

Water-spreading Weirs | Methods and Tools

Context

Water-spreading weirs (seuils d'épandage) aim to alleviate desertification by reducing or even stopping the erosion of drainage basins. This makes it possible to significantly increase the amount of land being cultivated, enabling a wider range of products to be grown over a longer period. Constructing weirs is one of a range of assessments and actions intended to protect drainage basins.

The erosion of drainage basins leads to a significant drop in the water table, a reduction in soil quality and hence a reduction in yields. Rehabilitating these basins helps to counter these negative effects, reinstate ground cover and enable more productive farming to take place, sometimes all the year round.

In the Sahel, the advance of desertification is a key factor in the impoverishment of the population. Desertification is also being exacerbated by climate change. Competition for the few resources that are available is increasing pressure on the environment and those who make use of it. Less land is available for agriculture and grazing, increasing the risk of conflict between stockbreeders and crop farmers. For many, the only solution is a rural exodus.

Water-spreading weir technology was introduced to Chad in the 1990s by Swiss cooperation. It has been used by the *Programme for Decentralised Rural Development in Assoungba, Biltine and Ouara (PRODABO)* since 2004, and also by the *Development-oriented Emergency Aid (DEA)/Development-oriented Emergency and Transitional Aid (DETA)* project. The technical aspects of weir design are carried out or managed by the project. Funding for PRODABO was provided by the *Decentralised Development Fund (DDF)*, with work being carried out by local companies set up for this purpose. Unskilled labourers (a short-term labour-intensive approach was used) from local villages have also been able to learn how to maintain the weirs they have constructed.

Water-spreading weirs slow the water flow and increase the area into which the water seeps. They enable some of the rainwater (3%–5%) to be stored, and increase the area along the banks of



the wadis that is suitable for cultivation. Weirs are never built singly. To be effective, managing drainage basins necessitates the construction of a series of weirs. Each of these retains some of the water and alluvial deposits, and gradually raises the bed of the wadi. This process helps to raise the level of the water table by up to 20 metres, and makes it possible to dig wells in areas where there previously were none, at the same time reducing the workload of the women who have to draw the water.

Water-spreading weirs are an important way of protecting drainage basins, making it possible to improve the low-lying areas which, together with improved cultivation techniques (such as using different seed varieties and introducing new crops), also increases agricultural production. Off-season cultivation is also possible, providing farmers with more income.

It is not possible to construct water-spreading weirs everywhere. Designing and constructing weirs requires significant technical knowledge. However, it is quite straightforward to build them using a labour-intensive approach. Their maintenance is straightforward and requires minimal effort provided there is no major damage.



Construction costs are significantly less than those of dams i.e. 10 – 40 times cheaper per hectare of land developed. Although dams enable water to be stored and irrigation to take place, they do not have the same stabilising effect on the environment that water-spreading weirs have. Before deciding which approach to use, a comparative study should be performed.

The average cost of a weir is EUR 56,000, including the contribution made by the local population. Combined with other agricultural production techniques such as stone bunds, weirs are a way of significantly increasing agricultural production. Additional revenue from farming can exceed EUR 100,000 per year – 10 to 15 times more than that before the weirs were built. Weirs can triple farmers' income from off-season cultivation alone, by increasing yields and the amount of land available for cultivation.

Stakeholders

a. The population

The population is the key stakeholder with regard to protecting natural resources. Building weirs meets their needs and the problems they have expressed in a local agreement or development plan. Technical proposals are presented to the local people, who undertake to fund their implementation. The local people are also expected to help build the weirs in line with the labour-intensive approach used. They have to guard the construction site, train themselves to maintain the weirs, and carry out this maintenance. The weirs are handed over to them, and they take on full responsibility for them. Increased yields and revenue theoretically enable them to cover the costs of maintenance and monitoring.

First of all, even before the DDF has accepted the plan, the local people enter into an agreement on the management of the weirs, their construction, maintenance and, most importantly, the sharing out and use of land.

b. The cantonal development committee (CDC)

Requests by the local population for technical support and funding are made by the cantonal development committee, which passes them on to *departmental advice and support centres* (PODACs), which finalise the documents and send them to the project. The CDC represents the local people, and passes on their decisions.

c. Executing agencies

Technical studies are essential, and are carried out by the programme and service providers. This is very complex work. An invitation to tender is issued to local contractors with training in this type of construction. The service provider selected carries out the construction work with the help of local men and women.

Follow-up work is performed by the local population, the CDCs and PODACs. Maintaining the weirs is the responsibility of the local population. During construction, village stonemasons are trained in the different techniques associated with this type of work. In theory, the economic benefits of the weirs enable the villagers to cover the maintenance and monitoring costs.

Note that engineering companies in Chad have developed some technical capacity, but ongoing training is still required.





Activities

All activities take part within a participatory framework. PRODABO initially financed the construction of weirs on a trial basis. By the end of 2009, it had built 37 weirs and reclaimed 1,163 hectares of cultivable land. Funding was provided by the DDF (KfW) programme component.

Stages for the local population:

- Draw up a local development plan. In the light of technical studies, this plan may propose a project to create weirs in several different areas;
- Discuss the construction of the proposed weirs;
- Draft an agreement covering the establishment of a management and maintenance committee;
- Arrange for the management and maintenance committee to be trained by the project;
- Build and maintain the weirs;
- Train farmers in techniques suited to the new agricultural conditions.

Products and their use

- Training for the local people who will benefit: in construction, maintenance, protecting the environment and also improving agricultural production;
- Developing the capacity of the local population within the context of defining and implementing the local development plan;
- Techniques for building weirs, new approaches and knowledge enabling these techniques to be refined;
- Training for local contractors.

Direct results

- An additional 1,100 hectares protected by water-spreading weirs;
- A significant increase in agricultural production;
- Increased income for the local population;
- Increased vegetation cover;
- Reduced erosion;
- Significant rainfall infiltration;
- Development of wooded grazing areas at the edge of agricultural production areas to enable forests to regenerate;
- Reduced rural depopulation as a result of increased agricultural production.

Monitoring and evaluation

PRODABO has been monitoring the water-spreading weirs very closely on an ongoing basis. This age-old technology is relatively new to the Sahel, and calls for changes and in-depth studies on soil types, rainfall, etc.

Each drainage basin is different, and each weir has to be built to take account of the basin's special characteristics. Experts are regularly asked to monitor the development of weir technology. For example, new techniques using remote sensors can improve and speed up the design of each individual weir.

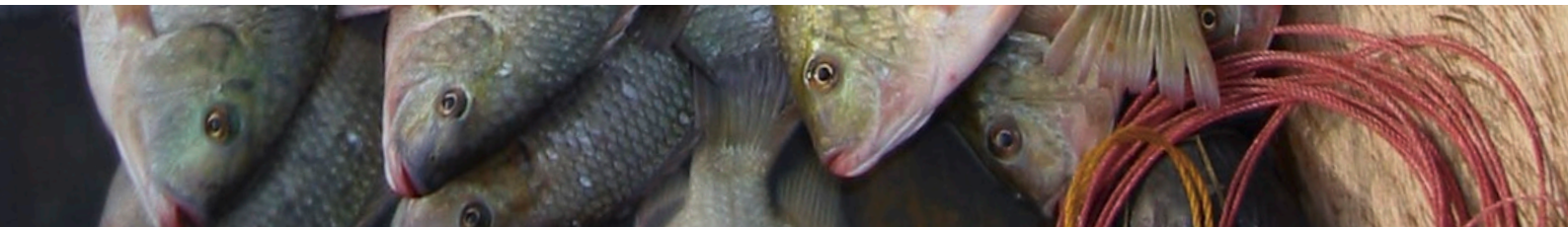
The effectiveness of water-spreading weirs also depends on changes that the farmers are prepared to make to the way they farm. Assessments are needed here, too, regarding the quality of seeds, techniques and production methods. The management and maintenance committees are monitored to ensure that they know what they need to do.

Scaling up

Weir construction adequately solves the problems faced by 90% of low-lying areas in the Sahel. This type of work regenerates low-lying areas that have deteriorated, and is a useful tool for alleviating desertification.

With regard to restoring natural resources and increasing agricultural production and revenue, results indicate that managing drainage basins properly feeds the local population and enables them to sell their surplus produce.

Building weirs calls for technical skills that also need to be developed locally. This has been made possible by the *Programme for Decentralised Rural Development (PDRD)*.



The intellectual and physical work carried out by the local population, as illustrated by its development plans, local agreements and charters, and organised on the basis of legitimate, recognised structures, represents true added value for the quality of these weirs.

With regard to forthcoming decentralisation, the new local bodies will be responsible for local development. Weirs cannot be funded by local people alone. If supported by funding measures and technical assistance from the government, they could play a vital role in alleviating poverty.

Environmental impact

By slowing down rainfall run-off, water-spreading weirs protect low-lying areas from accelerated erosion and promote the growth of vegetation cover.

In less than five years, weirs reverse the damage caused by 30 to 40 years of droughts and poor land management.



They are undoubtedly effective, and building them would appear to be a long-term measure for protecting both the environment and the people that live off these local resources. Climate change does not bode well for the Sahel. More effective land management is the only way of protecting and also increasing the potential of this land.

Constraints

A construction programme to meet Chad's needs would take an estimated 20 to 50 years to complete. Political decisions need to be made to this effect and, to ensure such a programme is carried out, the ministries involved must join forces with the local people who will benefit, and with local organisations.

This responsibility involves not only jointly identifying needs, undertaking joint actions and training local people in maintaining the weirs but also, perhaps most importantly, training in new agricultural methods. Rehabilitating drainage basins takes time, and farmers need to be patient and adjust to it, above all adapting their farming methods to suit the new conditions. If the water level rises fairly quickly, the vegetation will take longer to get established, and will need more protection.

On a technical level, it is still necessary to develop the capacity of local contractors and government officers. Technical knowledge needs to be shared and be the subject of ongoing development.

At present, the issue of land rights does not seem to be causing any problems, but the introduction of new municipal organisations may create new challenges or even conflicts affecting the local population.

Imprint:

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit
(GIZ) GmbH

Programme for Decentralised
Rural Development (PDRD)

PRODABO, Chad, carried out by the
consultancy firms PÖYRY/AFC and
ECO/IRAM/AFC

Project to improve livelihoods in
the refugee area in eastern Chad (ENÜH)

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