7.10 Sahelian *bocage*: an integrated approach in Burkina Faso

Patrice Savadogo

Summary

- The deterioration of the rural landscape in the Sahel region in general has worsened in the last decades, endangering local populations.
- The creation of Sahelian bocage, or live fence perimeters, in this rural landscape is a way to remedy the problems linked to extensive agriculture and degradation of natural capital.
- The concept is based on the creation of bocage perimeters in a mixed regime for enhancing agricultural productivity, increasing fodder and fuel wood availability.
- The tree-based farming technique adopted in the Sahel helps farmers cope with climate change.

Approach

Traditional knowledge and practices in the Sahel region are first capitalized and improved technologies developed and tested. Traditionally in the Sahel of Burkina Faso farmers have been practicing conservation agriculture for decades. *"In 1979, Yacouba Sawadogo started to use the zaï technique to rehabilitate degraded land"* (Reij et al. 2009). Since then, thousands of farmers have adapted the simple, labour-intensive method of digging planting pits called *'Zaï'*. The dimensions of pits often vary with the type of soil and availability of labour. Pits are dug after the crop harvest during the dry season from November until May. The number of *zaï* pits per hectare varies from 1,200 to 2,500. Both the density of *zai* pits on farm fields and their depth/size are dependent on the quantity of harvestable water. After digging the pits, composted organic matter is added and after the first rainfall, the matter is covered with a thin layer of soil and the seeds placed in the middle of the pit. *Zaï* are especially important for soil and water conservation and erosion control for encrusted soils, and increasing crop yields. Tree seed or rootstock began to germinate or sprout, promoting establishment of vegetation.

Sustainable tree-based land management developed through direct support to farmers. Species selection for live fence as well as farmer-managed natural regeneration is critical for sustaining wood-fuel production.

Impact

These practices are being spread across vast portions of Burkina Faso and neighbouring Niger and Mali, turning millions of acres of what had become a semi-desert in the 1980s until the 2000s into more productive land. The result is a restored environment, increased tree cover, availability of fodder, non-wood forest products and fuel-wood, widespread conservation and utilization of indigenous trees. More specific impacts include:

- Promotion of tree-crop-livestock integration with significantly higher/sustained level of productivity.

- The farmer-managed natural (tree) regeneration techniques adopted in the Sahel help farmers cope with climate change.
- The zai and other technologies on soil water conservation with trees are being spread across vast portions of Burkina Faso and neighbouring Niger and Mali.

Policy implications

- Institutional capacity development for the communities to manage land development and agriculture due to creation of village land management committee that undertake discussion with their municipality and community to secure their common land needs to be enhanced
- The adapted land-management approach has gained interest in many communities, which are organizing themselves to apply the techniques.
- There is a need to combine increased availability of wood fuel with improved technologies for efficient burning of wood fuel.

To find out more

http://www.eauterreverdure.org [*in French*]

Daniel Kaboré and Chris Reij (2004). The emergence and spreading of an improved traditional soil water conservation practice in Burkina Faso. EPTD Discussion Paper No. 114
Reij, C.; Tappan, G.; Smale, M. (2009). Agroenvironmental transformation in the Sahel. IFPRI Discussion Paper 00914, IFPRI.

7.11 Community-managed exclosures in Tigray, Ethiopia

Emiru Birhane and Kiros Meles Hadgu

Summary

Cumulative effects of soil erosion, deforestation and overgrazing caused widespread land degradation across the Ethiopian highlands. In response to the land degradation, rehabilitation measures such as exclosures have been practised by community, government and non-government organizations. Exclosures are areas socially fenced off from wood cutting, grazing by domestic animals and other agricultural activities, with the goal of promoting natural regeneration of plants and rehabilitation of formerly degraded communal grazing lands. The practice of exclosure has been mainly carried out during the last two decades (1991-2013). Priority areas for exclosure are identified by local community representatives, Ethiopian Government development agents, and NGOs closely working together. Community-managed enclosures are mainly practised because of deforestation and overgrazing to rehabilitate degraded areas.

Approach

In the process of closing the area, local people are involved in the delineation of exclosures. In the beginning, the development agents, development committee and the local administration (Baito) jointly identify potential sites for protection based on physical

criteria such as shallow depth soil, 80% stoniness, etc. The final decision on the site selection is made during a general meeting of community members. Based on the interests of the local people, methods of protection are decided on at the same meeting (BoANRD 1996). In addition to the physical criteria mentioned above, additional site selection criteria include socio-economic criteria that selected sites are not too close to settlement areas, and are not to be used for grazing. Exclosures are protected using guards who are assigned by the villagers because exclosures are not fenced, to keep establishment costs low. The users of exclosures contribute money for the salary of guards. In some cases, guards work on a food-for-work basis, mainly provided by World Food Programme, for protecting the exclosures under conditions of highly food insecure areas (Yayneshet et al, 2009).

Impact

Converting degraded grazing lands into exclosures is a relatively low-cost land management option with many benefits: halt land degradation, reduce run-off/soil erosion, improve the micro-climate, water infiltration, restore soil nutrients, sequester carbon, provide livestock fodder, fuel wood, and thatch grass for house construction and enhance biodiversity.

Over a period of 20 years, more than 1.5 million ha of land has been rehabilitated in Tigray, and the sequestered carbon was 246 kgha^{-1}, total soil nitrogen increased by 7·9 kg- ha^{-1} and additional available phosphorous stocks amounted to 40 kg ha^{-1}. The Net Present Value of exclosures ecosystem services under consideration was about 28% (USD 837) higher than alternative wheat production. When all benefits are taken into account, exclosures provide higher benefits than other agricultural land use, e.g., intensive cultivation or livestock grazing. Exclosures provide substantial opportunities to mobilize the local communities in efforts to rehabilitate degraded communal lands, given that more than 75% of households had a positive view on exclosures effectiveness to restore degraded soils and vegetation. About 2 million people have benefited from the community-managed initiatives. The community owns the technology and does the promotion by themselves.

Exclosure contributed to the change in vegetation cover from 3 to 11%.

Figure 7.11.1 Land use land cover change after the placement of community managed exclosures (Photo by Land rehabilitation team)

Policy implications

The community-based initiative influenced the revision of agricultural policies in Ethiopia to become a conservation-based agricultural and rural development policy and strategy. This successful community initiative contributed to a national strategy called Climate Resilient Green Economy (CRGE), which considers trees in forestry and agroforestry as one of the pillars contributing to the country's economy. The community based by-laws related to the protection and management of the exclosure was recognized by the judiciary and influenced the extension systems in the drylands of the country. It is also considered as one of the tools for sustainable land management being practiced in 177 watersheds throughout the country. Success of exclosures is closely related to the issue of benefits and their equitable distribution among community members, which has helped to develop sense of ownership security. The emergence of exclosures as an alternative land management strategy is a proven cost-effective management option to counteract degradation of the environment, while at the same time providing long-term economic benefits for the local community.

To find out more

R. Aerts, J. Nyssen, M. Haile. 2009. On the difference between "exclosures" and "enclosures" in ecology and the environment. Journal of Arid Environments, vol. 73, no. 8.

7.12 Conclusion

When reading the project case studies there are many examples of how trees provide or increase the resilience of livelihoods of poor drylands people. These include the following:

1. The Ngitili system provides grazing resources for animals and foods from trees as well as opportunities to collect wood fuel during the dry season, all of which enhance the resilience at household and village level.
2. Small-scale stands of *Melia* on individual farms, once mature, offer the opportunity to harvest and market wood resources in case of drought or when the need arises.
3. In Sudan, the community level environmental management plans and restoration activities have resulted in greater access of refugees to state-owned forests allowing people to benefit from the resources in these dryland forests. This is likely to create resilience, however, the impact of this has yet to be assessed.
4. While farmer-managed natural regeneration offers multiple benefits, in the Uganda case, a full assessment of livelihood impact - though in process - has not been published.
5. A steady flow of carbon credit revenue to land owners in the Kasigau carbon sequestration project helps stabilize household income and thus enhances resilience through its effect on the financial capital of the livelihoods. Further resilience enhancing benefits are likely to accrue but remain to be assessed.
6. Shea butter and Balanites, two trees which provide food and income during the dry season, contribute to more resilient livelihoods where there are few other

options to acquire food and income during the dry season.

7. Water harvesting in drylands raises cropland productivity and speeds up the establishment and growth rate of trees on farm. The latter is a prerequisite to benefit from resilience provided by trees.
8. The Sahansaho project is still young, its community approach enhances the social livelihoods dimension.
9. Sahelian bocage enhances resilience through water harvesting and tree regeneration techniques. While it is obvious that Zai enhances resilience, the text is not specific enough to say more about the tree-related resilience enhancement.
10. Community-managed exclosures in Ethiopia enhance resilience while restoring land and providing goods that may be collected during the dry season or drought.

From the above it is clear that significant resilience may in fact be provided by the activities of these projects. The above overview further shows that projects have information to infer resilience offered by provisioning services, but most of the projects lack information to make the case for resilience offered by supporting, regulating and cultural services. This lack of articulation and providing evidence for resilience is understandable because the concept of and emphasis on enhancing household or community resilience is relatively young.

To ensure better documentation of resilience enhancement in future projects we propose including resilience enhancement as an integral part of project deliverables; second, plan how to collect data and compile evidence of resilience enhancement as part of project M&E activities and third; ensure attention to report on resilience-building of a wider range of ecosystem services than ecosystem goods alone. Finally, a concerted capacity building effort aiming at project staff and communities would be required to achieve this.

In several projects the duration has been just a few years, but in others, we can speak of decades of experience in bringing back the productivity of landscapes to levels that support growing populations. These are the efforts that warrant closer assessment for their resilience-yielding ability, the *how* as well as the *why.* Not enough emphasis – especially at the planning stages – may have been given to maximizing the many ways trees add long-term value in terms of food/fodder/fuel and fibre, not to mention the many systemic benefits of wind/dust/erosion/flood amelioration to the dryland environment. Alternatively, this emphasis may merely be implicit, versus explicit in project-level design.

Yet it is clear that there are large pools of experience and local knowledge in every country that can be drawn on where and when needed. Though only a small start, this chapter might serve as the beginning of a more systematic effort to document and share such knowledge, especially among other practitioners of the art of creating '*tree-silience*.' In annex 1, we pull together write-shop participants thinking about what it takes to achieve large-scale benefits by integrating trees into the game plan.