Stone Bunds | Methods and Tools

Context

Stone bunds are part of the natural resource management approach taken by the *Programme for Decentralised Rural Development* (PDRD). This method helps to control the erosion of drainage basins and allows water to seep into the soil, providing better crop yields and better access to drinking water by raising the water table. It is used in particular by the PRODABO programme in eastern Chad.

Efforts to combat erosion caused by rainfall consist in reducing the rate of runoff to prevent topsoil from being washed away. It has been shown that natural or artificial vegetation cover offers the most effective protection, so all measures that aim to maintain and extend this cover will contribute to soil conservation.
[Center for Tropical Forests (*Centre Technique Forestier Tropical, France*), 1989]

Combined with various agricultural production techniques, stone bunds increase production while preserving and improving soil quality. Measurement of crop yields shows an increase of 40 % to 70 % in agricultural production.

The dry-stone bunds, which are built along contour lines, help to build up soil levels and slow runoff. Once the soil has reached the top of the bund, the wall has to be built up to a maximum height of about 60 cm. In arid zones where water erosion is often a key factor in desertification and soil impoverishment, this technique that calls for few technical and financial resources helps to conserve drainage basins and improve the livelihoods of local people.

Stakeholders

a. The population
These structures are included in the *local development plan* (LDP), which is drawn up and approved by the people. PDRD makes use of self-promotion to improve living conditions in rural areas, reduce poverty and curb potential crises.

b. The cantonal development committee
The people's applications for technical and financial support within the local development plan are initially prepared by the *cantonal development committees* (CDCs), which pass them on to the *departmental advice and support centres* (PODACs). These in turn refer them to the programme.

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c. Executing agencies
Funding is provided by the *Decentralised Development Fund* (DDF-KfW). The selected service providers are introduced to the local authorities and people and carry out construction work with support from local men and women. Monitoring is handled by the population, the CDCs and PODACs.

Local engineering firms, NGOs and CDCs have developed their organisational capacities and act as service agencies:
- → More than 5,000 farmers have been trained as 'masons' to build stone bunds and dikes of various sizes.
- → Farmers have been trained to measure the contour lines.

Activities

All activities are performed in a participatory manner. Land is managed by the local people, and PDRD makes sure that each intervention meets a need voiced by the people, and that they are involved throughout the entire process.
The stone bunds are planned using land measurement techniques that are easy to master and the bunds are then built by unskilled labourers. As compared with dams and water-spreading weirs, the construction costs are lower, provided the raw material (stone) is available.
All the same, it is necessary to involve and raise the awareness of the local people during the design, construction and maintenance of the structures, to make sure they assume ownership of them. This training process prepares the people for the way in which the future municipal institutions will operate. These institutions will be involved in managing natural resources.

The people fill in information forms showing the size of the areas to be developed, the distance from the quarry to the site, the family situation and gender of the applicant, etc. Based on the technical data, an invitation to tender is issued to local contractors who have been trained in this type of construction.

PRODABO initially financed the construction of stone bunds using mechanical equipment such as tipper trucks and tractors. This method has the advantage of being fast, but calls for 15 to 20 workers throughout the process. The cost per linear metre is estimated as FCFA 313.

PRODABO then tested the construction of stone bunds using carts drawn by horses or donkeys, at an estimated cost of FCFA 146 per linear meter. This method calls for fewer people (6–7) to construct each bund. The cart is given to the owner of a horse in exchange for his help in building the stone bund.

Table 1: **Estimated total surface area developed per service provider and means of transport used in 2009**

Service providers (NGOs and engineering firms)	Means of transport used	Total length of stone bunds in metres	Estimated area covered (ha)	(%)
ECOHUBS	Tractors, tipper trucks and carts	399,389.00	1,331.29	64.85
BADIA	Carts	131,261.85	437.53	35.15
AKID	Carts	18,807.13	62.69	
APE	Carts	3,277.00	10.03	
EMMCRB	Carts	63,077.00	210.25	
Total		615,812.00	2053.00	100

Source: Report of study on the impact of carts on stone bunds, PRODABO 2010.
NB: the estimate is based on 300 linear metres per hectare.

- The trained villagers offer their services to other villagers, who pay them for building the stone bunds.
- More than 2,000 hectares have been developed so far.
- The cart method is definitely advantageous if the quarry is less than 3 km from the site to be developed.
- The programme distributed 30 kits made up of 3 carts and expendable equipment so that people in selected areas could build stone bunds.
- The *cantonal development committees* (CDCs) are responsible for organising the work and mobilising the people.
- The programme pays the operating costs for each CDC, which fills up their cash funds and ensures they are able to function.
- The people who benefit from the stone bunds take care of their maintenance.

Products and their use

- Training for the people who benefit from the stone bunds: training in construction, maintenance, environmental protection and improved agricultural production
- Capacity building for the local people in connection with drawing up and implementing the local development plan
- Development of the cart method, which meets various needs.

Direct results

- Over 3,000 hectares protected by stone bunds (estimates for 2011)
- Increased agricultural production on the land developed in this way
- Reduction in rural depopulation as a result of greater agricultural production.

Monitoring and evaluation

PDRD and PRODABO closely monitor the construction of stone bunds. Monitoring is handled by the people, the CDCs and the PODACs. The cart method was developed as a direct result of this monitoring process. The limitations of this method are known and relate to the distance to be covered to fetch stone and the willingness of the people to build and maintain the bunds.

The results of providing cart kits should be analysed, and maintenance of the bunds should be monitored, ideally as a comparative monitoring process: bunds built by contractors using mechanical equipment as compared with bunds built using the cart method.

Scaling up

The construction of stone bunds responds to expectations of controlling desertification by reducing the degradation of drainage basins, and even rehabilitating them. The bunds can be built almost anywhere in the Sahel and are equally useful for farming and for providing fodder and water for livestock.

This practice has the benefit of matching the physical and financial means of the local people. Improving the living conditions of farmers by better agricultural production directly helps to reduce poverty.

After building the bunds for which they received their carts, cart owners can offer their services to other villagers for transporting goods, water and people, which at the same time solves the major transport problem in the villages.

The results achieved, especially with regard to the methods for drafting and implementing local development plans, are particularly appreciated by the Chadian authorities. The method of drafting LDPs has served as the basis for a national model.

Environmental impact

Controlling desertification is one of the strategies for mitigating the effects of climate change. Stone bunds slow the erosion process, retain water, promote better vegetation cover, increase the protection of drainage basins and therefore reduce the damage caused by erosion.

In the long term, regenerating drainage basins makes it possible to preserve biodiversity and ensures the people can grow enough food to feed their families.

Constraints

PDRD's strategy was to develop an approach that made the local people the key players in their own development, and prepared them for the decentralisation process. The management of common property and individual land in the case of flood-recession crops makes the people think about their collective and individual interests. The results in this context are obvious and several government officials are convinced that this is an effective approach. However, the delay in setting up municipal institutions makes it doubtful that the people will be able to continue being involved in a participatory structure of this kind. Higher agricultural yields should encourage the people to pursue and develop this activity.

Another constraint relates to the monitoring and maintenance of the stone bunds. While users have been trained, many of them seem to expect that another 'project' will come along to give them financial support. This kind of expectation jeopardises the continuity of the developed approaches, which are based on autonomous collectivities.

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