Sounikéyni micro-dam in cyclopean concrete (IPRO-DB)

Cyclopean concrete micro-dams (马里)

Micro-barrage en béton cyclopéen (French)

描述

A water reservoir for growing off-season increases the farmed area, yields and production. A second growing season thus becomes possible.

A cyclopean concrete micro-dam is built using dressed stone pointed with concrete. Cyclopean concrete is stronger than rubble stone masonry. The width of the crest is 0.75 metres. The length generally ranges from 150 to 250 metres depending on the site. The height varies between two and four metres. Micro-dams are equipped with buttresses and a stilling basin. The dam can be built in the form of a dam bridge. Each dam is has a stoplog sluice 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. The dam creates a water reservoir upstream covering an area of between 4 and 15 hectares.
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. 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 areas 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. The dam increases the farmland areas, production and yields. Higher farming revenues lead to improved living conditions.

Initially, an information and awareness-raising workshop on the IPRO-DB approach is organised at the commune level, involving the villages affected by the project. Following this, a general meeting is held to secure the support of the whole village for the development request. The village chief and commune mayor then sign off the request. The project team carries out a scoping study and socio-economic surveys. If the outcomes of the scoping studies and socio-economic surveys are positive, the project team draws up the terms of reference for working with the consultancies. This stage is followed by the selection of consultancies through tender processes to carry out the technical studies and produce the invitation to tender document, all of which will be overseen by the project team. The village then makes its financial contribution towards the project, the management committee is set up, and organisational and technical training is provided to beneficiaries. The final stages comprise the partial acceptance of the building works (for example, foundations, wall, buttresses, stilling basin, gabion reinforcements, etc.), the monitoring of scheme building works by the project team, payment for activities on a unit-price basis, and interim acceptance leading to final acceptance after one year. A management committee takes charge of opening and closing the 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. Sustainable farming and management depend directly on employing a participatory approach.
Roles of the actors involved: Beneficiaries provide labour and financial resources, and conduct monitoring and the small-scale maintenance of the scheme. The project team provides funding, training and beneficiary support, carries out studies and capitalises on project data. The commune signs off the village request and repairs major damage (an activity that has so far been undertaken by the project team). Consultancies and contractors conduct surveys, carry out building work and are responsible for oversight. Rural engineers: quarterly inspections are carried out by the Regional Directorate of Rural Engineering and the Regional Directorate of Agriculture.

Since 2010, four dams were built so far in the Kolokani Circle (Tiembougou, Bamabougou, Korokabougou, Tienko). Others are currently being planned. The practice is recommended for areas lacking the right kind of stone for dressing (dolerite).

地点

地点: Kolokani Circle (Tiembougou, Bamabougou, Korokabougou, Tienko), 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. 0.1-1 平方千米)

在永久保护区？:

实施日期: 不到10年前（最近）

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
- [x] 通过项目/外部干预

Tiembougou dam bridge in cyclopean concrete (IPRO-DB)

技术分类

主要目的

- [x] 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

土地利用

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
- [x] 混合雨水灌溉
- [ ] 充分灌溉

土地退化相关的目的

- [x] 防止土地退化
- [ ] 减少土地退化
- [x] 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, Hs：地表水良变化, 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

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 (193'851-271'379 Dollar)

技术建立活动

1. information and awareness-raising workshop on the IPRO-DB approach is organised at the commune level (时间/频率: None)
2. a general meeting is held to secure the support of the whole village for the development request (时间/频率: None)
3. The project team carries out a scoping study and socio-economic surveys (时间/频率: None)
4. draw up the terms of reference for working with the consultancies (时间/频率: None)
5. carry out the technical studies (时间/频率: None)

6. management committee is set up, and organisational and technical training is provided to beneficiaries (时间/频率: None)
7. building works (foundations, wall, buttresses, stilling basin, gabion reinforcements, etc.), (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%
其它					
total construction		1.0	271379.0	271379.0	100.0
技术建立所需总成本				**271'379.0**	
技术建立总成本，美元				*524.91*	

技术维护活动

1. A management committee takes charge of opening and closing the 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
- [x] 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
- [x] 半干旱
- [ ] 干旱

关于气候的规范
Thermal climate class: tropics

斜坡
- [x] 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
- [x] 高原/平原
- [ ] 山脊
- [ ] 山坡
- [ ] 山地斜坡
- [ ] 麓坡
- [x] 谷底

海拔
- [ ] 0-100 m a.s.l.
- [x] 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）
- [x] 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）
- [x] 中粒（壤土、粉土）
- [x] 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%）
- [x] 中（1-3%）
- [x] 低（<1%）

地下水位
- [ ] 表面上
- [ ] < 5米
- [x] 5-50米
- [ ] > 50米

地表水的可用性
- [ ] 过量
- [ ] 好
- [x] 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）
- [x] 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
- [x] 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）
- [x] 混合（生计/商业）
- [ ] 商业/市场

非农收入
- [ ] 低于全部收入的10%
- [x] 收入的10-50%
- [ ] > 收入的50%

相对财富水平
- [ ] 非常贫瘠
- [x] 贫瘠
- [x] 平均水平
- [ ] 丰富
- [ ] 非常丰富

机械化水平
- [x] 手工作业
- [ ] 畜力牵引
- [ ] 机械化/电动

定栖或游牧
- [ ] 定栖的
- [ ] 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
- [x] 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
- [x] 2-5公顷
- [ ] 5-15公顷
- [ ] 15-50公顷
- [ ] 50-100公顷
- [ ] 100-500公顷
- [ ] 500-1,000公顷
- [ ] 1,000-10,000公顷
- [ ] > 10,000公顷

规模
- [x] 小规模的
- [ ] 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）
- [ ] 社区（有组织）
- [ ] 租赁
- [ ] 个人

进入服务和基础设施的通道

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

Increased farming revenues lead to improved 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

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

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

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?

- 1-10%
- 11-50%
- > 50%

- 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

- The dam increases the amount of available surface water during the rainy season and groundwater during the off-season. 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.
- Generation of year-round employment results in a reduction of seasonal outmigration
- Increased farming revenues lead to improved living conditions
- Increased farmland areas, increased production and yields

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

- There is an occasional lack of monitoring and maintenance.

参考文献

编制者
Dieter Nill

Editors

审查者
Deborah Niggli
Alexandra Gavilano

实施日期: Sept. 24, 2014

上次更新: May 27, 2019

资源人
Dieter Nill - SLM专业人员
Mamadou Gallo Kone - SLM专业人员
Ralf Schneider - SLM专业人员

WOCAT数据库中的完整描述
https://qcat.wocat.net/zh/wocat/technologies/view/technologies_1634/

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

- 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 (2007): Fiches techniques des barrages individuels. [Data sheets on individual dams]:
- 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 inFrench and Bambara):
- IPRO-DB: Approches du projet de l'irrigation de proximité au Pays Dogon et dans le Bélédougou [Small-scale irrigation project approaches in Dogon Country and in the Bélédougou region], (O. Fritz, Technical Assistant, GIZ, December 2011):