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SCALING SUSTAINABLE LAND MANAGEMENT INNOVATIONS: THE AFRICAN HIGHLAND INITIATIVE DEVOLUTION MODEL

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ABSTRACT

Benefits accruing from using sustainable land management (SLM) innovations including technologies, approaches and methods specifically in eastern Africa highlands do not match the scale of their adoption among rural poor communities inhabiting critical ecosystems of global importance. The African Highlands Initiative (AHI), an ecological programme building on more than a decade legacy as an innovator towards development of innovative methods and approaches, unveils an AHI devolution model anchored in policy reforms involving transfer of functions to more localised institutions that empowers stakeholders towards scaling SLM innovations. This paper presents the model whose focus is on multi-stakeholder engagements embedded in a structured process comprising of drivers, facilitators, devolution governance, outcomes and feedback systems. The model capitalises on Innovation Platforms (IPs) to access a large consortium of actors, each playing important roles at multi-scales, and further take advantage of the benefits of decentralisations to leverage support and buy-in necessary for operationalising an effective scaling strategy. Towards operationalising the model, SLM scaling strategy developed and rolled out in Ethiopia and Uganda is described, unpacking its five components: (i) understanding local contexts; (ii) facilitating learning alliances; (iii) monitoring performance; (iv) implementing tangible action including creating enabling environment; and (v) continuous capacity building. Achievements attributed to the model specific to Ethiopia and Uganda include; a systematic strategy for 10 devolution structures (IPs) at multi-scales mainstreamed under decentralised local government authorities; enabling policy environment beyond capacity building; institutional strengthening and human resource development and increased allocation of resources to SLM by local government. Tangible results in Ethiopia include: 1.24 ha fenced for regeneration, seed bulking on 8 community nurseries; distribution of 62, 463 seedlings; 234 km of soil conservation structures; 2 bylaws with 608 households benefiting from Integrated Natural Resource Management (INRM) technologies. In Uganda results include distribution of 71,903 tree seedlings, nurturing 219 seedlings in 6 community nurseries, building capacity of 153 IP members in seed collection, two bylaws and ordinance; as well as 8,435 ha regenerated. Policy recommendations in support of the AHI devolution model include investment in creating enabling environment, including incentive packages; mainstreaming IPs in local government structures, ; and knowledge management; capacity building; advocacy and awareness building and a political will.

Key Words: Empowerment, Innovation Platforms, decentralisation

RÉSUMÉ

Les bénéfices issus de l'utilisation des innovations de la gestion durables des terres (SLM) incluant les technologies, approches et méthodes spécialement dans les hautes terres de l'Afrique de l'Est, ne correspondent pas au niveau d'adoption parmi les communautés rurales pauvres habitant les écosystèmes critiques d'importance mondiale. L'initiative dénommée "African Highlands Initiative (AHI)", un programme écologique se basant sur plus d'un leg d'une décennie comme un innovateur de développement de méthodes d'innovation et approches, dévoile un modèle de délégation d'AHI, ancré sur les réformes politiques impliquant le transfert des fonctions aux institutions

plus localisées renforçant les partenaires dans l'application des innovations de SLM. Cet article présente le modèle focalisé sur des engagements multi-partenaires implantés dans un processus structuré comprenant les chaffeurs, facilitateurs, délégation de la gouvernance, les résultats et les systèmes de restitution. Le modèle s'appuie sur les plateformes d'innovation (IPs) pour accéder à un large consortium des acteurs, chacun jouant des rôles importants à des niveaux multiples, et prenant avantage des bénéfices de décentralisation pour gagner du soutien et du *bay-in* nécessaires afin d'opérationnaliser une stratégie efficace d'application. Vers une opérationnalisation du modèle, la stratégie d'application de SLM développée et largement appliquée en Ethiopie et Ouganda est décrite, révélant ses cing composants: (i) compréhension des contextes locaux; (ii) facilitation des alliances d'apprentissage; (iii) performance de suivi; (iv) exécution des actions tangibles incluant la création d'un environnement propice; and (v) renforcement continu de capacité. Des réalisations attribuées au modèle spécifique pour l'Ethiopie et l'Ouganda incluent une stratégie systématique pour la délégation des structures (IPs) à des niveaux multiples intégrées dans un gouvernement d'autoritv locale; permettant une politique d'environnement au-delà du renforcement de la capacité; renforcement institutionnel et le développement et développement des resources humaines et l'augmentation d'allocation des resources au SLM par le gouvernement local. Des résultats tangibles en Ethiopie incluent: 1.24 ha clôturés pour régénération, collectin des sémences sur 8 pépinières communautaires; distribution de 62, 463 plants; 234 km de structures de conservation du sol; 2 lois avec 608 ménages bénéficiant des technologies d' intégration de la gestion des ressources naturelle. En Ouganda, les résultats incluent la distribution de 71,903 plants d'arbres, fournissant 219 plants dans 6 communautés, renforcement de la capacité de 153 IP membres dans la collection des semences, deux lois et ordonance aussi bien 8,435 ha régénérés. Les recommendations des politiques pour l'appui du modèle d'AHI de délégation incluent l'investissement dans la création d'environnement propice, incluant des paquets de motivation, l'intégration des IPs dans les structures des gouvernements locaux et la gestion des connaissances, renforcement des capacités; la promotion et la sensibilisation ainsi que la volonté politique.

Mots Clés: Renforcement, plate forme d'Innovation, décentralisation

INTRODUCTION

Sustainable Land Management (SLM) is at the center of sub-Sahara Africa's (SSA) development challenge in view of land being the subcontinent's true wealth for the poverty stricken populations who constitute 83% (FAO, 2008). At a regional level, the comprehensive use of SLM innovations in eastern Africa including methods, approaches, practices, policies that seek to increase production through both traditional and innovative systems, and improve resilience to the various environmental threats is a lifeline support system for 232 million people (Keely, 2001). About 20% of SSA land area is affected by land degradation, a situation closely associated with soil moisture stress, affecting 86% of a range of soils with implications of negative nutrient balance on crop lands. This is in addition to soil fertility degradation ranked the single most important food security constraint in SSA (Oldeman, 1994; Eswaran *et al.,* 1997). In terms of biodiversity loss, 126 African species are reported extinct and 2,018 threatened (IUCN, 2006).

Despite intervention efforts, land degradation persists and continues to increase at an alarming rate, undermining the capacity of ecosystems to provide critical environmental services such as clean water and fertile soils (Sanchez, 2002; Pender *et al.,* 2004). Considering the significance of land resources to the majority rural poor in the region, whose economic activity is predominantly agriculture, SLM presents a unique pro-poor rural livelihood strategy to unlock smallholder farmers out of poverty traps (Bunning, 2004). Wide adoption of SLM has potential to reverse land degradation and help integrate land, water, biodiversity and environmental management (including input and output externalities) to meet rising food and fiber demands, while sustaining ecosystem services and livelihoods that meet the requirements of a growing population (World Bank, 2006).

The need for scaling SLM therefore is based on impact driven for a greater and more effective investment necessary to address the scale and adverse wide implications of land degradation problem, raise economic growth, secure livelihoods, and reduce environmental risks including climate change. Increasingly and for a number of reasons, there is a glaring need for scaling SLM particularly in the eastern Africa

highlands: (i) as a highly vulnerable ecological region producing over 50% of the staple foods and most cash crops in the region yet agricultural productivity has steadily been declining due to pervasive land degradation and poor support mechanisms to scaling of SLM innovations proven successful in pilot sites (ii) Although estimates globally and in particular eastern Africa vary together with associated costs, on record startling land degradation rates include: 1.9 billion tonnes of top soil worth US $106 million and equivalent to 3% of agricultural GDP annually washed from Ethiopian highlands (FAO/ UNDP, 1986; Bojo and Cossells, 1995); and a loss of 4-12% of the national GNDP valued at US $ 625 million, lost annually in Uganda due to environmental degradation (Slade and Weitz, 1991); (iii) In spite of vulnerability to degradation, the region comprising 23% of eastern Africa land area, doubles both as a home of rich biodiversity hot spots of invaluable local, regional and international importance; and (iv) as an epicenter of the world's highest population growth rate of over 5.5 million people per year at the same time the eco region functioning as a food basket for populations beyond its boundaries.

Consequently, the importance of scaling SLM has increasingly and simultaneously been recognised under the Comprehensive Africa Agricultural Development Programme (CAADP) and the Environment Programme and Action Plan of the New Partnership for African Development (NEPAD) as well as under national development plans and poverty reduction strategies by governments (NEPAD, 2003; World Bank 2006). However, this recognition remains lacking in terms of translation into effective pro-scaling SLM national policies or programmes, including prioritisation of scaling SLM in national and local government budgets or for donor support. Besides, new opportunities for scaling SLM are arising from regulations and emerging markets to mitigate global emissions of greenhouse gases (GHG). This is against a background that many SLM practices such as agroforestry, integrated crop-livestock management and conservation agriculture have demonstrated potential to simultaneously achieve both adaptation and mitigation goals (Kandji *et al*., 2006). Scaling SLM therefore, offers a competitive approach to climate change with potential of reducing the need for costly coping measures such as adjusting cropping systems and livelihoods styles, and opening new land for agriculture.

In terms of SLM impacts towards rationalising scaling SLM innovations, there is apple evidence in the region. This include: (i) farm productivity increase in West Usambara, Tanzania by up to 5 times, upon adoption of SLM innovations (Mowo *et al*., 2002); (ii) strong positive impact of incorporation of crop residue up to 30% increase as well as soil and water conservation (SWC) measures up to 58% increase on crop yields in Uganda (Nkonya *et al*. (2008); (iii) significant positive impacts of stone terraces on crop yields up to 18 - 24% in low rainfall highlands of Tigray, Ethiopia (Benin, 2006; Pender and Gebremeldin, 2008; Kassie *et al*., 2008); (iv) cereal yields increase from 50 to 100% for 45 interventions of SLM practices in SSA (Pretty, 2006); (v) maize yields increase in Zambia averaging 3.6 tonnes ha^{-1} in the first year after two years of improved *Sesbania sesban* compared with yields of only 1.0 tonne ha^{-1} on continuous unfertilised maize. This impressive evidence unfortunately does not match adoption rates. For instance, inorganic fertiliser use estimates for SSA varies from as low as 2% of plots in Uganda, to 50% of plots in Ethiopia (TerrAfrica, 2009). Further, according to UNEP-UNCTAD (2008), at least 1.9 million farmers representing only a small fraction (less than 1%) of the total agricultural land, use SLM practices in SSA. In the eastern Africa highlands, the adoption rate for SLM is very low and characteristically depicts islands of success status (Mekuria *et al.,* 2008).

Scaling SLM as a desired outcome has connotations of devolution including empowerment, social change, learning, participatory process, and people oriented. It also involves relationship building with elements that target more quality SLM benefits to more people over a wider geographical area more quickly, equitably and lastingly (IIRR, 2000). Consequently, within devolution principles, the decentralisation form of governance based on principles of subsidiary and democratic governance, with more powers to localised institutions prevailing in all eastern African countries, represents great prospects for scaling

SLM. However, the lower governance levels at district, sub country, parish and villages face many challenges. These include; overlapping responsibilities between central and local government organs; weak enforcement of by-laws associated with potential conflict of interest by elected local leaders; limited sensitisation about benefits from enforcement of by-laws; oppressive and inappropriate by-laws conflicting and pervasive policies. Further, there are inhibiting gaps towards achieving landscape level impacts with SLM:

(i) at farm level, there is conspicuous lack of continuity of SLM characterised by patchy adoption patterns. This is illustrated by lack of collective action translating in fragmented acreage of land under SLM. Thus, generating suboptimal environmental benefits accruing to a small population. Farmers' institutions are weak, with limited advocacy and lobbying skills and poor representation of the vulnerable groups. More specifically, a gender dimension which explores dynamics in SLM is limited. There are wide gaps in critical information required for SLM and the problem of fixed mind-sets among farmers. In terms of strategies, effective structures such as a hierarchy of proactive farmer groups linking community level organisations to district and national decision making institutions are missing to trigger landscape level outcomes including more inclusive stakeholder involvement and increased partnerships SLM

(ii) at community level, participation of communities in local level natural resource governance, including by-laws reform and enforcement, is minimal despite its huge potential in spearheading landscape level management. Among the casual factors are dysfunctional organisational structures among rural institutions.

(iii) at district level, where farmers groups and national level decision making intersect, adequate knowledge is lacking on the mechanisms for involvement including rules of engagement by various stakeholders and support for integration between the different levels (community, district, national and regional). District departments involved with Natural Resources Management (NRM) are poorly facilitated, coordinated and subjected to different social political interests. Meanwhile, power and control factors characterise politics resulting in competition and conflicts.

(iv) at national level, linkages between research and development institution are weak albeit with several complementarities. The current institutional set-up, coordination is complicated by overlapping roles among institutions involved in knowledge generation on one hand, and extension on the hand, glaringly limits mainstreaming integrated approaches of land management for wider adoption.

(v) Opportunities of Information Communication Technology (ICT) have not been fully utilised to catalyse wide scale landscape level impact with regards to SLM.

It is in the light of SLM benefits yet undermined by persistent land degradation; great prospects for scaling SLM. However, these are constrained by a number of governance complications; knowledge gaps and weak extension system. On this basis, a Learning Alliance Action Research Team (LAART) was formed. The team operated as a collaborative network of international, regional and national research institutions, local government authorities, farmer groups and nongovernmental organisations. Primarily, LAART steered customising and operationalising of AHI devolution model while implementing the 'Going to Scale' project with support from International Development Research Centre (IDRC) towards innovatively addressing the challenges and leveraging support for effective SLM targeting landscape scales. LAART membership (Table 1) is comprised of (i) direct implementing partners: AHI hosted by World Agroforestry Centre (ICRAF); Policy Analysis and Advocacy Programme (PAAP) a programme of Association for strengthening Agricultural Research in East and Central Africa

TABLE 1. LAART membership under the 'Going to scale' project'

Organization	Institutional mandates	Scale of operation
IDRC	Initiate, encourage, support and conduct research into the problems of the developing regions of the world and into the means for applying and adapting scientific, technical and other knowledge to the economic and social advancement of those regions. IDRC regional office for SSA focus on agriculture and environment, social and economic policy and information and communication technologies for development.. paying attention to governance, translating research results into policy decisions, and gender issues in development.	International, Regional
AHI programme under ICRAF	Generate methods and tools for integrated natural resource management (INRM) at farm and landscape levels in highlands of eastern Africa	International Regional
PAAP programme under ASARECA	Support the provision of an appropriate regulatory and incentive structure that enhances the performance of the agricultural sector in eastern and Central Africa	Regional
BUGIZARDI[1] Institute under NARO	Generate, develop and promote appropriate agricultural technologies and knowledge for improving the livelihoods of people in Uganda's South Eastern Agro-Ecological Zone	Zonal
HARC[2] under EIAR	Conduct research at federal level that will provide market competitive agricultural technologies that will contribute to increased agricultural productivity and nutrition quality, sustainable food security, economic development, and conservation of the integrity of natural resources and the environment.	Zonal
Makerere University in Uganda; Ambo University, Addis Abeba University and Hawassa University in Ethiopia Local Government authorities	Provide innovative teaching, learning, research and services responsive to National and Global needs. Coordinate, support and advocate for participation and accountability at local levels for sustainable, efficient and effective service delivery under the decentralized system of governance.	National
Farmer groups such as: KADLACC[3] in Uganda and Garee Misoomaa [4] in Ethiopia	Forum for sustainable solutions developing options, creating demand and advocacy for SLM	National and Community
NGOs such as KACOFA[4] in Uganda and Oromiya Saving and Credit Association in Ethiopia	Improve incomes through improved farming practices in Kapchorwa	District

[1.] Bujinyanya Zonal Agricultural Research and Development Institute. [2.] Holetta Agricultural Research Centre; [3.] Kapchorwa District Landcare Chapter; [4.] Collective action farmer group for gulley rehabilitation; [5.] Kapchorwa Commercial Farmers' Association (KACOFA)

(ASARECA); Ethiopia Institute of Agricultural Research (EIAR); and National Agricultural Research Organisation (NARO) involved in the learning alliance at IP level; (ii) critical partners at local government level and higher institutions of learning such as universities to facilitate SLM scaling up and out within institutions and beyond the study sites; and (iii) target institutions for uptake promotion including farmer organisations and land care chapters.

The aim of 'Going to scale project' was to improve agricultural productivity and increase rural income and food security from sustainable utilisation of agro-based natural resources by scaling SLM innovations for sustainable agricultural productivity in the highlands of eastern Africa. To achieve this aim, AHI and partners have over four years focused on engagement of a multi-scale, multi-stakeholder adaptive management process that involve three major components to enhance the scaling up of SLM innovations which include: (i) strong farmer institutions; (ii) functional multi-scale, multi stakeholder innovation platforms, and (iii) effective adaptive governance processes (Fig. 1).

The objectives of this paper are to: (i) elucidate an AHI devolution model that evolved from insights of previous AHI and ECAPAPA work illustrating that landscape level impacts can be realised through strong multi-level innovation platforms that use social learning and adaptive management; (ii) review the achievements using AHI devolution model; (iii) highlight the challenges and opportunities of scaling SLM innovations using the AHI model; and (iv) make policy recommendation for strengthening scaling SLM in eastern Africa highlands.

African Highlands Initiative. The AHI was initiated in 1995 as a consortium of national and international agricultural research and development organisations. It is currently hosted by ICRAF under the eastern African regional programme, coordinated in Nairobi, Kenya. In its life time, AHI functioned both as an eco-regional programme of the *Consultative Group on International Agricultural Research* (CGIAR)

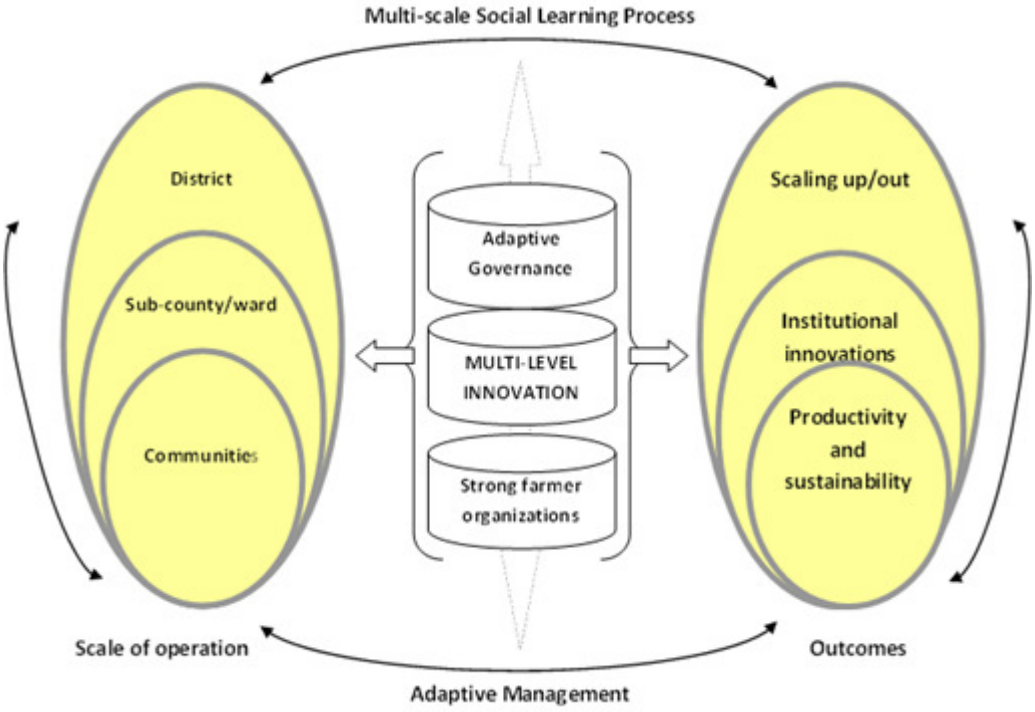


Figure 1. Operational framework for engagement of multi-scale, multi-stakeholder, adaptive process towards scaling SLM.

and a regional programme of the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA). The core role of AHI, as an innovator, is to develop novel methods and approaches for participatory Integrated Natural Resources Management (INRM) through testing in pilot sites, cross-site synthesis, and regional dissemination and institutionalisation. AHI's targeted beneficiaries and partners included national and international research organisations and networks, development organisations, local governments, civil society organisations, service providers, policy makers, community-based organisations, and male and female farmers. Since its inception, AHI has coordinated and supported a multi-disciplinary and multi-institutional team of researchers and development workers, located in benchmark site, working with farmers in a participatory mode. A regional research team supports the site teams, with a regional coordinator providing the oversight technical and administrative support. AHI uses capacity building as an instrument for enhancement of the competence of scientists and associated partners. AHI has adopted an approach in developing and managing its research/development programmes that allows a large number of stakeholders to have an active role in identifying and prioritising research themes. The use of multi-disciplinary and multi-institutional research teams in implementing sites, in each participating country, enhances testing relevant social and technological approaches to solve problems related to agricultural productivity and environment management.

AHI is guided by INRM principles including: fostering sustainability; enhancing local adaptive capacities, acknowledging and addressing trade-offs through negation support; emphasis of livelihoods with partners through the integration of system components, disciplines, stakeholders and scale. Renewed strength of AHI beyond a decade of existence is attributed to commitment to NRM; informal capacity building of partner institutions and scientists; advocacy for change in research approaches; influencing other actors consolidation of system components and their relationships; and the ability to influence communities using social science and participatory tools (Mekulia, 2008).

The AHI devolution model. A conspicuous feature of AHI devolution model is stimulating investment in NRM by improving farmers feedback to research, extension and development agencies within a social learning process. Towards achieving synergies between local technological, institutional, market and policy innovations and enabling higher-level innovations within research and development institutions, the model has inherent mechanisms to foster knowledge and skills while institutionalising lessons learned for wider impacts. The main components of the model illustrate a structured process including drivers, facilitators, devolution governance, outcomes and feedback (Fig. 2)

Drivers are compelling factors to devolve roles and responsibilities towards effective and efficient NRM. They include persistent land degradation and its wide cost implications both onsite and offsite; opportunities of emerging payment for environmental services such as carbon offsets; global and regional coalitions towards comprehensive land degradation intervention such as TerrAfrica under NEPAD; greater emphasis on participation, democracy and inclusive mechanisms to catalyse greater impacts; glaring limited effectiveness of NRM by states characterised by protracted conflicts and capacity gaps; and fiscal crisis of governments with donor intervention becoming regular interventions.

Facilitators are supportive factors including institutional framework presenting an enabling policy environment such as decentralised form of governance; institutions sharing common goals and the elaborate leadership coordination mechanisms including recognised mandates and jurisdiction.

Devolution governance system as the core component and engine of the model, presents fundamental issues and priorities concerning the transfer of authority and deployment of authority as well as sets of incentives required to support devolution. These are embedded in five (5) linked elements of devolution process namely:

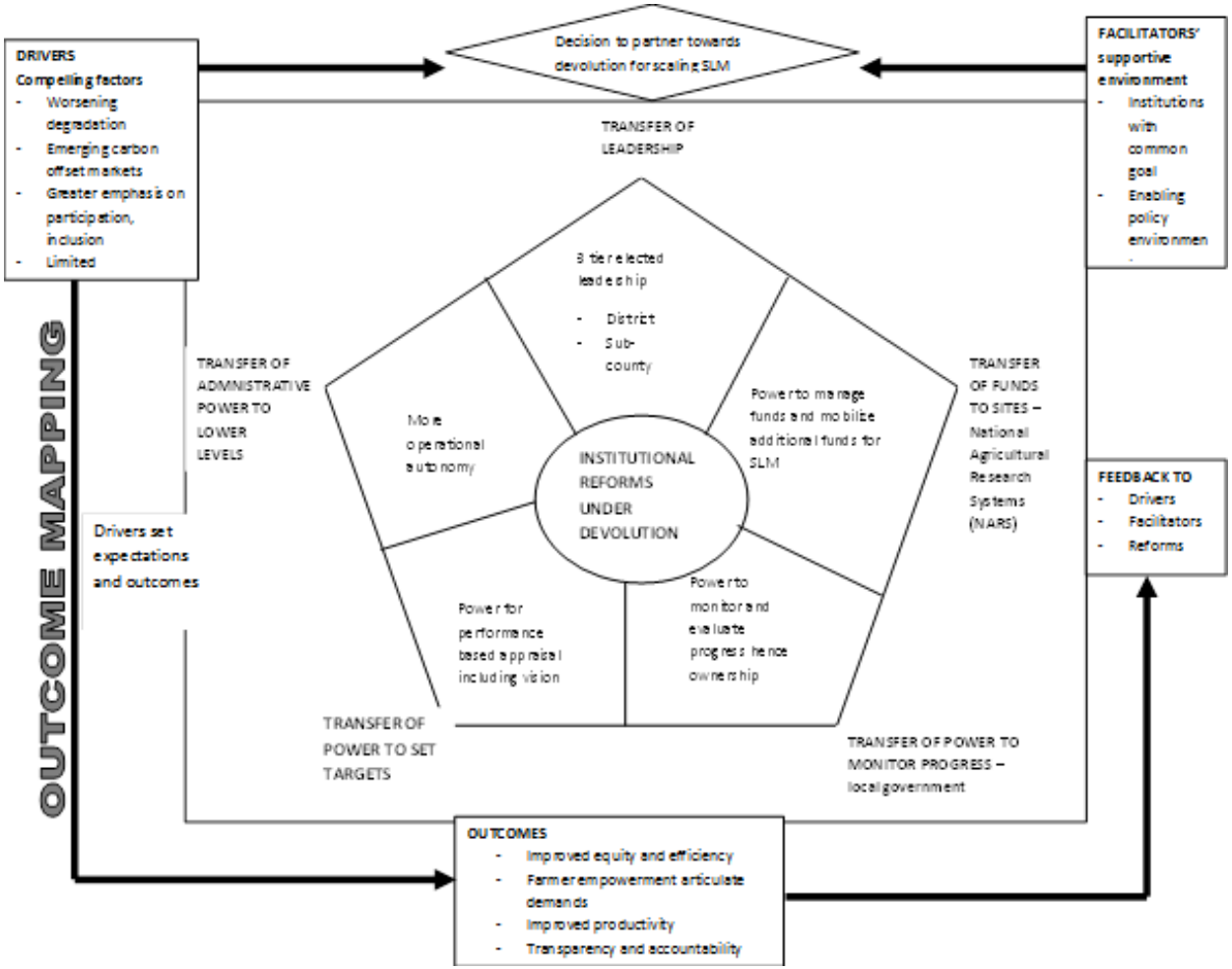


Figure 2. AHI Devolution Model.

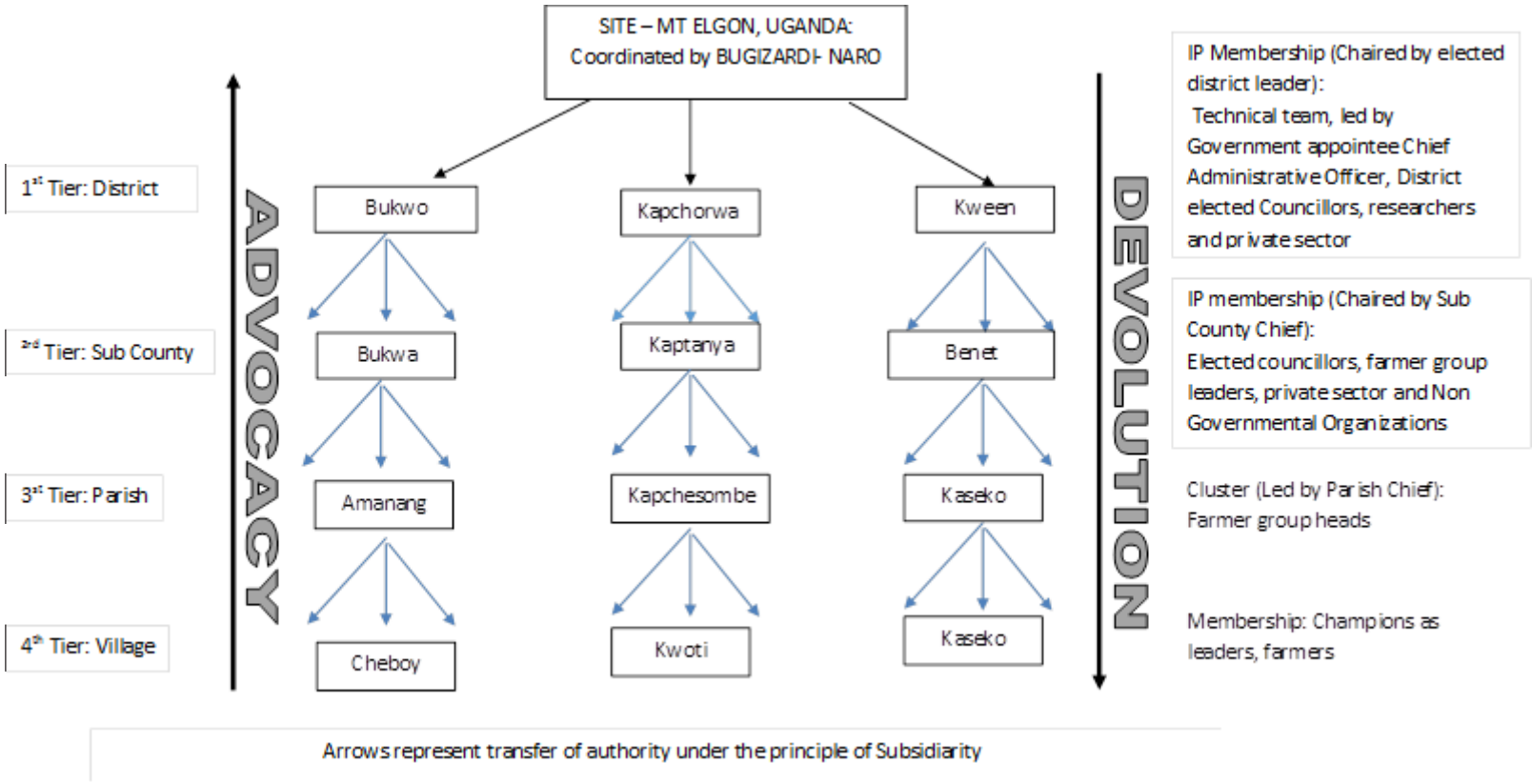
1. Transfer of leadership functions to a multi tier elected leaders of IPs starting with innovation clusters which are localised context specific partnerships that include champion farmers, farmers groups and other local organisations acting as pillars that support and are supported by intermediary IPs at sub county then apex IPs at district level for policy innovations (Fig. 3).
2. Transfer of funds directly from source, in this case at donor level, to site coordinators representing National Agricultural Research Systems (NARS) to support research and development activities, trigger mobilisation of resources for SLM at site level and empower site teams to manage funds and associated accountability.
3. Transfer of monitoring functions to local government to lead while ensuring ownership of programme activities.
4. Transfer of performance based appraisal systems that include participatory diagnosis of farming systems highlighting constraints opportunities; participatory visioning towards setting landscape targets and recognition of rewards as incentive for wider adoption
5. Transfer of operational authority to district government authorities towards elevating the NRM agenda.

Outcomes reflect the performance of devolution in achieving set targets. These outcomes are classified in three primary categories namely: (1) related to the enhancement or leveraging of profits such as improved productivity; 2) process related to empowerment, equity and efficiency; and, 3) competitive advantage such as increased economic value of NRM.

The AHI devolution model is built on management ethics that involve transfer of responsibility and authority over natural resource to site team dominated by user groups and farmers. The underlying devolution rationale in the model is to (i) build an institutional structure within the context of Innovation Platforms that empowers the poor; giving them vested interest to manage natural resources base; (ii) ensure cost effectiveness of programme activities and (iii) delivery of accelerated actions towards SLM. The model include efforts to organise stakeholders, equip them with skills, making essential structural repairs to harness synergies and negotiate agreements for wider impacts. Further, the model capitalise on decentralisation form of governance consistent with the subsidiary principle so that decision making is done at the lowest level where pertinent information, and interest are manifested. The learning wheel methodology for systematising experiences of multiple stakeholders described by Cambell *et al*., 2006 forms an important reference point for the devolution model.

Under the AHI devolution model, Innovation Platforms (IPs) have a comparative advantage in scaling SLM because of opportunities of fostering collective action that develops farmer level institutional capacity to engage in landscape level decision making. The IPs provide the niche and expand the spaces of engagement through partnerships, networks and linkages within and across scales. The IPs further, presented central units for diagnosis, planning, implementation, evaluation, feedback and re-planning of SLM activities.

Towards supporting scaling process, IPs provide the basis for horizontal integration (scaling out) and vertical integration (scaling up) of SLM innovations, thus creating an interface of top down with bottom up feed-backs in policy formulation . Horizontal integration at the micro-(farm) and meso- (district) levels, provides insights into the biophysical and socio-economic factors that determine adoption of innovations, and district level strategies that trigger spreading of innovations from farmer to farmer within villages of landscape. Vertical integration at the meso – macro (district, national and regional) levels, provides new insights into the benefits of SLM at higher scales. The significance of IPs in scaling innovations is towards developing mechanisms that interpret and respond to feedbacks; as well as catalysing the emergence of flexible organisations and institutions for SLM. The feedback mechanism link partner institutions with different governance levels (community, sub-county and district), thus ensuring cross-scale integration. Legitimacy of IPs capitalise building on existing local institutions (farmers' forums, peasant associations, NGO fora, local government structures) and operate based on consensus,



Accountability	District	Sub County	Parish	Village
Sector Subsidiarity	GOVERNMENT Type			Collective Vertical Horizontal

Figure 3. Multi-tier Leadership structure of Innovation Platforms matching local government administrative levels under decentralisation system.

through monitoring and reflection in order to optimisethe process. In terms of spread of SLM innovations, it is done through social learning made possible in networking and experiential exposures to new knowledge. Regarding the roles and responsibilities of partners at IP level, farmer organisations are the key stakeholders in the IP (Table 2). They are diverse and membership based, composed of and run by farmers themselves; and to a great extent, they are strongly rooted in traditional societies with a focus on membership welfare issues. Farmer organisations are critical in scaling SLM because they link grassroots to district level processes and important partners in development. However, they face challenges such as limited skills in advocacy and negotiation to participate actively in the governance process. This situation justifies protracted capacity building as part and parcel of devolution process.

SLM scaling strategy. Towards an attempt to operationalise the AHI devolution model, LAART rolled out SLM scaling strategy (Fig. 4)

TABLE 2. Roles and responsibilities of partners in scaling SLM

Feed Back[1]	Organisation	Roles
		**International Level**
	Donor/ Bilateral	Design devolution policy, grant making and budget support
	AHI hosted by ICRAF, CGIAR centre	Knowledge management, facilitating alliance, sharing lessons, Technical backstopping in research
		**National**
	Local government	Develop and ratify/endorse policies, budgeting and mainstreaming of IPs in local government structure, respond to feedback from sub county, linkage with ongoing programmes and project, monitoring and evaluation
	Civil society	Lobby and advocacy, information sharing/ dissemination
	Research	Lead action research, strengthen capacity at district and sub county, facilitate IP functioning
	University	Research grants and technical backstopping
		**Regional**
	Research Institution	Capacity building in policy and institutional analysis, monitoring and evaluation
	Development NGO	Stakeholder consultation and information dissemination
	Regional Government Agencies	Develop and harmonise regulations. Monitor compliance
		**Local**
	Farmer organization	Voices for farmer, strengthening local innovation systems, enabling farmers benefit from technologies
	Private sector	Provide farm implements and inputs; marketing and lead value chain processes
	Communities	Participate in action research, collective action in SLM, provide land for research
	NGO	Information sharing and dissemination and extension
	Local government	By-law formulation, analysis and ratification,

[1] Back and forth ward arrows represent feedback mechanisms on information flow at any given scale

over a 4 year period (2009- 2013) in Ethiopia, and Uganda. The strategy is focussed on scientific evidence and new insights that support multi-scale approaches towards promoting SLM, triggering behavioral changes, and fostering multi-level collaboration; while harnessing opportunities for pro-SLM adaptive policies. The rationale for this strategy is based on observations by Lee, 1993; Hagmann, 1999; Sayer and Campbell, 2004) that, 'Greatest impacts tend to occur where actors become researchers and visa versa; the researchers investigate the 'softer' social systems, that are more difficult to observe, as well as the 'harder' environmental factors; and facilitators create learning processes among stakeholders at different scales, not just among scientists' The observations are further articulated by (Roussel *et al.*, 1991) on, 'third generation' needed in which researchers and other stakeholders work together to improvise and integrate research and development (R&D).

The strategy outlines the technical contributions of the partners' activities within an action research framework comprised of five major components: (i) understanding the local contexts to isolate action points along a scaling process; (ii) facilitating learning alliances for wide stakeholder engagement towards collective action; (iii) implementation towards tangible action on landscapes including creating enabling environment; (iv) monitoring performance towards devolution for empowering site teams for more responsibility to steer SLM processes; and (v) cross-cutting capacity building. A key feature of the strategy is characterised by iterative mechanisms occasioned by dynamic processes that demand specialised facilitation, coordination and attention to details because of their intricate factor complexity

Understanding the local contexts to isolate action points along a scaling process. By articulating the context for scaling SLM, a deeper understanding of limits, needs, and priorities of what is being scaled is critical for better results. According to Carter *et al*. (2006) opportunities for scaling-up are framed by such factors as legislation, institutions, and practices, as well as stakeholders' perspectives, values, and interests; and by the way broader social, economic, environmental, political and other changes playout in the local context.

Guided by AHI devolution model, Participatory Diagnosis (PD) was employed in the target sites to highlight key issues, including baseline conditions, typology of networks and participatory generated visions of the future with SLM scaling. Some of key research activities included:

(i) land cover analysis in Uganda sites isolated degraded landscapes as hot sports for scaling SLM, as well as evidence of policy both as a driver of degradation and accelerating SLM;
(ii) network analysis conducted to understand the existing networks in Ethiopia and Uganda, revealed a network strength of 56 and 45%, respectively, implying that only about half of the potential networks among partners actually function, hence illustrating a need for strengthening networking among SLM stakeholder through rigorous institutional and organisational strengthening for effectiveness, efficiency, sustainability and legitimacy;
(iii) governance issues; a comprehensive assessment of existing laws, bye-laws, rules and regulations governing SLM and the formal and informal institutions involved in the development and enforcement of regulations in land management in Ethiopia revealed governance constraints such weak implementation mechanisms, knowledge gaps on policy updates and incentives in SLM such as rewards system;
(iv) erosion assessment , rates of 25.1 t $ha^{-1}yr^{-1}$ for fields without conservation were established illustrating NPK loss of 138 kg ha^{-1} yr^{-1} that signals the urgency to reverse the land degradation targeting integrated approaches; and on profitability of SLM technologies, 27 different combinations were found profitable and marginally affected labour costs, a situation that underscores investment in high value crops for SLM to be cost effective.

Facilitating learning alliances for wide stakeholder engagement towards collective action. Scaling SLM requires rigorous learning

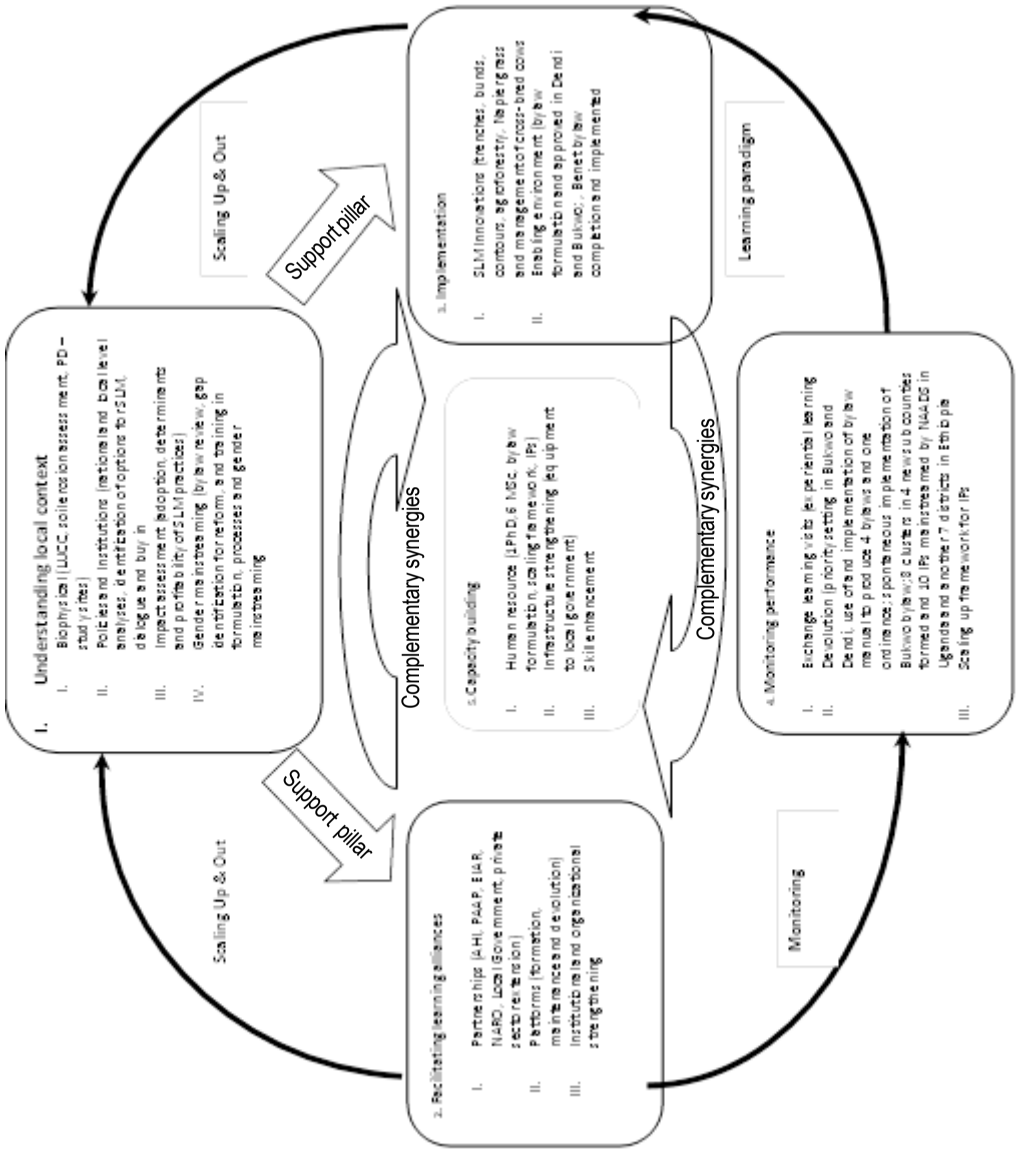


Figure 4. SLM scaling strategy rolled out in Ethiopia and Uganda.

through skill enhancement and experience exposures. Under the AHI scaling strategy, 10 Innovation platforms (Table 3) were facilitated to trigger scaling SLM at district and subcountry levels.

The benefits of functional IPs include: (i) local buy-in at local government level,with Bukwo, one of the districts in Uganda, allocating USD $ 1,250 to SLM activities at subcounty IP levels in 2010; (ii) Increased visibility and involvement of local communities, including marginalised groups (Table 4) where the people, including those with disabilities, participate actively in IP activities. (iii) Increased behavioral change, culminating in wide adoption of SLM innovations, totaling to 237 km of soil and water conservation bunds construction in Ethiopia and 8,435 ha of land in Uganda regenerated. (iv) institutional and organisations capacity strengthening of IPs that culminated into coalitions of stakeholders in Ethiopia to form thirty seven collective action groups comprised of development group Garee Misoomaa) and working group "Garee hoojii") in Ethiopia towards implementation of SLM innovations

Monitoring performance towards devolution for empowering site teams for more responsibility to steer SLM processes. In order to keep track of progress, an outcome mapping framework was established that articulated indicators of progress among all participating partners. Among farmers, indicators included increased farmers practicing SLM innovations, decreased conflicts, pro-active and lobbing for additions resources, more participation of men and women organised groups. Indicators for research and development (R&D), included increased synthesis and documentation, promotion of new scaling approaches, facilitating IPs, and joint planning with other partners. Lastly, for policy makers, the indicators were, allocation of funds for NRM and effective byelaws. Consequently, the monitoring process triggered a priority setting in Bukwo District in Uganda and Dendi district in Ethiopia. The use of and implementation of by-law manual resulted into 4 by-laws and one ordinance; spontaneous implementation of Bukwo by-law and 8 clusters in four new sub-counties formed and mainstreamed in the local government structure.

Implementation towards tangible action on landscapes including creating enabling environment. The scaling strategy prioritised triggering implementing SLM innovations including (i) creating an enabling policy environment by facilitating fours by-laws, two

TABLE 3. Innovation platforms in Ethiopia and Uganda

Scale	Name of Innovation Platform	Platform constituents
Woreda (Ethiopia)	(i) Dendi (ii) Were Jarso	· Farmer organisations · District authorities
District (Uganda)	(iii) Bukwo (iv) Kapchorwa (v) Kween (IPs hosted and chaired by District LG chair)	· Research and Extension organisations · Non Governmental Organisation · Private sector
Kebere (Ethiopia)	(vi) BorodoGinchi Watershed	· Farmer organisations
Sub County (Uganda)	(vii) Mekentuta (GohaTsion) watershed (viii) Kaseko –Benet landscape (ix) Kortek - Benet landscape (x) Kwoti- Benet landscape (At cluster level stakeholders around organised around local level NRM priorities as clusters	· Watershed leadership in Ethiopia · Lower –level District authorities LC3 in Uganda · National level research and extension · Nongovernmental organisations · Private sector

in Bukwo, Uganda, one in each Dendi and Were Jarso in Ethiopia; one ordinance up to approval by District council in Bukwo Uganda; one collective decision on fencing 1.24 ha for regeneration in Ethiopia; (ii) seed bulking through facilitating a total of eight nurseries, distribution of 62,463 seedlings in Ethiopia; purchasing 136 kg tree seeds, distributing 71,903 seedling; nurturing 219,000 seedling collectively in six community seed nurseries in Uganda; and (iii) building capacity of 153 farmers on seed collection in Uganda.

Cross cutting capacity building. This is important towards empowering stakeholders with skills and exposing experiences to foster adaptive capacities for future shocks. Under the AHI scaling strategy, several trainings (Table 5) were conducted in addition to several graduate studentship on scaling proved an important channels of disseminating information to a wider community.

ACHIEVEMENTS

Key achievement accompanying operationalising the AHI devolution model through rolling out a SLM scaling strategy include:

(i) development, implementation and evaluation of a systematic strategy for devolution structures (IP) mainstreamed in local government under decentralised form of governance in both Uganda and Ethiopia;
(ii) an enabling policy environment through development of SLM by-laws for two IPs in Bukwo, Uganda; two by-laws in the Mekhankuta, Borodo watershed IP in Dendi, Ethiopia; and a district level land care ordinance in Bukwo, Uganda district. The by-laws and ordinance prescribed uptake of agro-forestry, contour bunds, Napier grass to establish contours, terraces, trenches and improved cow management among other

TABLE 4. Participants in a collective action on soil and water conservation event Bukwo, Uganda

Stakeholder participation								Total
No disability				With disability				
Adult		Youth		Adult		Youth		
Male	Female	M ale	Female	M ale	F female	M ale	Female	
50	30	10	6	3	1	4	-	104

TABLE 5. Training offered to site level research teams in Uganda and Ethiopia

	Participants	
Training	Male	Female
Proposal development in Uganda 2010	43	25
Gender mainstreaming in Ethiopia 2011	58	8
Watershed management in Uganda 2011 and 2012	62	43
Monitoring and evaluation Joint Uganda and Ethiopia 2011	8	6
Writing skills Joint Uganda and Ethiopia 2011	8	4
Write skills Joint Uganda and Ethiopia 2012	26	6
Policy analysis in Ethiopia 2011	68	12
Gender mainstreaming in Uganda 2011	22	17
Ordinance development in Uganda 2013	215	

innovations through collective action of farming households across the landscape;

(iii) institutional strengthening where for example, Uganda study sites had the most glaring gaps at the beginning of the project in 2009 with a skelton of two scientists. By the 2013, a marked progress in building an NRM unit was registered with a total of 28 staff, in addition to seven graduate students

(iv) increased finances towards support to SLM in Uganda including (i) adapting soil and water conservation practices under Government of Uganda's Technical and Agribusiness Advisory Services (ATAAS) project for 3 years (USD $ 3.700); (ii) ecosystem based adaptation under UNDP for 1 year (USD 9,000); (iii) adapting and promoting temperate fruits on Mt. Elgon zone (USD $ 6,200) and (iv)conflict management on Mt. Elgon (USD$ 50,000).

CHALLENGES

One of the key challenges encountered while operationalising AHI devolution model is coordination that put a lot of pressure on close collaboration in joint visioning, planning, budgeting, implementation monitoring and evaluation. This demands unique team building skills, leadership, system thinking and ability to coordinate a devolution process. Adequate resources, both fiscal and human capacity available for an extended period are vital as building blocks for scaling SLM. However, under a project mode situation of a four years, most processes were only beginning to stabilise for meaningful impacts. Unless roles and responsibilities of different stakeholders are spelt out clearly, implementation is dominated by regular disagreement translating in delays on implementation of activities and to a large extent, demanding specialised conflicts management for better result. Although policy is a key enabling environment for scaling SLM, the process of developing policies is long and protracted and involves managing politics, hence, very expensive. The decentralised form of governance is a great opportunity towards scaling SLM. However, the capacity at local government is weak and characterised by high turnover of staff. This undermines consistence in coordination and facilitating SLM. In addition, maintaining adequate feedback mechanisms to ensure ongoing learning demands continuous generation and flow of new knowledge and innovative extension models that all thrive on few available champions and long term funding .

CONCLUSION AND POLICY RECOMMENDATIONS

Scaling SLM innovations under devolution contexts presents great development opportunities especially, among rural communities. The scaling process is a knowledge intensive demanding heavy investment in continuous learning, while facilitating multi stakeholder processes at multiple scales and creating enabling policy environment. The AHI devolution model operationalised through a scaling strategy rolled in Ethiopia and Uganda offers competitive means of scaling SLM through a structured process. The model comprised of structured process involving drivers and facilitators, devolved governance and outcome illustrate an inherent advantage in scaling SLM through fostering collective action that develops farmer level institutional capacity to engage in landscape level decision making. Policy innovations, and social learning opportunities strategically positioned AHI devolution model to catalyse investment in landscape level processes including: (i) institutionalising IPs to backstop pro-SLM budgeting at local government levels; and (ii) knowledge management including information generation, packaging and distribution to different audiences, and landscape unit planning that calls for collaborative planning for specific landscapes that cuts across administrative boundaries; (iii) encouraging greater participation hence critical mass in adoption and (iv) more accountability, transparency generate desired economic efficiency.

In terms of recommendations, the devolution model's center piece entails institutional reforms that are characteristically process oriented in nature and time consuming. While continuity is the key to success, monitoring and trouble shooting of the process are critical and

necessitating an elaborate capacity building programe and a strong political will at national levels. Devolution process oblige an elaborate advocacy and awareness building to better understand the process hence empowering masses to demand and actively participate while owning the process. Incentives, such as rewarding champions in the system need to be in places to encourage compliance. Strengthened coordination is vital involving civil service reforms towards targeting stabilising staff to avoid the high turn over that undermine the system. Regarding financial aspects, devolution thrives on streamlined process of transferring funds from the source. However, the implications is an elaborate financial systems with clear procedures including streamlined process for transferring funds and their accountability. Even after transfer of roles and responsibilities, the role of the state remains important especially, efforcing regulations, non compliance and settling disputes among stakeholder. This calls for a streamlined institutional frame work including an efficient regulator systems as part of government package to support scaling SLM for landscape impacts.

REFERENCES

Benin, S. 2006. Policies and programs affecting land management practices, input use, and productivity in the highlands of Amhara Region, Ethiopia. In: Pender, J., Place, F. and Ehui, S. (Eds.). *Strategies for Management in the East African Highlands*. International Food Policy Research Institute, Washington, D.C. Sustainable Land.

Bojo, J. and Cassells, D. 1995. Land degradation and rehabilitation in Ethiopia. A Reassessment. World Bank.

Bunning Sally, 2004. Strengthening natural resources management building on local Knowledge for sustaining the productivity and viability of agricultural heritage. A paper presented at the 2nd International Workshop on Globally Important Ingenious Agricultural Heritage Systems (GIAHS) – FAO.

Campbell, B., Hagmann, J., Sayer, J., Stroud, A., Thomas, R. and Wollenberg, E. 2006. What kind of research and development is needed for Natural Resource Management? In: Water International. *International Water Resources Association* 31(3):343-360.

Eswaran, H. 1997. In: Swift , M.J., Shepherd, K.D. (Eds.) 2007. *Saving Africa's soils: Science and Technology for Improved soil Management in Africa.* Nairobi, World Agroforestry Centre.

FAO. 1986. Ethiopian Highlands reclamation study: An assessment of the dominant soil degradation process in the Ethiopian Highlands: Their impacts and hazards. MoA/ FAO, Addis Abeba, Ethiopia.

FAO. 2001. The economics of soil productivity in sub-Saharan Africa. Rome, Italy: FAO.

FAO. 2008. Terra Africa - A vision paper for sustainable land management in Sub Sahara Africa. FAO, Rome, Italy.

Hagmann, J. 1999. Learning together for change. Facilitating innovation in Natural Resource Management through learning process approaches in rural livelihoods in Zimbabwe Weikersheim: Margraf Verlag.

International Institute of Rural Reconstruction (IIRR), 2000. Going to scale: Can we bring more benefits to more people more quickly? Silang, Philippine.

International Union for Conservation of Natural Resources (IUCN), 2006. Red list of threatened species. Geneva.

Kassie, M., Pender, J., Yesuf, M., Kohlin, G., Bulffstone, R. and Mulugeta, E. 2008. Estimating returns to soil conservation adoption in the northern Ethiopian highlands. *Agricultural Economics* 38: 213-232.

Keeley, J.E. 2001. Influencing policy processes for sustainable livelihoods: Strategies for change. Lessons for change in policy and organisations, No. 2. Brighton: Institute of Development Studies.

Lee, K. 1993. Compass and gyroscope: Integrating science and politics for the environment. Washington D.C.: Island Press.

Mekuria, M., La Rovere, R. and Szonyi, J. 2008. External review and impact assessment of the African Highlands Initiative (AHI). Program Evaluation report. February 2008.

Mowo, J.G., Mwihomeke, T.S. and Mzoo, J.B. 2002 Managing natural resources in the West Usambara Mountains: A glimmer of hope in thé horizon. Paper presented at the Mountain

High Summit Conference for Africa, UNEP Nairobi, Kenya, 6-10 May 2002.

NEPAD, 2003. Comprehensive Africa Development Programme. NEPAD Secretariat, Midrand, South Africa. 102pp.

Nkonya, E., Pender, J., Kaizzi, K., Kato, E., Mugarura, S., Ssali, H. and Muwonge, J. 2008. Linkages between land management, land degradation, and poverty in Sub-Saharan Africa: The case of Uganda. IFPRI Research Report #159, Washington D.C.

Oldeman, L.R. 1994. The global extent of land degradation. pp. 99 - 118. In: Land resilience and sustainable land use. Greenland, D.J. and Szabolcs, I. Wallingford: CABI.

Pender, J. and Gebremedhin, B. 2007. Determinants of agricultural and land management practices and impacts on crop production and household income in the highlands of Tigray, Ethiopia. *Journal of African Economies* 17(3): 395 - 450.

Pender, J., Ssewanyana, S., Kato, E. and Nkonya, E. 2004. Linkages between poverty and land management in rural Uganda: Evidence from Uganda National Household Survey, 1999/00. A Paper presented at a workshop on Poverty, NRM linkage, held at hotel Africana- Kampala Uganda

Pretty, J.N., Noble, A.D., Bossio, D., Dixon, J., Hine, R.E., Penning de Vries, F.W.T. and Morison, J.I.L. 2006. Resource conserving agriculture increases yields in developing countries. *Environmental Science and Technology* 40(4): 1114 - 1119

Roussel, P.P., Saad, K.N. and Erickson, T.J. 1991. Third Generation R&D: Managing the link to corporate strategy. Cambridge, Massachusetts: Harvard University Press. pp. 175-185

Sanchez, P.A. 2002. Soil fertility and hunger in Africa. *Science* 295(5562): 2019 - 2023.

Sayer, J. A. and Campbell, B.M. 2004. The science of sustainable development. Local livelihoods and the global environment. Cambridge University Press, Cambridge, UK. paperback. 288 pp.

Sayer, J.A. and Campbell, B. 2004. The Science of Sustainable Development: Local Livelihoods and the Global Environment. Cambridge: Cambridge University Press. Scoones, I. and Thompson, J. 1994. Beyond Farmer First: Villagers' Knowledge, Agricultural Research and Extension. International Institute for Environment and Development (IIED): London, UK.

Serigne, T. Kandji, Louis V. Verchot, Jens Mackensen, AnjaBoye, Meine van Noordwijk, Thomas P. Tomich, Chin K. Ong, Alain Albrecht and Cheryl A. Palm 2006. Opportunities for linking climate change adaptation and mitigation through agroforestry systems In: Dennis, P., Garrity, Antonia Okono, Michelle Grayson and Sue Parrott (Eds.). *World Agroforestry into the Future.* World Agroforestry Centre – ICRAF, Nairobi, Kenya

Slade, G. and Weitz, K. 1991. Uganda environmental issues and options. Unpublished Masters Thesis, Duke University, Durham, North Carolina, USA.

TerrAfrica. 2009. The world food crisis, land degradation, and sustainable land management: Linkages, opportunities, and constraints. www.nepad.org/foodsecurity/.../world-foodcrisis-land-degradation

UNEP 2008. (United Nations Environment Programme) and UNCTAD (United Nations Conference on Trade and Development). Organic agriculture and food security in Africa. United Nations, New York and Geneva.

Voss J. 2001. Integrated management for sustainable agriculture, forestry and fisheries. In: Adamo and Hagmann (Eds.). Intergrated management for sustainable agriculture, forestry and Fisheries. Proceedings of a workshop for the INRM Task Forse, Cali, Colombia, August 28-31, 2001

World Bank. 2006. Interim country assistance strategy for the Federal Democratic Republic of Ethiopia; May 2006. Ethiopia Country Management Unit Africa Region

World Bank. 2006. Sustainable land management: Challenges, opportunities, and trade-offs. Washington, D.C.: The World Bank.

Yaron, G., Moyini, Y ., Wasike, D., Kabi, M. and Barungi, M. 2004. The role of environment in increasing growth and reducing poverty in Uganda. DFID Technical report Ema consult and GY Associates.