Restorated area (Anuschka Barac)

Restoration of degraded rangeland (南非)

Rehabilitation/restoration of an area, after control of alien invasive species.

描述

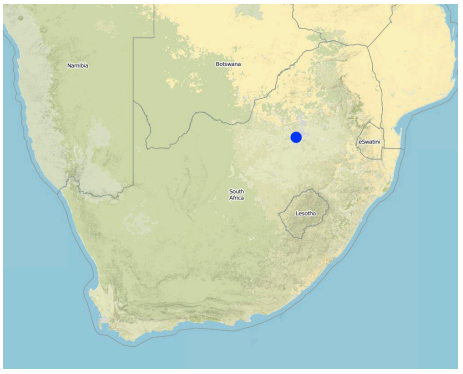
Eradication of invasive species and revegetation of degraded rangelands by different treatments, including oversowing with grass seed mixture, supplementing with lime, cattle dung, and "brush packing" (laid out branches).

A research investigation was undertaken in an area of degraded communal rangeland, which had been invaded by an alien tree species (Acacia mearnsii – black wattle). Competition from the water-demanding A. mearnsii, combined with overgrazing, had resulted in an almost total absence of palatable grasses. All that was left were a few patches of star grass (or 'bermuda grass': Cynodon dactylon). Prior to the research, discussions were held between personnel of the 'Working for Water' programme of the South African government and community members. The purpose of the trials was to determine how best to eradicate the invasive trees and revegetate the rangeland. The restoration area was not fenced off and was thus open to grazing. The trials comprised five treatments, with three replicates each, on plots of 10 m by 20 m. In all treatments the A. mearnsii was eradicated manually, and chemical biocide applied to the stumps to prevent regrowth. Lime and grass seed (of palatable species) were applied to the loosened surface and covered with soil. The five treatments were:
(A) oversowing with grass seed mixture, supplementing of dolomitic lime, cattle dung, and 'brush packing' (see below for explanation of term);
(B) oversowing with grass seed mixture and supplementing with cattle dung;
(C) oversowing with grass seed mixture and supplementing with dolomitic lime;
(D) oversowing with grass seed mixture and brush packing;
(E) oversowing with grass seed mixture only.
In addition stone lines were laid out along the contour, between plots. The 'brush packing', referred to in treatments A and D comprised branches laid out in strips across the slope to retard runoff, trap soil, improve the micro-climate for establishing grass seedlings and protect the young plants from browsing by animals. The results showed treatment A to be the most effective in restoring the productive and protective function of the rangeland. From the trials, the estimated costs of applying the best technology would be US$ 230 per hectare. The key constraints for successful adoption however are not just technical, but include: (1) the need to protect the area from grazing and trampling by animals during the establishment period; (2) stopping removal of brushwood for firewood; and (3) the need for community agreement on initial protection and subsequent sustainable utilisation of the restored range.

Establishment activities:
1.Manual eradication of trees with chain saw and axe
2.Application of chemical biocide to the stumps to prevent any regrowth
3.Ripping of soil surface to a depth of 5 cm using a three tined hand implement
4.Application of dolomitic lime and raking it into soil after ripping of the soil
5.Application of organic material (cattle dung) after ripping and lime application
6.Oversowing with grass seed mixture after ripping of the soil and application of lime and organic material
7.Brush packing against contour and packing of rock contours against the slope All the branches and stones were collected from the restoration area. Rock contours were packed against (perpendicular) to the slope in the study area at varying intervals (approximately 10-15 m apart) in order to retard runoff water, trap soil, and improve conditions for seed germination (see inserted drawing below and attachment). Branches were packed (brush packing) along the slope in certain treatments within the study site in order to trap soil, retard runoff water en serve as a micro-climate for germinating and establishing grass seedlings
Total duration of restoration took 3 years, from removal of trees till revegetation trials were laid out and technology was established.

Maintenance / recurrent activities per year:
Following initial establishment maintenance was limited to 2 follow up applications of herbicide (after 3 and 5 months). Maintenance of contours was not done after restoration.

地点



地点: Johannesburg, Gauteng, 南非

分析的技术场所数量:

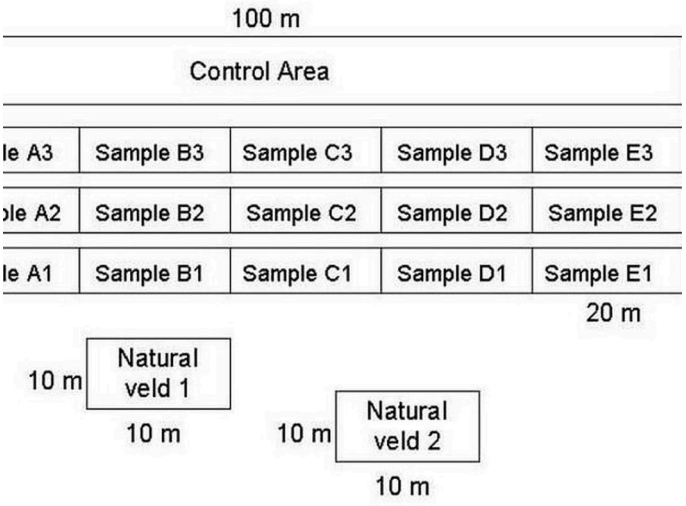
选定地点的地理参考
- 27.8666, -26.3824

技术传播: 均匀地分布在一个区域 (9.0 km²)

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 /研究期间
- 通过 外部干



Plot area (Anuschka Barac)

Layout of sample/treatment A (oversowing with grass-seed mixture, application of lime and organic material and brushpacking. (Anuschka Barac)

技术分类

主要目的

- [ ] 改良生产
- [x] 减少、 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 生物多样性
- [ ] 降低灾害 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

牧场

- 半游牧畜牧业

供水

- [x] 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
- [x] 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

土壤水蚀 - Wt 表土流失地表侵蚀

化学性土壤退化 - Cn 肥力下降和有机质含量下降 非侵蚀所致

物理性土壤退化 - Pc 压实

生物性退化 - Bc 植被覆盖的减少

SLM组

- 畜牧业和牧场管理

SLM措施

农艺措施 - A7 其它

植物措施 - V5 其它

结构措施 - S11 其它

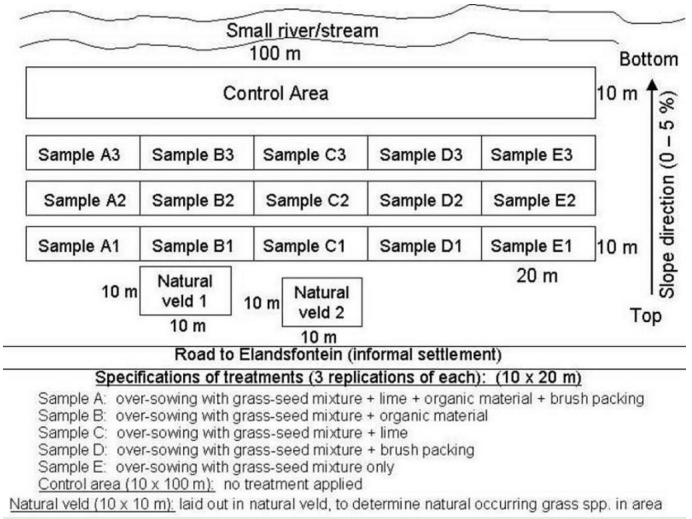
技术图纸

技术规范

Specifications
Location: Elandsfontein. Gauteng
Technical knowledge required for field staff / advisors: high
Technical knowledge required for land users: moderate

Main technical functions: control of raindrop splash, control of dispersed runoff: retain / trap, increase in organic matter, sediment retention / trapping, sediment harvesting, increase in soil fertility, improvement of ground cover
Secondary technical functions: control of dispersed runoff: impede / retard, reduction of slope angle, increase of surface roughness, increase of infiltration, water harvesting / increase water supply, water spreading, reduction in wind speed, improvement of soil structure

Vegetative measure: contour
Vegetative material: O : other
Number of plants per (ha): 0
Vertical interval between rows / strips / blocks (m): 0.3
Spacing between rows / strips / blocks (m): 3
Vertical interval within rows / strips / blocks (m): 0
Width within rows / strips / blocks (m): 0.3
Vegetative measure: Vegetative material: O : other
Grass species: Mixture of perennial and annual grasses
Other species: rocks
Slope (which determines the spacing indicated above): 5.00%



Author: Anuschka Barac

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 **Rand**
- 汇率 换算为美元 1 美元 = 8.2 Rand
- 雇用劳工的每日平均工资成本 4.30

影响成本的最重要因素
Biocides, fertilisers (lime), seeds and labour have a great effect on costs.

技术建立活动
1. Eradication of trees, Follow-up with herbicide (时间/ 率beginning of project)
2. Loosening of soil, Lime application (时间/ 率6 months)
3. Application of organic material (时间/ 率6 months)
4. Oversowing with grass seed mixture (时间/ 率6 months)
5. Brush packing (时间/ 率6 months)

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 (Rand)	每项投入的总成本 (Rand)	土地使用者承担的成本%
劳动力					
labour	ha	1.0	35.0	35.0	
设备					
machine use	ha	1.0	65.0	65.0	
tools	ha	1.0	5.0	5.0	
植物材料					
seeds	ha	1.0	70.0	70.0	
肥料和杀菌剂					
fertilizer	ha	1.0	25.0	25.0	
biocides	ha	1.0	30.0	30.0	
技术建立所需总成本				**230.0**	
技术建立总成本 美元				*28.05*	

技术维护活动
1. 2 Follow-ups with herbicide (时间/ 率after 3 & 5 months after application of technology /twice (at 3 and 5 months))

技术维护的投入和成本

对投入进行具体说明	单位	数量	单位成本 (Rand)	每项投入的总成本 (Rand)	土地使用者承担的成本%
劳动力					
labour	ha	1.0	7.0	7.0	
设备					
tools	ha	1.0	5.0	5.0	
肥料和杀菌剂					
biocides	ha	1.0	20.0	20.0	
技术维护所需总成本				**32.0**	
技术维护总成本 美元				*3.9*	

自然环境

年平均降雨量
- [ ] < 250毫米
- [ ] 251-500毫米
- [x] 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
- [x] 半湿润
- [ ] 半干旱
- [ ] 干旱

关于气候的规范
600 - 800 mm/annum

斜坡
- [ ] 水平（0-2%）
- [x] 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
- [ ] 平原
- [ ] 山脊
- [ ] 山坡
- [ ] 山地斜坡
- [x] 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.
- [x] 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
- [x] 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）
- [x] 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%）
- [x] 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

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
- [x] 生计自给
- [ ] 混合生计商业
- [x] 商业/市场

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

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

机械化水平
- [ ] 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
- [ ] 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
- [x] 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
- [ ] 小规模的
- [ ] 中等规模的
- [ ] 大规模的

土地所有权
- [x] 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
- [x] provincial government

用水权
- [ ] 自由进入无组织
- [ ] 社区有组织
- [ ] 租赁
- [ ] 个人
- [x] provincial government

进入服务和基础设施的通道

影响

社会经济影响

土地管理

妨碍 ✓ 简化

Brush packing was removed by community members for firewood.

农业收入

降低 ✓ 增加

工作量

增加 ✓ 降低

Not all labourers could be employed, more would have like to have the job (money).

社会文化影响

社区机构

削弱 ✓ 加强

SLM/土地退化知识

减少 ✓ 改良

Capacity building awareness

冲突缓解

恶化 ✓ 改良

Farmers not positive about SWC project and effect.

生态影响

多余水的排放

减少 ✓ 改良

土壤水分

降低 ✓ 增加

土壤覆盖层

减少 ✓ 改良

土壤流失

增加 ✓ 降低

SLM之前的数量: 2
SLM之后的数量: 1

速

增加 ✓ 降低

场外影响

下游洪水 不希望

增加 ✓ 减少

下游淤积

增加 ✓ 降低

力搬运沉积物

增加 ✓ 减少

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

-

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
- 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

- Gazing improvement.

长处: 编制者或其他关键资源人员的观点

- Improvement of grazing resources.
- Improved soil moisture availability by removing an alien species with a high water demand.
- Reduced erosion by controlling runoff.

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

- The question of controlling 'open access' grazing by the community is the key to long-term success of rehabilitation It is incumbent on the local municipal council to negotiate with communities regarding grazing control and community-based natural resource management more generally.

- Removal of brushwood for firewood by community members and other aspects of long-term maintenance See above: perhaps also seeking funds to pay labourers and buy biocides
- Too many cattle and goats. Reduce numbers to match grazing resources available
- Insufficient aftercare. Secure additional funds to pay labourers and buy biocides.

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_1416/

链接的SLM数据
不适用

文件编制者

机构
- 不适用

 目
- Book project: where the land is greener - Case Studies and Analysis of Soil and Water Conservation Initiatives Worldwide (where the land is greener)
- Sustainable Land Management Practices of South Africa (SLM South Africa)

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