscape conservation approach.

**Challenges and research areas**

The main global challenge in biodiversity conservation is how to balance the need to sustain people’s livelihoods with the need to preserve the environment. The Joint CIFOR-ICRAF platform, Landscape Mosaic project among other activities is an effort to address key research issues such as:

- Relationships between biodiversity and livelihood security in dynamic multifunctional landscapes
- Ecological processes and spatial dynamics of biodiversity in landscapes mosaics
- Opportunities and constraints in incentives for biodiversity conservation, sustainable use and equitable sharing in landscape mosaics
- Potential for harmonisation of customary and statutory rules and laws in relation to multifunctionality of landscape mosaics.

Another important aspect in the new thinking in conservation and development is in understanding and incorporation of local knowledge and management practices in biodiversity conservation. This is a challenge and poses a number of research questions, for example how democratic processes can be fostered so that motivation for conservation action is really rooted in local and national contexts in terms of what truly matters to people on the ground. These and other questions related to governance and cultural aspects of biodiversity conservation require deployment of a Participatory Action Research approach which can complement conventional research for the achievement of
more sustainable integration of livelihoods and multiple biodiversity values in landscape management.

Through the PAR approach, we also aim at accelerating the use and impact of our research (“from knowledge to action”). Recognizing local communities and other collaborators as full research partners from the start and targeting locally relevant impact pathways, such as the village land use planning in the East Usambaras, is resulting in increased adoption of appropriate approaches and techniques by partners. At local level, research is envisaged to lead to iterative problem-solving orientated action already during the process instead of after dissemination of final research results.

References


Conserving forests and improving livelihoods in a multifunctional landscape in the East Usambara Mountains of north-east Tanzania. Undated Project plan 2008-2010, WWF Finland.


URT 2006. The Third National Report on the implementation of the Convention on Biological Diversity (CBD). Division of Environment Vice Presidents Office, URT. Dar es Salaam

