Apple trees with the house of the farmer in the background (Malgorzata Conder)

Silvo-pastoralism: Orchard with integrated grazing and fodder production (塔吉克斯坦)

描

Increased productivity of the land by planting fruit trees and conserving the land by restricting the access of livestock resulting in improved runoff retention

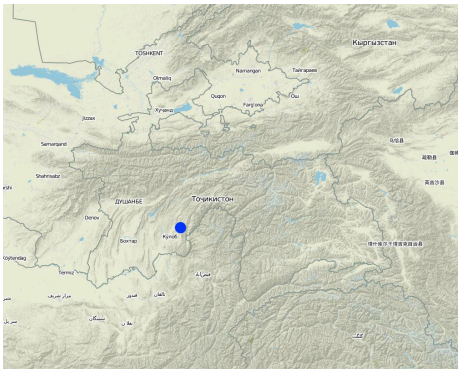
In Soviet times, this area of totally 40 ha comprised terraces and walnut trees in the steep foothills and pastures in the lower and flatter part. After the collapse of the Soviet Era, many similar areas got degraded due to uncontrolled grazing and overuse of natural resources. The area described in this documentation, in contrast, was taken over by a family in 1991. Within the whole area of 40 ha, roads were built to improve the access and 6000 trees were planted, whereof 1200 fruit trees were planted on the pasture, conversing it into an orchard. At present, the 6 ha of orchard are mainly consisting of three types of apple (white, golden and red), some pear and cherry trees. Several trees must have dried out or have been cut, as the farmer counts currently around 1000 fruit trees. The whole orchard is combined with pasture land. The farmer let his livestock graze in the orchard, and cuts the remaining grass in autumn, if there is still left.
The integrated orchard with pastureland and fodder production is partially fenced to hinder livestock entering his property. Furthermore, the orchard is within the range of vision which allows the farmer`s family to guard it.

The farmer who is managing the orchard today obtained the property of his father in order to continue the family project by his own initiative. By farming he ensures the livelihood of his family. Hence, he felt responsible to progress and improve the quality of life of his own family. The main reason for establishing the orchard within the grassland and to install fences, was to increase productivity of the land, bringin along beneficial effects on soil quality. According to his land users certificate, the main purpose of this land is to provide the local market with food products.

After planting, some of the seedlings were stolen or eaten by livestock from neighbouring farms. Initial labour input in the newly established orchard consisted of getting and planting the seedlings and applying pesticides. The trees are being maintained by pruning. Soil is loosened and drainage provided to increase water infiltration and to protect the trees additionally from parasites. The pasture is grazed by the livestock of the farmer. As the family only has a small number of livestock, grass is cut afterwards and used as fodder. Half of the fodder harvest belongs to the hired worker, the other half belongs to the farmer. The other tasks are executed by the farmer and his family.

The climate is semi-arid with precipitation (800mm totally) mainly during winter and spring time. Altitude is around 1380 m asl. The plot is located at the foothill, with the wider riverbed and fan downstream and overgrazed hills upstream. Bordering with the property from above, a steep slope with a dense vegetation of grafted fruit trees and walnut trees stabilizes the soil.The farmer is living with the family on the property, near the village of Momandion. In the past many livestock from nearby entered the property and grazed there. Through better control and fences less livestock is entering. The property is located directly on the road to Muminabad, the center of the District with a market- 2 km away.Considering the establishment costs of the orchard, the farmer is a fairly whealthy man, nevertheless he had to rely on his family and friends in terms of the working input.The establishment phase was a time and money consuming

地



地点: Muminabad, Khatlon, Tajikistan, 塔吉克斯坦

分析的技术场所数量:

选定地点的地理参考
- 70.03478, 38.08521

技术传播: 均匀地分布在一个区域 (approx. < 0.1 平 千 10 公)

在永久保护区？:

实施日期: 10-50年前

介绍类型
- [x] 土地使 创
- [ ] 作为传 >-50 年分
- [ ] 在实 /
- [ ] 外 干

Orchard with integrated grazing (Malgorzata Conder)

技 分

主要目的

- [x] 改 产
- [x] 减少、 、恢复土地 化
- [ ] 保护 态
- [ ] 合其他技 保护/下 域 区域
- [ ] 保持/提 多 性
- [ ] 低 害
- [ ] 应 候变化 天 及其影响
- [ ] 减 候变化及其影响
- [ ] 创 影响
- [ ] 创 会影响

土地利用

农田

- 乔 与 仁 、 矛、

牧场

- 半 业

供水

- [x] 养
- [ ] 合
- [ ] 充分

土地退化相关的目的

- [x] 土地 化
- [x] 减少土地 化
- [ ] 修复/恢复严 化 土地
- [ ] 应土地 化
- [ ] 不

解决的退化问题

土壤水蚀 - Wt 土/地 失 侵, Wo 场外劣化效应

物理性土壤退化 - Pc 压实

生物性退化 - Bc 减少

SLM组

- 农业 学
- 业和 场

SLM措施

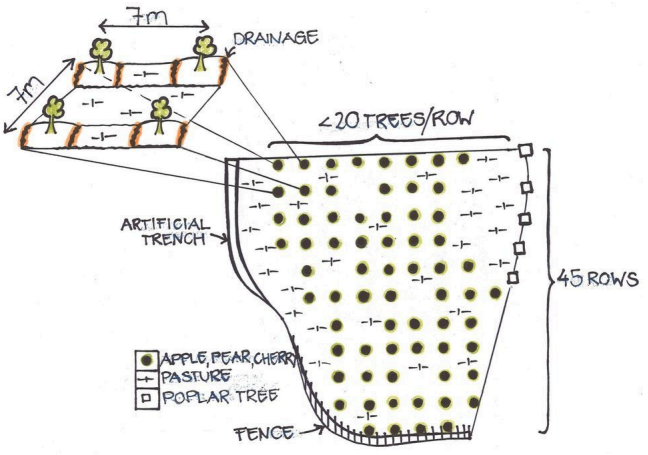
植物措施 - V1 乔 和 层

管理措施 - M1 改变土地使 M2型 改变 /强度 别

技 图

技术规范

The orchard is situated within the farmers' property which is almost completely fenced by an artificial trench, thornbush fences, poplar trees and a natural steep slope. The orchard is 6 ha in size and consists of around 45 rows, with some 20 trees per row on average. In some places trees are missing due to drying out or cutting. Currently approximately 1000 fruit trees are growing. In between the tree rows and at the borders of the orchard, grass is growing and grazed by animals, and if not entirely grazed cut for haymaking in autumn.
The fruit trees grow at a distance of 7 meters. Around the trees the soil is loosened and a tiny trench is dug, the latter serving as a rainwater drainage.
Location: Momandion. Muminabad, Khatlon, Tajikistan
Date: 14.09.2012
Technical knowledge required for land users: moderate (Good knowledge for planting required, knowledge about maintenance activities is probably more widespread amongst farmers, idea of fencing is lacking)



Author: Conder Malgorzata

Main technical functions: control of concentrated runoff: retain / trap, control of concentrated runoff: impede / retard, control of concentrated runoff: drain / divert, improvement of ground cover, improvement of topsoil structure (compaction), spatial arrangement and diversification of land use
Secondary technical functions: control of raindrop splash, control of dispersed runoff: retain / trap, control of dispersed runoff: impede / retard, stabilisation of soil (eg by tree roots against land slides), increase in organic matter, increase in nutrient availability (supply, recycling,...), increase / maintain water stored in soil, increase of groundwater level / recharge of groundwater, increase of biomass (quantity), promotion of vegetation species and varieties (quality, eg palatable fodder), reduction of dry material (fuel for wildfires)

Aligned: -contour
Number of plants per (ha): 200
Vertical interval between rows / strips / blocks (m): 7
Spacing between rows / strips / blocks (m): 7
Vertical interval within rows / strips / blocks (m): 7
Width within rows / strips / blocks (m): 7
Fruit trees / shrubs species: Apple, pear, cherry
Change of land use type: change of pasture land into an orchard with integrated pasture land and fodder production (Silvopastoralism)
Change of land use practices / intensity level: Fencing hence more extensive and controlled grazing

技 建 与 护 动、投入和

投入和成本的计算
- 成 为
- 成 使 Somoni 币
- 换 为1 元元 4.83 Somoni
- 劳工 平均12.40 成

影响成本的最重要因素
Apart from the orchard, the whole property was rebuilt with roads, fences and tree planting which caused high initial costs during the establishment phase.

技术建立活动
1. Buying and transport of fruit seedlings (totally 6000 seedling, whereof 1200 seedlings on for the orchard of 6 ha) (once)
2. Planting fruit tree seedlings (totally 6000 seedlings, whereof 1200 seedlings for the orchard), cost according to planted trees (3 TJS per tree) (once)
3. Partial fencing (of around 200m) along the property, 10.5 days, 3-4 persons (1991)
4. Building roads for access to the house (1991)

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 (Somoni)	每项投入的总成本 (Somoni)	土地使用者承担的成本%
劳动力					
labour	ha	1.0	194.9	194.9	100.0
设备					
machine use	ha	1.0	0.7	0.7	100.0
植物材料					
seedlings	ha	1.0	207.0	207.0	100.0
施工材料					
fence	ha	1.0	124.2	124.2	100.0
技术建立所需总成本				**526.8**	
技 建 总成 元				*109.07*	

技术维护活动

1. Pruning of 400 trees, ca. 40 days, 1 person, 3 TJS per tree (all trees pruned every 3 years) (/ spring/ once a year)
2. Soil loosening around 1000 fruit trees, ca. 25 days (5 h/day), 1 person (/ spring/ once a year)
3. Pesticides spraying once (should be done 2-3 times), 4 days (ca.5 h/d), 1 person (/ End of May/ once a year)
4. After several years: Harvesting fruits (mainly apples) (/ September/every year)
5. Cutting grass, by 10 people, one month, hours per day unknown. Half of straw harvest for owner, other half for the mowers as salary (4-5 Somoni/bundle). Total salary: 1000 bandles (/ End of summer)
6. Guarding the orchard (/ all the time)

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 (Somoni)	每项投入的总成本 (Somoni)	土地使用者承担的成本%
劳动力					
labour	ha	1.0	383.3	383.3	100.0
肥料和杀菌剂					
pesticides	ha	1.0	7.8	7.8	100.0
技术维护所需总成本				**391.1**	
技 护总成 元				*80.97*	

境

年平均降雨量
- < 250
- 251-500
- 501-750
- ☑ 751-1,000
- 1,001-1,500
- 1,501-2,000
- 2,001-3,000
- 3,001-4,000
- > 4,000

农业气候带
-
- ☑ 半
- 半干
- 干

关于气候的规范
Totally 800 mm: 700mm in winter-spring, July-Sept dry season (At 1200m asl, weather station Muminabad)
Thermal climate class: temperate

斜坡
- 平 0-2%
- ☑ 3-5%
- 平 6-10%
- ☑ 坡 11-15%
- 崎岖 16-30%
- 峭 31-60%
- 常 峭 >60%

地形
- 原
- 山
- 山坡
- 山地斜坡
- ☑ 坡
- 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 情况
- 不 关

土壤深度
- 常 0-20厘
- 21-50厘
- ☑ 中 厚 50-80厘
- 81-120厘
- 常 > 120厘

土壤质地（表土）
-
- ☑ 中 壤土、 土
- ☑ 土

土壤质地（地表以下>20厘米）
-
- 中 壤土、 土
- 土

表土有机质含量
- 3%
- ☑ 中 1-3%
- 低 <1%

地下水位
- 上
- ☑ < 5
- 5-50
- > 50

地表水的可用性
-
- 好
- 中
- ☑ 匮乏/

水质（未处理）
- ☑ 好
- 不 处
- 仅供农业使
- 不可
- 参

盐度是个问题吗？
-
- 否

洪水发生
-
- 否

物种多样性
-
- ☑ 中
- 低

栖息地多样性
-
- 中
- 低

应 技 土地使 征

市场定位
-
- 合 商业
- 商业/市场

非农收入
- ☑ 低于全 收入10%
- 收入 10-50%
- > 收入 50%

相对财富水平
- 常
-
- 平均 平
- ☑ 丰富
- 常丰富

机械化水平
- 手工作业
- 力 引
- / 化 动

定栖或游牧
- 定
- 半
-

个人或集体
- ☑ 个人/家庭
- 团体/ 区
- 合作

性别
- 女人
- ☑ 人

年龄
- 儿
- 年人
- 中年人

员工 公司、政府 年人

每户使用面积

- [ ] < 0.5 公
- [ ] 0.5-1 公
- [ ] 1-2 公
- [x] 2-5公
- [ ] 5-15公
- [ ] 15-50公
- [ ] 50-100公
- [ ] 100-500公
- [ ] 500-1,000公
- [ ] 1,000-10,000公
- [ ] > 10,000公

规模

- [ ] 小
- [x] 中
- [ ] 大

土地所有权

- [x] 州
- [ ] 公司
- [ ] 区 庄
- [ ] 团体
- [ ] 个人 命名
- [ ] 个人 命名

土地使用权

- [ ] 入
- [ ] 区
- [x]
- [ ] 个人

用水权

- [ ] 入
- [x] 区
- [ ]
- [x] 个人

进入服务和基础设施的通道

健康	好
教	好
技 援助	好
就业 例如 农	好
市场	好
	好
和交	好
和卫	好
务	好

影响

社会经济影响

作 产	增加
料 产	增加
料	增加
产	
	增加
产	
	增加
产品多 性	增加
产区域 /使 中 土地	增加
	增加 低
农业投入	增加 低
农业收入	增加
收入 多 性	增加

As the area of the orchard with pasture is fenced it is not an communal pasture anymore as it was before

From pruning

社会文化影响

品安全	减少 改
健康 况	恶化 改
冲	恶化 改

contribution to human well-being

decreased — increased

Products for market leading to higher income, sharing of some knowledge about management of private land enhances dissemination and exchange of information/knowledge.

生态影响

地 径	增加 低
土壤 分	增加
土壤 层	减少 改
土壤 失	增加 低
土壤 封	增加 减少
土壤压实	增加 减少
养分循 /	增加
土壤 /地下C	增加
/地上C	增加
害 / 控制	增加
	增加 低

场外影响

下 不希	增加 减少
冲 力 按土壤、 、 地划分	减少 改
对 农 坏	增加 减少

成 效 分

与技术建立成本相比的效益

回报	常	✓	常
回报	常	✓	常

与技术维护成本相比的效益

回报	常	✓	常
回报	常	✓	常

Family project to improve the quality of life of the family. Costs were high at the beginning with little outcomes, now there is less labour required and the outcome is high.

候变化

渐变气候

年 加	常不好	✓	常好

气候有关的极端情况（灾害）

局地	常不好	✓	常好
局地	常不好	✓	常好
干	常不好	✓	常好
和	常不好	✓	常好

其他气候相关的后果

	常不好	✓	常好

和 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？

-
- 否

什么样的变化条件？

- 候变化 候
- 不断变化 市场
- 劳动力可 性 例如 于

和吸取 教

长处: 土地使用者的观点

- Giving good yield and "cash crop" hence having success in the project of the family
- Better quality of fodder and less damages due to intrusive livestock

长处: 编制者或其他关键资源人员的观点

- Thanks to the establishment time, right after the collapse of the Soviet Union, when land was generally well conserved, the technology worked as a preventive measure.
- Silvopastoralism not only raises productivity of the same plot as an orchard and pasture is combined, but also enables mutual benefits (p.e.rooting system raises soil moisture, which is again improving vegetation cover).
- The technology might work as exemplary model for other farmers

弱点/缺点/风险: 土地使用者的观点如何克服

- There is always work to do, without input no (good) output.

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

- For the farmer, the economic benefit is more important than the ecologic benefit. Especially, there is missing sensibility of the farmer concerning the application of pesticides (quantity, type). A workshop which provides guidelines on optimal use of pesticides (type and quantities of pesticides, timing and frequency of application etc.)
- The establishment of orchards is more efficient on big plots of land, which often prevents poor farmers with small plots from establishing orchards. Creating incentives to change land use, by combining plots from different land owners, which will allow to share costs for establishment and maintenance. Yields should be clearly attributed to the individual farmers.

参 文

编制者
Malgorzata Conder

Editors

审查者
Deborah Niggli
Alexandra Gavilano

实施日期: July 30, 2012

上次更新: Aug. 4, 2019

资源人
Malgorzata Conder - SLM专业人员
Sa'dy Odinashoev - SLM专业人员

WOCAT数据库中的完整描述
https://qcat.wocat.net/zh/wocat/technologies/view/technologies_1554/

链接的SLM数据
不

文件编制者

- NCCR North-South (NCCR North-South) - 吉尔吉斯斯坦

- 不