

Masonry micro-dams (马里)

Micro-barrage en pierres maçonnées (French)

描述

The role of masonry micro-dams is to raise the level of the water table so as to supply wells and create water reserves for off-season farming activities.

A masonry micro-dam is a structure built of dressed stone pointed with cement mortar. The width of the crest is 0.75 metres. The length generally ranges from 100 to 200 metres depending on the site. The height varies between two and four metres. The dam creates a water reservoir upstream covering an area of around 5 to 15 hectares. Micro-dams are equipped with buttresses and a stilling basin. Each dam has a sluice fitted with a stoplog gate for draining away sediment during the first rains of the season and to regulate water levels. The use of stoplog gates is recommended instead of sluice gates, as the latter are more technically sophisticated and require more maintenance. Farming is carried out upstream and downstream in the rainy season and off-season.

The dam increases the amount of available surface water during the rainy season and groundwater during the off-season. This results in increasing the farmland area as well as yields and production. A second growing season is made possible. Its effect on the water table depends on the depth of the scheme's foundations: the deeper the foundations, the greater the recharge of ground water. During the rainy season, the lands are used for rice growing. The wells used for irrigating market gardens are fed from the water table, meaning vegetables can be grown off-season. The water is also used for watering livestock, fish farming and, sometimes, domestic purposes.

Implementation steps: An information and awareness-raising workshop is organised on the IPRO-DB approach at the commune level, involving the villages affected by the project. A general meeting is held to secure the support of the whole village for the development request. The village chief and commune mayor sign off the request. The project team carries out a scoping study and socio-economic surveys. If the outcomes of the scoping study phase and socio-economic surveys are positive, the terms of reference are drawn up for working with consultancies. Consultancies are selected through tender processes to carry out the technical studies and create the invitation to tender document. The project team monitors the consultancies' delivery of the technical studies. The village pays its financial contribution towards the project. The management committee is set up and organisational and technical training is provided to beneficiaries. Exchange visits are organised with villages that have experience in installing these schemes. The project team, village, mayor and company sign the memorandum of understanding. Stone breaking gets underway. Landowners sign the transfer deeds for the site. The invitation to tender for the building works is published and the contractor selected. The invitation to tender for works supervision is published and the supervisory consultancy selected. The building contractor and supervisory consultancy are introduced to the village and begin the building work. Local labour is employed in building the scheme. Partial acceptance of the building works (for example, foundations, wall, buttresses, stilling basin, gabion reinforcements, etc.) is granted. The project team monitors the building works. Payment for activities is made on a unit-price basis. Interim acceptance is granted. Final acceptance is granted after one year.

A management committee takes charge of opening and closing stoplog gates, organises the maintenance of the scheme and institutes additional measures to protect the scheme (gabions, stone bunds, etc.). It collects and manages maintenance fees, ensures the committee's rules of procedure are adhered to and organises meetings of local producers. With minimum levels of maintenance, a scheme will remain functional for at least 20 years.

Around 60 masonry dams have been built or rehabilitated in the Bandiagara and Bélé Dougou areas.

地点

地点: Bandiagara and Bélé Dougou area, Mali, 马里

分析的技术场所数量:

选定地点的地理参考

- 不适用

技术传播: 均匀地分布在一个区域 (approx. 1-10 平方公里)

在永久保护区? :

实施日期: 10-50年前

介绍类型

- 通过土地使用者的创新
- 作为传统系统的一部分 (> 50 年)
- 在实验/研究期间
- 通过项目/外部干预

技术分类

主要目的

土地利用

- 改良生产
- 减少、预防、恢复土地退化
- 保护生态系统
- 结合其他技术保护流域/下游区域
- 保持/提高生物多样性
- 降低灾害风险
- 适应气候变化/极端天气及其影响
- 减缓气候变化及其影响
- 创造有益的经济影响
- 创造有益的社会影响

同一土地单元内混合使用的土地：是 - 农林牧业



农田
 • 一年一作
 每年的生长季节数: 1



水道、水体、湿地 - 池塘、大坝

供水

- 雨养
- 混合雨水灌溉
- 充分灌溉

土地退化相关的目的

- 防止土地退化
- 减少土地退化
- 修复/恢复严重退化的土地
- 适应土地退化
- 不适用

解决的退化问题



生物性退化 - Bc : 植被覆盖的减少



水质恶化 - Ha : 干旱化, Hg : 地下水/含水层水位的变化

SLM组

- 灌溉管理 (包括供水、排水)
- 引水和排水
- 地表水管理 (泉、河、湖、海)

SLM措施



结构措施 - S5 : 大坝、集水斗、水池

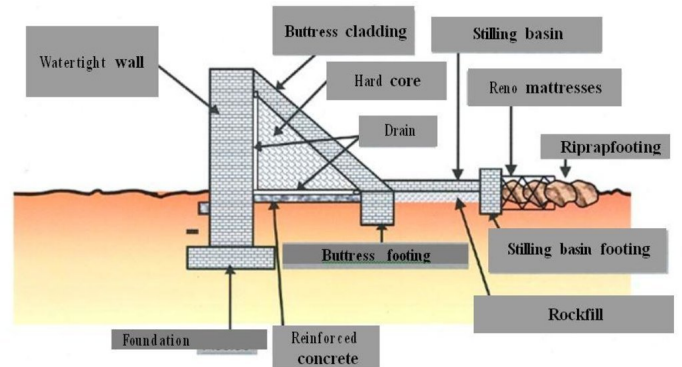
技术图纸

技术规范

A masonry micro-dam is a structure built of dressed stone pointed with cement mortar. The width of the crest is 0.75 metres. The length generally ranges from 100 to 200 metres depending on the site. The height varies between two and four metres. The dam creates a water reservoir upstream covering an area of around 5 to 15 hectares. Micro-dams are equipped with buttresses and a stilling basin. Each dam has a sluice fitted with a stoplog gate for draining away sediment during the first rains of the season and to regulate water levels.

Technical knowledge required for field staff / advisors: high
 Technical knowledge required for land users: low
 Main technical functions: increase of infiltration, increase / maintain water stored in soil, increase of groundwater level / recharge of groundwater, water harvesting / increase water supply, water spreading

Dam/ pan/ pond
 Height of bunds/banks/others (m): 2-4
 Width of bunds/banks/others (m): 0.75
 Length of bunds/banks/others (m): 100-200



Author: IPRO-DB

技术建立与维护：活动、投入和费用

投入和成本的计算

- 计算的成本为：
- 成本计算使用的货币：**CFA Franc**
- 汇率 (换算为美元)：1 美元 = 517.0 CFA Franc
- 雇用劳工的每日平均工资成本：不适用

影响成本的最重要因素

Each dam costs between 100 and 140 million CFA francs (195'583-273'817 Dollar). Costs are reduced as a result of the availability of local materials and the fact that local masons and contractors are well versed in this type of technology.

技术建立活动

1. information and awareness-raising workshop (时间/频率: None)
2. village chief and commune mayor sign off the request (时间/频率: None)
3. project team carries out a scoping study and socio-economicsurveys (时间/频率: None)
4. Consultancies are selectedthrough tender processes to carry out the technical studies (时间/频率: None)
5. management committee is set up and organisational andtechnical training is provided to beneficiaries (时间/频率: None)
6. Exchange visits are organised with villages that have experience ininstalling these schemes. (时间/频率: None)
7. building contractor and supervisory consultancy are introduced to the village and begin thebuilding work. Local labour is employed in building the scheme. (时间/频率: None)

技术建立的投入和成本

对投入进行具体说明	单位	数量	单位成本 (CFA Franc)	每项投入的总成本 (CFA Franc)	土地使用者承担的成本%
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其它					
total construction		1.0	273817.0	273817.0	100.0
技术建立所需总成本				273'817.0	
技术建立总成本, 美元				529.63	

技术维护活动

1. a management committee takes charge of opening and closing stoplog gates, organises the maintenance of the scheme and institutes additional measures to protect the scheme (gabions, stone bunds, etc.). It collects and manages maintenance fees, ensures the committee's rules of procedure are adhered to and organises meetings of local producers (时间/频率: None)

自然环境

年平均降雨量

- < 250毫米
- 251-500毫米
- 501-750毫米
- 751-1,000毫米
- 1,001-1,500毫米
- 1,501-2,000毫米
- 2,001-3,000毫米
- 3,001-4,000毫米
- > 4,000毫米

农业气候带

- 潮湿的
- 半湿润
- 半干旱
- 干旱

关于气候的规范

Thermal climate class: tropics

斜坡

- 水平 (0-2%)
- 缓降 (3-5%)
- 平缓 (6-10%)
- 滚坡 (11-15%)
- 崎岖 (16-30%)
- 陡峭 (31-60%)
- 非常陡峭 (>60%)

地形

- 高原/平原
- 山脊
- 山坡
- 山地斜坡
- 麓坡
- 谷底

海拔

- 0-100 m a.s.l.
- 101-500 m a.s.l.
- 501-1,000 m a.s.l.
- 1,001-1,500 m a.s.l.
- 1,501-2,000 m a.s.l.
- 2,001-2,500 m a.s.l.
- 2,501-3,000 m a.s.l.
- 3,001-4,000 m a.s.l.
- > 4,000 m a.s.l.

.....应用的技术

- 凸形情况
- 凹陷情况
- 不相关

土壤深度

- 非常浅 (0-20厘米)
- 浅 (21-50厘米)
- 中等深度 (51-80厘米)
- 深 (81-120厘米)
- 非常深 (> 120厘米)

土壤质地 (表土)

- 粗粒/轻 (砂质)
- 中粒 (壤土、粉土)
- 细粒/重质 (粘土)

土壤质地 (地表以下>20厘米)

- 粗粒/轻 (砂质)
- 中粒 (壤土、粉土)
- 细粒/重质 (粘土)

表土有机质含量

- 高 (>3%)
- 中 (1-3%)
- 低 (<1%)

地下水位

- 表面上
- < 5米
- 5-50米
- > 50米

地表水的可用性

- 过量
- 好
- 中等
- 匮乏/没有

水质 (未处理)

- 良好饮用水
 - 不良饮用水 (需要处理)
 - 仅供农业使用 (灌溉)
 - 不可用
- 水质请参考:

盐度是个问题吗?

- 是
- 否

洪水发生

- 是
- 否

物种多样性

- 高
- 中等
- 低

栖息地多样性

- 高
- 中等
- 低

应用该技术的土地使用者的特征

市场定位

- 生计 (自给)
- 混合 (生计/商业)
- 商业/市场

非农收入

- 低于全部收入的10%
- 收入的10-50%
- > 收入的50%

相对财富水平

- 非常贫瘠
- 贫瘠
- 平均水平
- 丰富
- 非常丰富

机械化水平

- 手工作业
- 畜力牵引
- 机械化/电动

定居或游牧

- 定居的
- 半游牧的
- 游牧的

个人或集体

- 个人/家庭
- 团体/社区
- 合作社
- 员工 (公司、政府)

性别

- 女人
- 男人

年龄

- 儿童
- 青年人
- 中年人
- 老年人

每户使用面积

- < 0.5 公顷
- 0.5-1 公顷
- 1-2 公顷
- 2-5公顷
- 5-15公顷
- 15-50公顷
- 50-100公顷

规模

- 小规模
- 中等规模的
- 大规模的

土地所有权

- 州
- 公司
- 社区/村庄
- 团体
- 个人, 未命名
- 个人, 有命名

土地使用权

- 自由进入 (无组织)
- 社区 (有组织)
- 租赁
- 个人

用水权

- 自由进入 (无组织)

- 100-500公顷
- 500-1,000公顷
- 1,000-10,000公顷
- > 10,000公顷

- 社区 (有组织)
- 租赁
- 个人

进入服务和基础设施的通道

健康	✓	好
教育	✓	好
技术援助	✓	好
就业 (例如非农)	✓	好
市场	✓	好
能源	✓	好
道路和交通	✓	好
饮用水和卫生设施	✓	好
金融服务	✓	好

影响

社会经济影响

作物生产	降低	增加
生产故障风险	增加	降低
生产区域 (耕种/使用中的新土地)	降低	增加
农业收入	降低	增加

社会文化影响

食品安全/自给自足	减少	改良
冲突缓解	恶化	改良
Contribution to human well-being	decreased	increased

Better levels of production increase producers' incomes and improve living conditions.

生态影响

水量	降低	增加
水的回收/收集 (径流、露水、雪等)	减少	改良
地下水水位/含水层	下降	补水
土壤水分	降低	增加

场外影响

成本效益分析

与技术建立成本相比的效益

短期回报	非常消极	非常积极
长期回报	非常消极	非常积极

与技术维护成本相比的效益

短期回报	非常消极	非常积极
长期回报	非常消极	非常积极

气候变化

渐变气候

年温度 增加	非常不好	非常好
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气候有关的极端情况 (灾害)

局地暴雨	非常不好	非常好
局地风暴	非常不好	非常好
干旱	非常不好	非常好
比较和缓的 (河道) 洪水	非常不好	非常好

其他气候相关的后果

缩短生长期	非常不好	非常好
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采用和适应

采用该技术的地区内土地使用者的百分比

- 单例/实验
- 1-10%
- 11-50%
- > 50%

在所有采用这种技术的人当中, 有多少人在没有获得物质奖励的情况下采用了这种技术?

- 0-10%
- 11-50%
- 51-90%
- 91-100%

最近是否对该技术进行了修改以适应不断变化的条件?

- 是

否

什么样的变化条件？

- 气候变化/极端气候
- 不断变化的市场
- 劳动力可用性（例如，由于迁移）

结论和吸取的教训

长处: 土地使用者的观点

长处: 编制者或其他关键资源人员的观点

- Micro-dams increase farmland area, yields and production. Better levels of production increase producers' incomes and improve living conditions.
- Generates employment throughout the year. Seasonal outmigration is reduced.
- With minimum levels of maintenance, a scheme will remain functional for at least 20 years.
- raise the level of the water table to supply wells and create water reserves for off-season farming activities

弱点/缺点/风险: 土地使用者的观点如何克服

弱点/缺点/风险: 编制者或其他关键资源人员的观点如何克服

- Beneficiaries occasionally fail to monitor and maintain schemes.
- Lack of quality rubble

参考文献

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WOCAT数据库中的完整描述

https://qcat.wocat.net/zh/wocat/technologies/view/technologies_1632/

链接的SLM数据

不适用

文件编制者

机构

- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (GIZ) - 德国

项目

- Manual of Good Practices in Small Scale Irrigation in the Sahel (GIZ)

主要参考文献

- IPRO-DB (2007): Fiches techniques des barrages individuels. [Data sheet on individual dams]:
- Manual of Good Practices in Small Scale Irrigation in the Sahel. Experiences from Mali. Published by GIZ in 2014.: <http://star-www.giz.de/starweb/giz/pub/servlet.starweb>
- IPRO-DB: Module de formation pour la préparation des aménagements [Training module on preparing schemes] (available in French and Bambara):
- IPRO-DB: Module de formation sur l'entretien des ouvrages [Training module on scheme maintenance] (available in French and Bambara):
- IPRO-DB: Approches du projet de l'irrigation de proximité au Pays Dogon et dans le Bélé Dougou [Small-scale irrigation project approaches in Dogon Country and in the Bélé Dougou region], (O. Fritz, Technical Assistant, GIZ, December 2011):

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