

An integrated approach to tackle soil erosion – Insights from Burundi

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Abstract

Combating soil erosion requires holistic approaches that improve land tenure systems and protect land rights. Good land governance is a key variable that enables long-term investments in land. Integrated-farm planning supports sustainable production increases and enables farmers to develop a vision for development. Combining these two factors can lead to approaches that create synergies and provide for long-term sustainability based on tenure security and growth. This paper presents such an approach, based on experiences from Burundi. It provides details on two tested approaches for creating sustainable land tenure systems and peer-learning systems for improved agricultural practices, which combined and integrated with a strong soil protection component can provide a sustainable, comprehensive manner to tackle the challenge of human induced soil erosion in Burundi and elsewhere. The paper provides insights from the work of one Netherlands-based NGO and its partners in Burundi.

Introduction, scope and main objectives

Environmental degradation and the effects of climate change have a particularly strong impact on poorer countries. Resource poor people struggle to adapt to changing climatic conditions and poverty can exacerbate the decline of natural resources. This also relates to the state of soils. While declining soil fertility and top soil erosion are not caused by poverty “soil degradation is accentuated by poverty” (Lal, 2001). In contexts with limited state capacities, comprehensive approaches to tackle the challenge of degrading soil are often missing. The rural poor are commonly the first to suffer from dwindling resources. There are indications that resource degradation can be the consequence of weak, inadequate or eroding land tenure rights, making this link a point of concern for international development actors (see: USAID, 2007). Smallholder farmers with weak land rights are prone to lose access to land if pressure on natural resources builds up. In countries with high population growth and small surface area, such pressure builds quickly. Small, landlocked countries like Rwanda and Burundi experience growing scarcity of arable land. While Rwanda’s government maintains strong control of governance in general and land governance in particular, the political turmoil of the recent past in Burundi also meant that land and environmental governance have suffered. Farmers struggle to make a living while support by the government remains limited and donor support decreased.

Burundi is globally among the twenty most vulnerable countries to climate change and natural hazards and has recently experienced massive rains and flooding, including devastating mudslides (UNOCHA, 2019). Soil erosion is one of a number of serious challenges that Burundian farmers face. Generally, “agriculture in Burundi is characterized by low food production due to the shortage of arable land, minimal use of improved seeds, a financial market with very limited access for farmers, the depletion of soil fertility by erosion, and suboptimal fertilizer use” (Ndagijimana et al, 2018). The country has very high population density (reported at 423 p. sq. km in 2017, see: World Bank, 2019) which puts additional pressure on natural resources. Moreover, the land governance system is of limited functionality, and the influx of large numbers of returnees from neighbouring countries led to a strong increase in land-related conflicts over the

past years. Among other challenges, these factors have contributed to a lack of investment in the protection of natural resources.

Other countries in the region and around the world are also trapped in vicious cycles of weak land governance, insufficient protection of smallholder's land rights and rural poverty. This paper argues that such contexts of weak land governance hamper global efforts to combat soil degradation as formulated in the Sustainable Development Goals and the Voluntary Guidelines on Sustainable Soil Management (FAO, 2017). While land tenure and land governance might have a more indirect impact on land management, land tenure and land governance should nevertheless be key factors in strategies to tackle soil erosion.

It has long been realized that there are a range of factors that determine if and how much people invest in the conservation and restoration of resources (FAO, n.d.). People are more likely to invest in land to which they have a strong claim and the access to which they consider to be safe. Local institutions play a key role in facilitating conservation and improving farming approaches and other environmental practices. Both, individual and collective land rights as well as local institutions need to be strengthened in order to support sustainable and effective conservation practices to combat soil erosion. This paper lays out two approaches that have been applied in the Burundian context and that can lead to "wise governance of land resources in coupled human-environment systems" which is needed to combat environmental degradation (Briassoulis 2019: 2).

This paper sketches out one approach that facilitates the establishment of functional local land administration systems, and a second one that creates a system of peer-learning and support for increased agricultural production and the application of conservation agriculture for soil protection. Furthermore, the paper explains how these two approaches can be combined to facilitate an integrated approach, which will provide for a holistic way to combat soil erosion, improve land governance and land use.

Materials and Methods

This paper draws on insights from more than five years of work of a consortium of NGOs on land tenure security and improved agricultural practices in Burundi. It utilizes evaluations of two land tenure projects in Burundi, financed by the government of the Netherlands and USAID based on the Fit For Purpose Land Administration Approach (Enemark et al 2016) and evaluations of a (climate smart) agriculture project based on the innovative PIP (Plan Intégr  Paysan/Integrated Farm Planning) approach, developed by Wageningen University (van Duivenbooden et al 2015). The outcomes of these projects are assessed and opportunities to improve both approaches through creating mutually reinforcing effects identified. Based on this comparative assessment an integrated approach is sketched which promises to address significant shortcomings that hinder sustainable and broad-scale achievements in fighting soil erosion in Burundi and which has a potential to be adapted in other contexts. The paper is based on a broader assessment of the literature on sustainable land management in developing and in particular post-conflict countries.

Results

Human activity and changes in land use are the primary cause of the global increase in soil erosion (Borrelli et al, 2017). However, this global phenomenon receives little attention and its socio-political implications appear to be underappreciated. As Lal (2001: 519) writes: "Soil degradation is a biophysical process exacerbated by socio-economic and political factors." Lal lists land tenure as one of six important anthropogenic factors for soil degradation. The centrality of land tenure for combating soil erosion relates to the fact that conflicts around (access to) land and perceived security of tenure affect people's willingness and ability to invest in land (see: Ravnborg et al 2013). However, tenure security alone will not suffice to enable people to invest in their land and address soil erosion. As long as human needs are pressing, sustainable land management is likely to be viewed as secondary to income and livelihoods. The necessity of addressing soil erosion to ensure long-term ability to profit from the land is not equally clear to every land user. Nevertheless, even in circumstances where people are aware of the existence and risks of soil degradation this awareness does not necessarily lead to sustainable land management (Ndagijimana et al, 2018). It has been argued that extrinsic motivation tends to be insufficient to ensure that farmers invest in sustainable land management. Intrinsic

motivation is seen to be the key variable (ibid.). This paper argues that (perceived) tenure security presents an important component of sustainable intrinsic motivation for sustainable land management. To perceive one's tenure are secure is a key driver of investing in agriculture and land more generally (see also: Ghebru et al, 2016).

The basis for investing in sustainable land management for many farmers is be to both motivated to undertake action and to have the means to invest (Ndagijimana et al, 2018). The Integrated Farm Planning approach (PIP) strives to enable farmers to invest in and profit from their land by applying simple methods for developing a household farm-plan with activities focusing on family competences and building a vision on household level. At its core is peer-to-peer learning among farmers. A group of farmers is trained to create a development vision on the household level as well to apply simple, resource-adequate techniques to improve farming results. These farmers in turn train a second group, which in turn trains a third. The trainings received in the context of the PIP approach (building a vision, soil and water conservation, integrated soil fertility management and others) help farmers to develop an integrated farm plan that addresses different dimensions of household development (Ndagijimana et al, 2018). The motivation of the farmers to change their life and practices are key to this approach. The PIP approach has been applied in Burundi by the Dutch NGOs ZOA and Oxfam Novib and achieved highly positive results (Kessler/Van Reemst, 2018).

The application of PIP in Burundi has led farmers to significantly change their practices not only related to farming itself but also in terms of household and community relations. People have started to do joint planning and to make decisions together within the household (PAPAB, 2018). It has also led to increased collaboration on community level. A qualitative analysis of the work has also indicated that the PIP approach can contribute to reinforcing the role of women in the household, strengthening their say in household matters (ibid.). Overall, better communication and collaboration within the household was among the most significant findings of the evaluation. People also mentioned that a lack of cultivable land was contributing to an initial feeling of helplessness and lack of perspective that was changed by the peer training and positive developments observed among other participants. One farmer reported: "(...) I was trained on modern agricultural techniques, I learned that the use of selected seeds, the respect of spacings and the use of organic manure mixed with mineral manure increases agricultural production if they are done on farms protected against erosion" (PAPAB, 2018).

The PIP approach thus combines mentality changes with integrated soil fertility management, anti-erosion control and management of natural resources in the context of the integrated farm plans. The integrated farm plan that gives the approach its name (PIP) essentially consists of two pictures, one that depicts the farm's current situation and one that visualises the vision of the household. Crucially, the PIP includes a concrete action plan. This motivates the family to plan and invest in their future (Kessler/Van Reemst, 2018).

Analyses of the PIP approach specifically refer to land tenure security (having official land registration) as a key component of intrinsic motivation needed to invest in sustainable land management (Ndagijimana et al, 2018). In Burundi, unregistered land is still considered as state property and having unregistered land can be discouraging the users from introducing sustainable land management investments (ibid.). Furthermore, many people experience land conflicts with neighbours, family members or returnees who come back after years of internal displacement or living as refugees in neighbouring countries (Betge et al, 2017). This increases insecurity of tenure and discourages people from long-term investments in land or even prevents them from accessing parts of it.

In late 2013, the Dutch Humanitarian organization ZOA started a project financed by the Dutch Embassy in Bujumbura, designed to establish a functioning local land administration linked to an envisioned scaled-up land registration program initiated on the national level (ZOA, 2013). The approach is based on a concept for fit-for-purpose land rights work (see: Betge et al, 2017b). ZOA targets areas with high levels of repatriation of former refugees and displaced people and a special focus is put on safeguarding the interests of women in the process of land rights registration. One of the central objectives of the project is to enable men and women to invest in their land and increase household food security and income. ZOA cooperates with

local partner Mi-Parec (Ministry for Peace and Reconciliation under the Cross) who support the project in resolving conflicts related to land and training local land registration committees in mediation (Betge et al, 2017). The combination of land tenure registration (LTR) and conflict resolution is central to the project. Mediation between conflict parties, particularly between returnees and residents, and a recording of the results of these mediations are seen as the basis for ensuring sustainable conflict resolution and tenure security of all parties and a basis for future land investments. The efforts around land tenure registration in Burundi are viewed as essential aspects of broader efforts to increase peace and stability as well as to contribute to food security for the population (Netherlands Embassy Office Bujumbura-Burundi, 2011).

At the core of ZOA's land registration work is the documentation of the location of a plot of land and the dimensions of the parcel. This data is put on a certificate so that the owner has evidence, serving to reduce uncertainties and future conflicts concerning boundaries. A public registry ensures that everyone who wants to acquire land can verify who the owner is and that his (or her) assertions as to the dimensions and other aspects of the land are true (IDLO/ZOA, 2016). Recognition Committees on Colline level were created (CRCs). These committees publicly establish whether there are land disputes regarding a plot, determine who occupies that land and who holds the de facto rights to that land. They then conduct plot surveys using handheld GPS devices, mobile phones with Kobo collect software and aerial photos. All of the neighbours of the particular plot participate in this exercise. The outcomes of the process are published and if after a period of 15 days no objection is made a certificate is issued. The owner needs to retrieve the certificate from the local land administration office. After this has happened there follows another 30 day period during which objections to the registration can be voiced (Betge et al, 2017).

ZOA followed a systematic approach to registration that enables all landholders to access the registration service (*approche groupée*). The systematic approach strives to address the social complexities of land tenure registration by including a broad range of stakeholders and making the process as accessible as possible. This also requires incremental capacity building of statutory and customary authorities who are responsible for maintaining the tenure system in the long term.

One of the central challenges of the registration process is increasing women's tenure security. While legally, women's land rights can be registered, this does not always ensure the factual access to land e.g. after the death of a husband. Specific efforts have been undertaken to ensure women are not excluded from the tenure registration. This aspect remains a point of attention as it means addressing norms and beliefs. State and customary authorities also play a crucial role in this.

ZOA's land rights program is designed as part of a holistic approach integrated in interventions by ZOA and other organizations targeting the effects of tensions over refugee resettlement, high population growth and declining agricultural productivity (Betge et al, 2017). In this sense, the land registration program relates to efforts for intensifying agricultural production through distributing agricultural inputs such as seeds, fertilizer, organic manure or animals and providing trainings on improved agricultural practices. A basic idea of the program is that conflict mediation, land certification and activities aimed at increased investments in agriculture and increased agricultural productivity are mutually reinforcing (ZOA, 2013). Recent outcome evaluations have shown that the local land administrations have become functional and enabled the registration of more than 43.000 parcels. The roles of state authorities and customary authorities are crucial in this. Without their cooperation the functionality and legitimacy of the outputs would be extremely limited while LTR interventions can have significant effects on the legitimacy of various actors (Betge et al, 2019). Strong efforts are still needed to ensure long-term conflict resolution as access to justice remains a challenge. However, there are clear indications that there is high demand for having land registered and conflicts resolved. At the same time, farmers are waiting to see clear, tangible benefits from improved tenure security. In many contexts, people have become used to receiving free inputs and support (see also: Reincke et al, 2018). Approaches, relying on material incentives often fail to deliver sustainable outcomes as they do not activate the crucial intrinsic motivation of men and women to improve their lives and livelihoods.

Combining the PIP approach and the systematic approach to land tenure registration and conflict resolution appears to be highly logical. There are clear indications that improved tenure security can contribute to

food security (Ghebru/Holden, 2013) and there is a logical link between tenure security and investments in combating soil erosion. Applying approaches that create synergies between these aspects should therefore be self-evident. Interestingly, in many contexts where tenure registration programmes are ongoing such integrated approaches are not standard practice, as to the knowledge of the author. The Netherlands Embassy in Bujumbura and its partners realized the unique opportunity of combining the two approaches and designed a multi-stakeholder approach that integrates central elements of the Land Tenure Approach and the PIP and complements them with access to finance elements and a strategy to provide strategic advice to farmers and enabling better market access.

The integrated approach

Combining activities to ensure land tenure and food security will contribute to the conditions for sustainable development and lasting solutions to land conflicts, particularly if they are based on strong local ownership. The integrated approach proposed consists of land management and farm planning in which land tenure registration and collective land protection strategies - and sustainable land-based activities are combined, using a combination of land conflict resolution, land tenure registration and support for sustainable agricultural practices and household based farm planning.

The overall objective of this integrated approach is to improve resilience of farmer communities and to increase their stewardship and intrinsic motivation to invest in their land. The two specific objectives are:

- Specific objective 1: Reduction of land conflicts and improved land security through systematic land tenure documentation and registration (LTR).
- Specific objective 2: Increase of soil protection, combating of soil degradation and increased agricultural productivity in a sustainable and inclusive manner through accompanying farmer households and communities with the participatory farm planning approach (PIP) to plan and manage crop production in a sustainable and highly productive manner (see: van Duivenbooden et al 2015).

The integrated approach strives to enable equal access to land and land rights for all based on fit-for-purpose land tenure registration, with a particular focus on the protection of women's land rights, addressing a population that is already mobilized and intrinsically motivated to improve their lives and livelihoods through the PIP approach. Farmers are trained in the PIP approach, and learn agricultural techniques to improve soil fertility (Integrated Soil Fertility Management - ISFM). These farmers are involved in peer-to-peer learning where they pass on their knowledge and experience. Additionally, innovative technology that supports farming and access to finance (AgriCoach, AgriMonitor and UMVA) On AgriCoach and AgriMonitor see here: <https://www.icco-cooperation.org/en/news/icco-and-auxfin-boost-digital-financial-inclusion-in-rural-areas/> For information on UMVA see here: <https://www.umva.org/>) will serve improve the integrated land management, to address climate change effects, simplify payments for fertilizers and enable further inputs. The focus on both land security and the fertility and productivity of the land will contribute significantly to long term sustainability and effectiveness in terms of poverty reduction.

The fit-for-purpose LTR will be connected to all three levels on which the PIP approach has an influence:

- *Household level* : In the communities to which the PIP approach is extend, the element of land tenure security will be integrated in the trainings and awareness raising of the households. Men and women will be triggered to discuss why and how to secure their land and how to divide the land between the family members. They will include tenure security aspects in their PIP.
- *Colline (village) level* : Connecting to the community vision for continued awareness raising on (women's) land rights, conflict mediation, and the procedure of LTR. Taking a systematic approach to land tenure registration, aiming to register and certify all land plots in a *colline* .
- *District (commune) level* : The final objective is to cover all *collines* in the targeted districts. This process will go parallel with the horizontal and vertical upscaling of the PIP approach in the targeted districts.

The difference in effectiveness between building forth on rural communities that have already gone through

the whole PIP-process in the past (without LTR) and rural communities that have not yet started the PIP process and will receive the integrated LTR-PIP approach, will be measured through impact studies and the insights from these will serve to develop a model approach for a holistic land and food security intervention. The integrated approach is based on the following assumptions:

1. Participatory approaches are needed to enable sustainable land governance and soil protection.
2. Long-term soil protection (and soil improvements) requires protected land rights, economic- and food security.
3. Despite the challenges that such complex objectives present, solutions are possible as the experience from Burundi with fit-for-purpose LTR and the PIP approach indicates.

Strong cooperation with state and customary actors can often be crucial and the experience from the Burundian context demonstrates that strong ownership of adopted solutions contributes significantly to success. However, the experience from the land rights component of the work also demonstrates the relevance of capacity building and a phased-approach with gradually increasing ownership given the extremely limited capacities of (local) state actors as well as limited trust by local populations in state institutions. Cooperation and co-creation with a range of stakeholders is necessary to ensure sustainability and legitimacy. Another point of attention is the necessity to establish functioning spatial data infrastructure beyond the provincial level in order to create sustainability for the results achieved so far. Latest technological tools can be used to improve local service delivery and introduce context adequate and cost-efficient solutions into contexts where state authorities struggle with adequate and widespread service provision to the population. At the same time, the technical aspects should not overshadow the fact that land rights work means social interventions that affect social structures and therefore require (conflict) sensitive approaches that allow for flexible adaptations to changes in the context.

The experience in the Burundian context shows that it is possible to address land rights issues in a systematic and participatory way even in very fragile and sensitive settings. With their participatory approach ZOA so far facilitated the documentation of 43.000 parcels of land in Burundi. What is currently missing is a true integration of this work with integrated farm planning (PIP) for climate smart practices, soil protection and sustainable production increases.

Discussion

Accelerated, human induced soil erosion is a major threat to soils globally (Borrelli et al, 2017). This paper contributes to the literature on sustainable land management in (post-conflict) development settings (see: Betge, 2019). Furthermore, it shows a way to create synergies between two relatively new and highly innovative approaches in development cooperation, the PIP approach and a fit-for-purpose land tenure registration approach. The result of this paper is a sketch concept for an integrated approach towards improved land management, including land tenure security, reduction of land related conflicts, improved agricultural productivity and climate smart practices with a focus on combating soil erosion.

I argue that sustainable results, in particular in (post-conflict) developing countries, will only be achieved through such integrated approaches. Soil protection and more broadly the combating of environmental degradation are not simply technical issues and in many countries around the world state actors lack the capacities to deliver the necessary services. The FAO underlines that land tenure is a key factor in resources management and resource degradation (FAO, 2002).

Complex land systems involve multitudes of actors that place demands on natural resources which can only be addressed through coherent land use planning (Briassouli, 2019: 2). Farmers need to have an intrinsic motivation to invest in their land and protect soils. In the long-term, this motivation will only be sustained if land rights are secure. "If a farmer cannot look to the future with security, little can be hazarded by him beyond the expenses which the returns of the year will defray; and not only will all great improvements, but even the most common works of the season, be imperfectly performed." (D. Low 1844; Landed Property and the Economy of Estates; LONDON. Cited after Bruce/Migot-Adholla 1994).

The argument made here is that significant results regarding improved land management and in particular relating to soil erosion can be achieved through an integrated approach such as the one proposed. This requires different actors to adapt their ways of working, including donors to adapt their ways of funding in order to make such projects possible. Short-term financing or consortia of implementers who work alongside each other instead of together will not suffice to make sustainable and scalable results possible. Furthermore, clear regulatory frameworks are needed that enable efficient and effective consortia management including necessary lobbying and advocacy activities towards policy makers.

Investments in land rights work strongly contribute to the resilience of local communities and resilience in turn is closely related to the food security of smallholders (Van Hecke, 2018). If land rights work is combined with targeted livelihood support including soil protection providing people with economic opportunities, they are likely to also invest in soil protection. Land rights work done right contributes to better social relations and better state-society relations. These objectives can only be achieved by flexible, conflict sensitive and above all participatory approaches. Generally, land rights work needs to be focused on improving governance structures, be they formal or informal. Therefore, land rights work is always a social intervention and never just a technical process and it needs to go beyond securing rights. Improvements in people's lives need to be tangible and possible to be achieved in a foreseeable timeframe. Soil protection and restoration as well as increased agricultural production are key elements to achieve this.

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