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Integrated agricultural landscape management: Case study on inclusive innovation processes, monitoring and evaluation in the Mbeya Region, Tanzania

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Abstract

Integrated landscape management is a process for achieving multiple objectives related to agricultural production, ecosystem conservation, and sustainable natural resource management. These multiple livelihood functions are important features of an agricultural landscape in Mbeya, Tanzania. Due to environmental damage caused by agricultural expansion and charcoal burning, a process called integrated agricultural landscape management (IALM) was implemented to address this problem. This encompassed the identification and involvement of a range of key landscape actors and processes like awareness creation and joint problem analysis, solution framing, learning, planning and implementation of actions, and monitoring and evaluation. A multistakeholder innovation platform was formed for creating a coordination mechanism, common understanding, vision and goals, and networking. Fifty IALM ideas were identified and six selected by the stakeholders. Outcomes of using the IALM process included policy recommendations, joint learning, and innovative actions and were codeveloped, implemented, monitored, and evaluated with the local communities.

Keywords

Intensification, inclusive innovation development, joint planning, joint learning, landscape

Introduction

Integrated landscape management refers to strategies for achieving multiple objectives related to agricultural production, ecosystem conservation and sustainable natural resource management, and human health and well-being across a landscape by strengthening institutions and supporting collaborative multistakeholder management processes (Milder et al., 2013). Integrated agriculture landscape management (IALM) is deliberately designed to support food production, ecosystem conservation, and rural livelihoods (Scherr et al., 2012). It aims to simultaneously contribute to human well-being, food and fiber production, climate change mitigation, and conservation of biodiversity and ecosystems services (LPFN, 2012).

IALM coupled with a strong and functioning agricultural organization is one of the best approaches for sustainable transformation of smallholder agriculture through innovation platforms (IPs). They are useful for getting to the root of problems and can bring about real and durable change in many people, despite the complexity of relationships that IALM deals with (Duncan et al., 2013). Conceptually, IPs bring together stakeholders from different sectors and from different levels of the innovation system, acknowledging and making use of diverse capacity, which includes knowledge, skills, capabilities, and resources (Swaanset al., 2014). In IALM, there is a need to connect diverse actors such as farmers, agricultural input suppliers, traders, food processors, researchers, and government officials who regularly come together to develop a common vision and find ways to achieve their goals. IPs enable and orchestrate the coevolution of technological, social, and institutional changes (Kilelu et al., 2013). Misiko et al. (2013) reported that IPs are most

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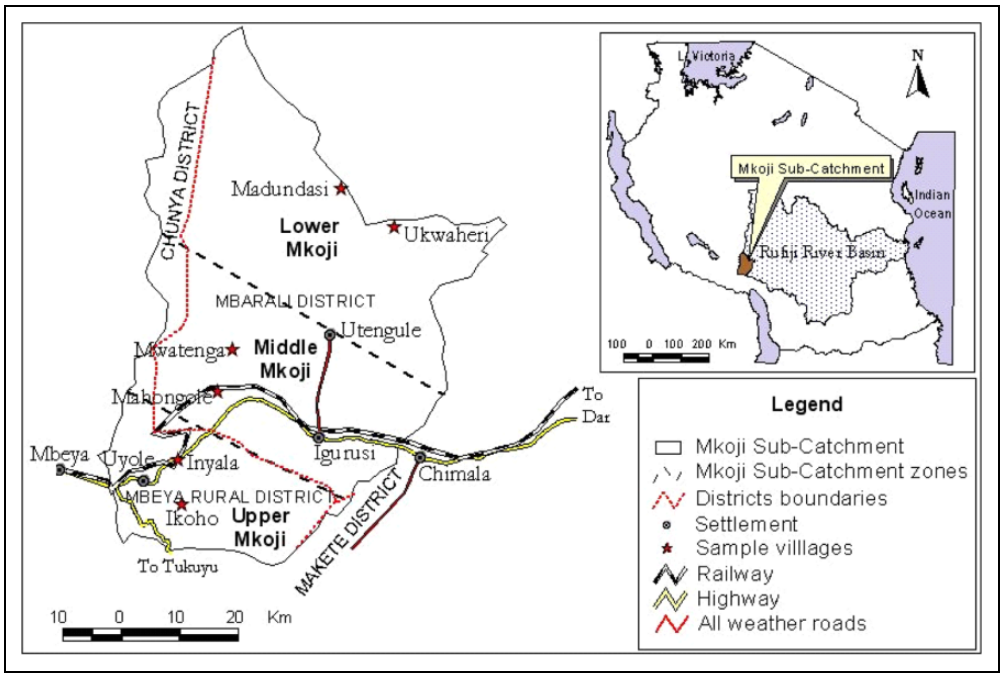

Figure 1. Location of the key landscapes.

relevant in natural resource management (NRM) actions, because it is hard to tackle these problems in components, particularly at the agricultural landscape scale, as most of the problems are beyond the individual farm. Furthermore, IPs can deal with the complexity of NRM, as it involves an interplay of biophysical, social, and economic factors.

The agricultural landscapes of Mbeya are important for the livelihoods of its people and nature, supporting livestock and crop production, nature conservation, and providing environmental services. The uplands are conserved for biodiversity and production purposes yet struggle to provide water for rice paddies, livestock, wildlife, and biodiversity downstream. Population growth and extensive agricultural practices have been causing unprecedented environmental degradation, food insecurity, climate change, variability-induced water scarcity, and social conflicts. Water supplies are dwindling, leading to serious shortages during the dry season—particularly for irrigation activities in the uplands. Mbeya, like other areas in Africa, is experiencing declining soil fertility, low agricultural productivity (livestock and crops), deforestation, soil erosion, water and fodder shortages, and conflicts over natural resources (Malley et al., 2009). These problems call for innovative, environmentally friendly livestock and crop production practices. The introduction of eco-friendly livelihood enterprises, such as beekeeping in conserved areas, is envisioned as a potential solution because it could help to achieve ILM outcomes. As a first step, and in an effort to address Mbeya's ecological, social, and economic challenges, an IP was developed through technical and financial support from Eco-Agriculture partners, United States. This article describes that process, the results, challenges, and lessons emanating from applying IALM processes in IPs.

The intervention landscape

The key landscape of focus in this work covers Mbeya Rural and the Mbarali administrative districts (Figure 1) covering about 3400 km^2. It is commonly known as Mkoji, an important part of the upper subcatchments, and inhibited by approximately 190,000 rural people who depend on agriculture and natural resources. The Ruaha river basin consists of wetlands and nature reserves, rain-fed and irrigated agricultural lands as well as reservoirs for power generation. The Mkoji subcatchment provides water for irrigation, mainly rice production, sustains agropastoral livelihoods in the lower plains, and feeds important wet lands in the Usangu plains (Figure 2).

Integrated agricultural land management

A scan of key stakeholders in the landscape was initiated in February 2013, and the process remained open to accommodate the inclusion of new stakeholders over time. As stakeholders were identified, the first tasks were consultation, sharing of ideas, raising awareness, and the identification and prioritization of IALM innovations.

Stakeholders were then convened in an awareness creation meeting in March 2013, termed "Greening agricultural development in Mbeya: using maps to advance innovations" (Eco-Agriculture Partners, 2013). The major livelihoods activities and their restraints in socioeconomic development were mapped out by workshop participants and five clusters of innovations relating to crop and livestock, biodiversity conservation, markets and marketing approaches, knowledge, learning and planning systems, and institutional and policy mechanisms identified. Innovation cluster teams were established based on relative knowledge advantage and

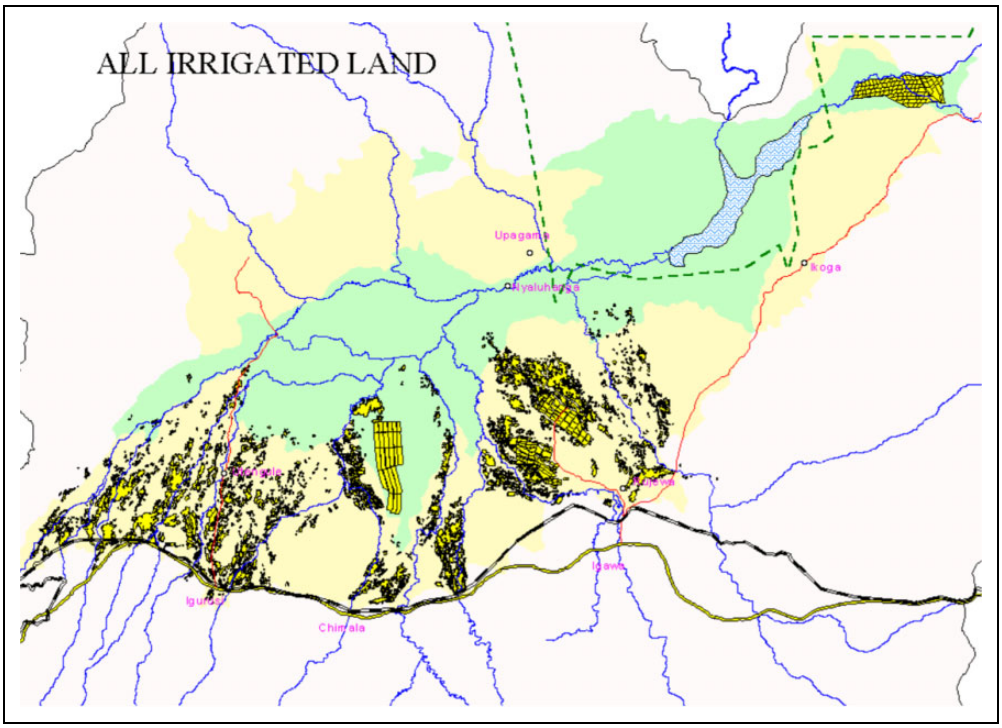

Figure 2. Irrigated paddy (deep yellow) and pastoral grazing (light green) lands.

interests of stakeholders; these teams then prioritized ideas using discussions and direct ranking.

Deepening an understanding that the implementation of participatory village land use planning (VLUP) policy is an integrated, whole-of-landscape exercise was imperative. Conjointly, a study of VLUP was conducted to better understand village land use processes. It involved major land users (pastoralists and farmers) and focused on how the VLUP shaped the policy environment. The study also identified challenges and opportunities for land users when using sustainable agricultural production practices that green the landscape. Another market and marketing innovation for green growth was landscape labeling. Stakeholders saw it as an important approach for enhancing products marketing. Landscape labeling was new in Mbeya landscape, and because of a need for creating market and marketing strategies, it had to be integrated with production innovations in crop, honey, and livestock production; thus, deeper knowledge was required. For this, a workshop of key stakeholders was convened in September 2013 (Environmental Resources Management Center for Sustainable Development [ERMCSD], 2013).

Developing an innovation platform

The idea of developing and establishing a structured and coordinated IP that would support IALM was conceived when a gap became evident in systematically implementing actions across different organizations. The IALM processes helped to select ideas from local community members, leaders, and organizations, which were then developed into coherent learning and development actions with guidance from external experts. Various options for multistakeholder platforms' and members' roles for better structured execution and coordination were presented, deliberated, and agreed in a multistakeholder workshop.

The IP was structured, by activity, into subplatforms under the guidance of experts. The capacities of stakeholders were strengthened through joint learning visits in each of the subplatforms. Communities and professional experts identified opinion leaders and innovators in specific activities, and these people were engaged in the learning visits. The learning visits were followed by village feedback meetings, which created awareness of the innovative solutions and shared knowledge of innovations learned with the rest of the community members. These experiences and learning were shared through reports, presentations, shows, storytelling, and question and answer sessions. The purpose of sharing experiences and learning was to encourage communities toward achieving their own socioeconomic development and/or environmental conservation objectives. At the community level, members were split into gender groups, and these groups prioritized the activities. Facilitators used pairwise and matrix ranking techniques simultaneously to compare community perceptions between paired actions and contribution of the actions to multiple objectives of IALM. The IALM objectives for ranking of the actions were increasing productivity; increasing food security; increasing income; increasing profitability; increasing resilience to climate change and variability, biodiversity and environmental conservation, conflict management; increasing marketability of the products; reducing drudgery; and providing evidence for policy lobby and advocacy. The ranked actions by women and men were compared, and the common highly ranked actions were selected. In cases where women had ranked

a particular action highly and men not, it indicated a gender division of roles in the community. These actions were specifically dealt with as a gender dimension. High-ranking actions for funding were scrutinized with respect to cost of implementation, feasibility, and assurance of completing the action within project duration as well as gender division of roles in that particular community. Community grants to support implementation plans of the high priority actions selected by community members were developed with technical support of experts.

Participatory monitoring and evaluation

A participatory monitoring and evaluation team (M&E team) was established with two members from the overall coordinating organization, members from stakeholders' organizations, and local community members. The team used an institutional score card (Table 1) to assess the performance of the IALM approach. Stakeholders including organizations' and community leaders were interviewed at the beginning and end of the IALM project to establish a benchmark to assess changes after the project. The score card utilized a scale that assessed the extent to which respondents agreed with a set of statements coded as: *strongly disagree*, *disagree*, *neither agree nor disagree*, *agree*, and *strongly agree*. In addition, follow-up mechanisms of the actions and activities, their outputs, and outcomes per indicators established with community members were developed and pursued. The overall coordinating organization and implementing organization supported technical implementation toward achieving outputs. Community members in the M&E team monitored monthly progress and reported to the coordinating organization on the hindering bottlenecks in implementing the actions on the ground in their communities. This helped with making joint corrective measures.

Results

Awareness creation, identifying, and prioritizing innovative IALM actions

Eighteen stakeholders in Mbeya were identified, including a range of organizations and groups representing pastoralists, agriculture, conservation, natural resources, energy, micro-finance, agri-business, civil society, agri-processing and product trading, research, extension and higher education, and public–private partnership facilitation. Concepts associated with the terms landscape and integrated management were shared with stakeholders to create awareness among them and to enable them to identify, for themselves, what innovative IALM actions they could take. During the process, they identified a total of 50 innovative actions, which were then prioritized. Innovative IALM actions that contributed highly to multiple objectives were pursued further. These included VLUP, System of Rice Intensification (SRI) in crop production, and sustainable intensification of livestock production and honey production.

Table 1. Institutional score card performance matrix used for assessment of the progress of IALM.

1 There is effective cross-sectoral and cross-boundary planning/decision-making, implementation, and monitoring at a landscape scale.
   (a) There is effective cross-sectoral and cross-boundary planning/decision-making, implementation, and monitoring at a landscape scale
   (b) Actors/organizations from different sectors (e.g. agriculture, forests, water, and wildlife) interact with each other to implement actions
   (c) Actors/organizations from different sectors (e.g. agriculture, forests, water, and, wildlife) interact with each other to monitor actions
2 Farmers, producers, and communities have adequate capacities to contribute to effective landscape management
   (a) Farmers, producers, and communities have financial capacity
   (b) Farmers, producers, and communities have human capacity
   (c) Farmers, producers and communities have demonstrated leadership capacity
   (d) Farmers, producers and communities have the capacity to coordinate with other organizations
3 Relationships among public, private, and civic institutions support the management of integrated landscapes
   (a) Different types of actors/organizations (i.e. civil society groups, community-based organizations, producer groups, government institutions, private sector, etc.) interact to make management decisions and implement management activities in the landscape
   (b) Responsibilities for managing different aspects of the landscape are shared across public, private, and civic organizations
   (c) Existing partnerships between public, private, and civic partners encourage the participation of new and diverse actors/organizations
4 Incentive mechanisms exist for the management of integrated landscapes
   (a) Regulations and legislation support the development of ILAM
   (b) There are market incentives for the development of ILAM
5 There are existing social mechanisms that support ILAM
   (a) Stakeholders in the landscape work collaboratively with different actors and sectors to overcome conflicts and solve problems
   (b) Stakeholders in the landscape work on landscape issues collaboratively (such as watershed management, land degradation, and sustainable agriculture intensification)
   (c) Stakeholders understand their landscape and how different components work together

IALM: integrated agricultural landscape management.

Understanding the status of potential IALM

The VLUP was a vehicle to foster the adoption of a range of appropriate eco-friendly actions and was thus investigated in detail. This revealed that VLUP was a potential tool to foster green growth in the landscape (Hart et al., 2014b). Implementing VLUP was constrained by a range of factors: financial resources at the local level, limited support from central government sources, technical support, poor

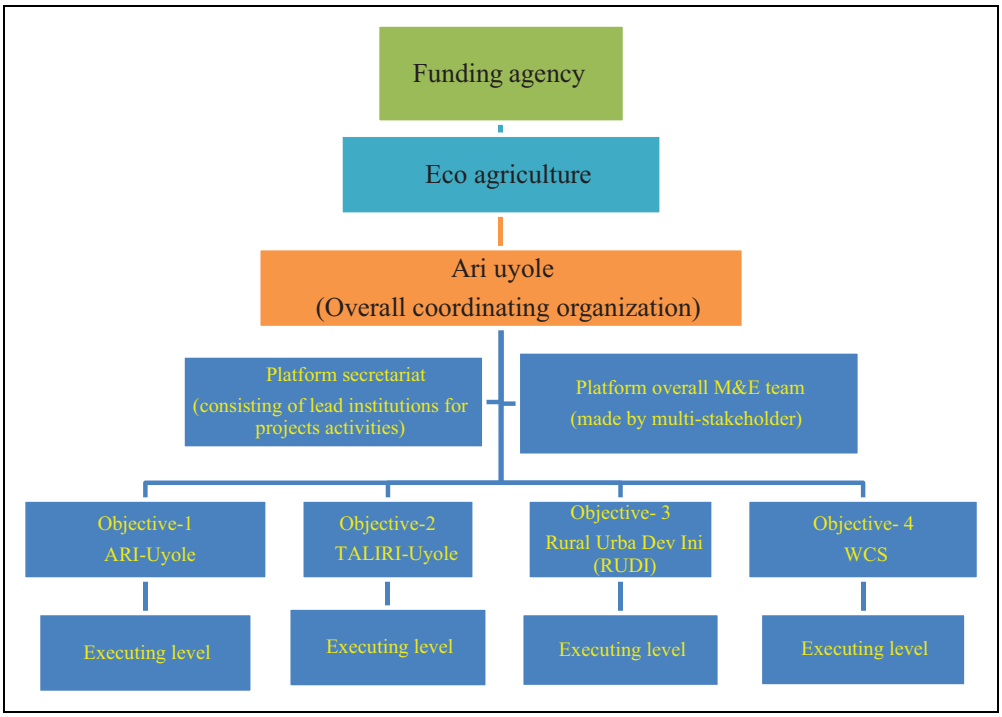

Figure 3. Organizational structure of the IALM innovation platform. IALM: integrated agricultural landscape management.

awareness among farmers and pastoralists, stakeholders' understanding of the VLUP steps and participatory processes, and boundary contests between villagers (Hart et al., 2014a). The IP was used to improve knowledge and understanding of the VLUP process with local decision makers and local communities, while actions to improve the VLUP process were identified by the IP actors. Stakeholders' understanding of the landscape labeling method was imparted through a workshop (ERMCSD, 2013) and furthered through exposing processors and traders to local and regional commercial trade fairs. This proved to be particularly valuable. Rice and honey production received particular attention and has been scaled up in the Mbeya landscape.

Mbeya IALM innovation platform

To get action on the ground through learning and engaging multistakeholders in deliberation, an IALM IP was established and tested (Figure 3). Leading expert organizations were assigned roles to execute joint learning and put innovation actions on the ground with communities. For example, a public research institute, Agricultural Research Institute-Uyole [ARI-Uyole]) has the role of overall coordination and platform strengthening. ARI-Uyole signed an agreement with eco-agriculture partners and received funds to support actions and subcontracted implementation of activities to the expert lead institutions. The Tanzania Livestock Research Institute, a public institute, led the livestock intensification learning and action team for pastoral systems improvement. Civil society organizations, Rural Development Initiatives, and Grassroots Development along with Wildlife Conservation Society (WCS) led rice system intensification and nature and beekeeping actions, respectively.

Expert organizations executed their activities with relevant stakeholders with support from the coordinating organization. The expert lead institute constituted the secretariat of the platform and technically supported actions as well as comanaged community grants and communicated with the overall coordinator. Furthermore, expert organizations guided development of the community grants and coordinated the actors in the respective subplatforms. In addition, the expert lead organizations were responsible for monitoring the indicators for evaluation of respective actions and consolidate reports of the actions.

The overall coordinator of the platform, in collaboration with secretariat members from the sub-platform, organized and facilitated learning visits of innovation teams. Each innovation team, made up of community opinion makers, innovators, and experts, visited innovation hubs, so all participants were exposed to new action ideas. This is discussed in the following sections.

Learning about Sustainable Livestock Intensification

The livestock subplatform was composed of professionals from research and extension and the pastoral community. They identified opinion makers and innovators who visited the Manyara Ranch in the Maasai Steppe as well as the Ol Pejeta Ranch in the Laikipia landscape in Kenya. The purpose of these visits was to learn new ideas and innovations for sustainable intensification of pastoral livestock production in a ranch (Matebete in the Mbeya landscape). Immediately after the visits, a feedback meeting was held with the pastoral community to trigger innovative ideas for their own sustainable pastoral livestock production. A range of

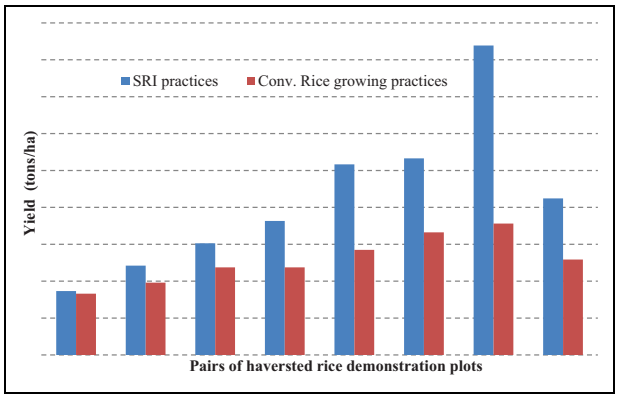

Figure 4. Observed productivity of rice under SRI and conventional practice.

ideas were generated, which included animal breed improvement, feeds and pasture improvement, livestock fattening for the meat markets as well as water and health infrastructure. Water supply was a priority for both men and women for distributing water from a central community borehole to watering points for calves and milking cattle. Women identified two priorities: the training of women on milk and milk products processing, packaging, and landscape labeling, and the construction of traditional *boma* (places of gathering) as a business center for Maasai women handcrafts. These communities were supported to implement the first two actions, which in turn resulted in the supply of water for 76 nearby households, 300 milked cows and their calves, and hundreds of goat and sheep in Matebete villagers traditional ranch. In addition, 96 women were trained in milking and milk hygiene, processing, and marketing milk products.

Learning about SRI innovations

A team of opinion leaders and innovators from the Mbarali rice irrigation schemes, accompanied by professionals in production, processors, and marketing stakeholders, visited Agricultural Marketing Co-operative Societies (AMCOs) and Savings and Credit Co-operatives (SACCOs) in the Madibira and Idodi in Mbarali and Iringa districts. It was identified that the adoption of the RSI innovations could increase rice yield from 4 to 8 t/ha (Figure 4), which in addition had saved irrigation water and was thus a climate smart agricultural practice. Soil fertility information for better fertilizer application was generated in four irrigation schemes. Farmers were provided with feedback on fertility constraints and corrective measures in rice production. Furthermore, they learned about the structured and profitable marketing of the produce. Through this learning, it was realized that labor associated with SRI practice and profitability of increased productivity called for innovation in mechanization, particularly in transplanting of 12- to 15-day-old seedlings and in processing, grading, packaging, and landscape labeling for increased competitiveness in markets. A local company, Rafael Group limited, which is leading a Comprehensive African Rice Initiative consortium, chose to focus on learning and actions on processing, packaging, and marketing innovations.

Learning about honey production

A group of beekeeping leaders as well as researchers and community members visited Kijombe Environmental Volunteers in Lari, Kenya, as part of their learning visits. The team learned new ideas for improving beekeeping techniques, honey harvesting and collection for processing, packaging, and landscape labeling. Lessons about water and environmental management techniques beekeepers used inspired the group to pay attention to the economics of beekeeping, among other activities such as spring water processing, packaging and sale, eco-tourism and associated services (lodge and tour guiding), and idigenous tree nurseries that are also important income earning opportunities. They also learned about institutional innovations, such as the role of a beekeepers' association, creating value and ownership of the landscape to local communities, and environmental conservation school clubs for revegetation of the landscpae through community initiatives. Feedback from visits and planning meetings with local beekeepers resulted in jointly establishing a network called the Mbeya Beekeepers' Association, for the three districts of Mbeya landscape. The association adopted the landscape labeling marketing approach with three distinct district identities, namely, *Rungwe Bio Honey*, *Mbarali Bio Honey*, and *Chunya Bio Honey*. The network envisages having a common collection and processing center with support of the WCS.

Participatory M&E

The IALM innovation platform had an overall M&E team made up of a range of stakeholders participating in the platform. Capacity building and facilitating the subplatforms and development of a common vision and understanding of the IALM approach among stakeholders was key to proper execution of the actions. Joint learning developed understanding of IALM concepts and components, specific management techniques of biodiversity conservation, climate smart agricultural practices, and identification of actions and analysis of knowledge gaps were emphasized as part of the platform capacity building. In fostering the inclusive IALM approach, stakeholders' capacity was built to improve their knowledge of mechanisms for lobbying for a change to create enabling policies and laws in support of the ILM approach. One of the key overarching issues was support to implement VLUP as a tool in integrating agriculture green growth with nature conservation in the landscape. One of the key deliverables of the project was creating awareness among stakeholders of the ILM approach. Using a questionnaire (Table 1), our assessments showed that at the beginning many were unsure about ILM, and after the intervention, there was a noticeable shift in most stakeholders' awareness of the ILM approach. Moreover, communities in general had positive views of how well the ILM approach worked.

Discussion and concluding comments

Integrated landscape management is a complex holistic concept (Pulido and Bocco, 2014), which requires commitment of stakeholders to the process of achieving a shared vision. Socioeconomic and cultural factors appear crucial in learning and accelerating inclusive innovation development processes. In Nepal, Bhattarai et al. (2015) identified optimism, willingness to take risks, high will power, commitment, and continuous learning attitudes as keys to success. The main drivers of being innovative were identified as a need to solve family/community problems, change existing unfavorable situations, and deal with scarcity, personal habits, and ego. Similar attributes, particularly learning and a need to change the situation, were observed in identified opinion makers and innovators by their communities in the Mbeya landscape. According to Pratt et al. (2015), culture (risk taking, acknowledging failure, fostering collaboration, and social networks), process (unpredictable and nonlinear), incentives (not recognizing failure as eventual success); composition (cognitive diversity), leadership (bottom up), and structure (complex structures) are important characteristics of inclusive creativity and innovation. These elements were also important in this case study, whereby stakeholders with diverse backgrounds and objectives were brought together for problem analysis, learning, solutions framing, and implementing actions. Our experiences were similar to those of Duncan et al. (2013) who showed how complex relationships are in landscape management and that IPs can help get to the root of the problems to bring about real and durable change for many people.

The M&E process in this case study attempted to engage beneficiaries and professionals to track progress, process, outputs, and outcomes of the interventions. This was in agreement with Preskill and Mack (2013) that M&E is a tool of learning and looking at the progress of planned development actions. They argued that M&E is important in (i) understanding and tracking effects, influence, and impacts of the actions; (ii) ensuring the collection and use of meaningful and useful stakeholder information; (iii) facilitating and supporting individual, group and organizational learning; (iv) providing insights into the effectiveness and efficiencies of the organization's core activities (e.g. communication); and (v) informing the field stakeholders about key learning from their work. They indicate in order to learn from M&E-generated information, M&E needs to be collaborative, designed to generate actionable and ongoing learning, flexible and adaptive to many dynamic contexts, and mindful of everyone's time and resources. In our case study, M&E has generated information from stakeholders on their awareness before and after intervention. Learning, communication, joint decisions on corrective actions, and progress to achieving outputs and outcomes were enhanced through the stakeholder innovation platform in the process.

The challenges in fostering adoption of ILMin Mbeya and Tanzania in general seem to be the development of policies focusing on disciplinary sectors, which have different objectives and strategies along professional disciplinary lines such as agriculture, livestock, conservation, water, and land. Funding of the different sectors is based on the strategies and objectives set by a particular sector policy. This is a challenge in developing operational mechanisms for implementing ILM. It is difficult to harmonize adopted approaches by different sectors because of differing fund provision and understanding among stakeholders in integrating sectors. Finally, organizational innovation is critical for effective and efficient coordination and engagement of multiple stakeholders in the process of IALM. Local community engagement from the outset creates focus, incentive, and alignment with communities' needs, which led to effective implementation of the actions.

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