Land reclamation by agave forestry with native species (Mexico)

Recuperación de tierras degradadas por agaveforestería con especies locales de agaves, arboles y hierbas

**DESCRIPTION**

Land reclamation with local agave (to produce mezcal) associated with trees, shrubs and grasses planted through participative actions for economic benefit.

Aims / objectives: Rehabilitation of degraded land is achieved by using native agave and trees, shrubs and grasses which creates, over the medium-term (7-10 years), a sustainable production of an alcoholic drink and/or pharmaceutical products and/or fodder for cattle and/or wood. Further objectives are water conservation, biodiversity, generation of permanent employment, carbon sequestration, generation of higher family incomes and a reduction of the amount of livestock and number of animals and uncontrolled grazing. These positive impacts of the Approach contribute to preventing the rural population from emigrating to the cities or abroad.

Methods: Coordination, cooperation and systematic participatory process among stakeholders are the basis of the Approach. Promoting participatory process occurs through workshops, interviews with community leaders, field visits conducted with owners of the land to recognize the problems and identify areas of opportunity, training courses, exchange of experiences with other people who are developing similar projects at different stages. Technical advice and the links with scientists, technicians and public officials in charge of project beneficiaries is given under a two-way process of mutual learning and seeking to strengthen self-management capabilities that inspires innovation at the different stages. The key to success of a participatory Approach lies in liberating and developing community leadership and self-organization processes.

Stages of implementation: The project is part of a regional planning context and a basin scale approach of intervention. The watershed of the site project is included in a special programme of the Ministry of Environment and Natural Resources of Mexico which gives the opportunity of developing and financing a medium- to long-term project. The participatory process is delivered from planning, organizing, programming and implementing to financing, training, monitoring and disseminating the results. The greenhouse and nursery management, the technical assessment for the improvement of the agave forestry system, guidance with quality production of mezcal and marketing support to diversity products and sell them in order to make the project financially self-sustaining and profitable. All these stages range from short- to medium- and long-term.

Role of stakeholders: The government finances the project through grant resources, promotes the participation of beneficiaries and monitors it, seeking the management of resources and intersectoral participation. Scientists and academics share their knowledge, techniques and methodologies for implementation, improvement, evaluation and monitoring of each stage, and they support capacity-building of the community. The owners of the land and the community implement and develop each of the activities from building and maintaining the greenhouse and nursery, planting agaves, trees and shrubs, to the use and production of mezcal and other commercial products.

**LOCATION**

Location: Morelia, Cointzio watershed, Mexico/Michoacán, Mexico

Geo-reference of selected sites: n.a.

Initiation date: 2007

Year of termination: n.a.

Type of Approach
- traditional/indigenous
- recent local initiative/innovative
- project/programme based

7 years old plantation of agaves (Agave cupreata) ready for the production (Christian Prat)
Main aims / objectives of the approach
The Approach focused mainly on SLM with other activities (Economical activity, Health, agriculture, wood, agave-forestry)

Rehabilitation of degraded land is done using native agave, trees, shrubs and grasses which creates over the medium-term (7-10 years) sustainable production of an alcoholic drink (mezcal) and/or pharmaceutical products and/or fodder for cattle and/or wood.

The SLM Approach addressed the following problems: Social and economic problems: Agriculture and livestock in the region are primarily for subsistence. The level of poverty and marginalization of the people of the project site is medium to high with low education levels. People need to migrate to the cities or outside the country to supplement the family budget. Prices of farmer productions are too low and do not allow economic survival. Therefore, only 10 to 20% of the total incomes are derived from agricultural products. This explains why the children of farmers do not want to become farmers and lands are less and less cultivated.

In correlation, as the livestock price is good and animals can be raised with little input of time. Thus the number of animals is increasing and as they are grazing everywhere, they have a strong soil erosion impact.

Conditions enabling the implementation of the Technology/ies applied under the Approach

- **Legal framework (land tenure, land and water use rights):** The existing land ownership, land use rights / water rights greatly helped the approach implementation. The project starts with bad lands used by the community, so risks are limited for farmers.

- **Social/ cultural/ religious norms and values:** The social arrangement of the ‘ejido’ requires all people to agree on moving forward with different activities. The level of education and migration Treatment through the SLM Approach: Systematic and constant promotion of the participatory process through community assembly meetings, workshops, community exchange travel, experiences and training. Promote complementarity and targeting of resources from other sectors.

- **Availability/ access to financial resources and services:** Potential constraints in the final stages of the project when receiving revenue from the sale of mezcal and other products Treatment through the SLM Approach: Strengthening capacities of organization and administration, promoting transparency and accountability in the community. Development and consolidation of the formation of cooperatives as an alternative to social enterprise.

- **Institutional setting:** The risk that the six-year change in administration does not follow the care programme in the area Treatment through the SLM Approach: Strengthening self-management capabilities of the group of beneficiaries of the project. Involving other government levels and sectors funding training and monitoring of subsequent stages.

- **Legal framework (land tenure, land and water use rights):** Federal, state and municipal regulations for preventing clearance of woods, biodiversity uses, forest exploitation, water concessions and water quality must be applied. Mexican official standards of mezcal production must be used. Treatment through the SLM Approach: Conduct a through review with a focus on prospective different stages of a project and the legal implications and regulations that must be met at these stages. Inform land owners about their rights, obligations and mechanisms of fulfilment.

- **Knowledge about SLM, access to technical support:** Lack of validation and technology transfer of agave forestry. Lack of information on the requirements of these species of agave. Potential risk to move from non-intensive system to an intensive one due to economic and market factors. Treatment through the SLM Approach: Development of technological packages for an agave forestry system as a basis for the production of mezcal, considering soil erosion levels and system arrangements. Promote only ecologically diversified, non-intensive systems. Design environmental and ecological monitoring stage.

PARTICIPATION AND ROLES OF STAKEHOLDERS INVOLVED

Stakeholders involved in the Approach and their roles
What stakeholders / implementing bodies were involved in the Approach?

<table>
<thead>
<tr>
<th>Specify stakeholders</th>
<th>Describe roles of stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>local land users/ local communities</td>
<td>they are concerned! Traditionally, women are more in charge of the house and the area close to the house. Women have a specialized involvement in this project which is mainly focus on the beginning of the installation of the crops (management of the greenhouse and plantation) as well as the collect of annual herbaceous and fruit trees, meanwhile the agave collect and alcohol production is done by men. Women are worried about possible impacts of alcohol in the communities, because alcoholism is a social drama. There is no discrimination inside the communities until now</td>
</tr>
<tr>
<td>SLM specialists/ agricultural advisers, teachers/ school children/ students</td>
<td></td>
</tr>
<tr>
<td>NGO</td>
<td>Scientific and practical approaches University (UMNSH)</td>
</tr>
<tr>
<td>local government</td>
<td>Technical help, interests for the results (extension of the approach)</td>
</tr>
<tr>
<td>national government (planners, decision-makers)</td>
<td>Funding (Mainly SEMARNAT) and interests for the results (extension of the approach)</td>
</tr>
<tr>
<td>international organization</td>
<td>Scientific approaches (DESIRE project)</td>
</tr>
</tbody>
</table>

Involvement of local land users/ local communities in the different phases of the Approach

<table>
<thead>
<tr>
<th></th>
<th>none</th>
<th>passive support</th>
<th>interactive</th>
<th>self-mobilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>initiation/ motivation</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>planning</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>implementation</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>monitoring/ evaluation</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Balance alternatives and take decisions to test the agave forestry planning, organizing, and programming the project, defining responsibilities, time and initial investment. Identification of agave seeds and a proper place to install the greenhouse and nursery.

Building and maintenance of greenhouse and nursery, selecting the sites for the plantation and planting. Training of land users by other land users to produce mezcal according to quality rules for a recognized product.

In each field: monitoring plant growth, status of the protection against cattle grazing, indications of soil erosion.

Monitoring by some land users of some parameters defined by scientists.

Flow chart
Agave forestry system production cycle

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**Decision-making on the selection of SLM Technology**

Decisions were made by:
- land users alone (self-initiative)
- mainly land users, supported by SLM specialists
- all relevant actors, as part of a participatory approach
- mainly SLM specialists, following consultation with land users
- SLM specialists alone
- politicians/leaders
- by SLM specialists and by land users

Decisions were made based on:
- evaluation of well-documented SLM knowledge (evidence-based decision-making)
- research findings
- personal experience and opinions (undocumented)

**TECHNICAL SUPPORT, CAPACITY BUILDING, AND KNOWLEDGE MANAGEMENT**

The following activities or services have been part of the approach:
- Capacity building/ training
- Advisory service
- Institution strengthening (organizational development)
- Monitoring and evaluation
- Research

**Capacity building/ training**

<table>
<thead>
<tr>
<th>Training was provided to the following stakeholders</th>
<th>Form of training</th>
<th>Subjects covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ land users</td>
<td>✓ on-the-job</td>
<td>Training focused to explain which plant to select for seeds, how to create and maintain plants in greenhouses, how to transplant them, and what is the strategy to plant them in the fields (border/production-trees/Agave...) Training for the alcohol production: management of the equipments, quality rules, tips, etc., done by another mescal producer (small farmer) Training for annual herb</td>
</tr>
<tr>
<td>✓ field staff/advisers</td>
<td></td>
<td>Advisory service is very adequate to ensure the continuation of land conservation activities; The extension system is very adequate to ensure continuation of activities</td>
</tr>
</tbody>
</table>

**Advisory service**

Advisory service was provided:
- ✓ on land users' fields
- ✓ at permanent centres

Name of method used for advisory service: Plant (native Agave, trees and herbaceous) production advises; Key elements: Plant selection, Management of plants under greenhouse, Field plantation design; 4. Process of the mature plants (Production of certified mescal, medicinal herbs...)

Advisory service is very adequate to ensure the continuation of land conservation activities; The extension system is very adequate to ensure continuation of activities

**Institution strengthening**

<table>
<thead>
<tr>
<th>Institutions have been strengthened/established</th>
<th>at the following level</th>
<th>Describe institution, roles and responsibilities, members, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ yes, greatly</td>
<td>✓ local</td>
<td>Further details transport</td>
</tr>
<tr>
<td>yes, a little</td>
<td>✓ regional</td>
<td></td>
</tr>
<tr>
<td>yes, moderately</td>
<td>✓ national</td>
<td></td>
</tr>
</tbody>
</table>

**Type of support**

- ✓ financial
- ✓ capacity building/training
- ✓ equipment

**Monitoring and evaluation**

Area treated aspects were regular monitored by project staff, government, land users, other through observations no. of land users involved aspects were regular monitored by project staff, government through observations management of Approach aspects were regular monitored by project staff, government through observations area treated aspects were regular monitored by project staff through measurements economic/production aspects were regular monitored by project staff, government through measurements economic/production aspects were regular monitored by project staff, government through observations technical aspects were regular monitored by project staff, land users through observations technical aspects were regular monitored by project staff through measurements bio-physical aspects were regular monitored by project staff through measurements bio-physical aspects were monitored by project staff, government through observations There were few changes in the Approach as a result of monitoring and evaluation: Too early to answer There were few changes in the Technology as a result of monitoring and evaluation: Too early to answer

**Research**

Research treated the following topics:
- ✓ sociology
- ✓ economics/marketing
- ✓ ecology
- ✓ technology

No information about condition of production of this agave species, especially to the sugar produce by the plant which will be used for alcohol production (better plant in the shadow or under direct sun? better old plants than young one? etc...). Effectiveness of soil control erosion system (density of Agave plantations on line of green walls...) have not been measured until now

Research was carried out on station

**FINANCING AND EXTERNAL MATERIAL SUPPORT**

**Annual budget in USD for the SLM component**

- ✓ < 2,000
- ✓ 2,000-10,000

Approach costs were met by the following donors:
- ✓ Financial/material support provided to land users

The following services or incentives have been provided to land users:
- ✓ Transport
Financial/ material support provided to land users
Parts comes from UE research project (DESIRE) and main part comes from environmental taxes funds managed by SEMARNAT (Sec environment)

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Partially financed</th>
<th>Fully financed</th>
</tr>
</thead>
<tbody>
<tr>
<td>shovel, hammer, pickaxes</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Greenhouse</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>agricultural: seeds</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Plastic bags, soil, water</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Materials for greenhouse</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Transports</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>People, plants, materials</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

Labour by land users was
- voluntary
- food-for-work
- paid in cash
- rewarded with other material support

IMPACT ANALYSIS AND CONCLUDING STATEMENTS

Impacts of the Approach

Main motivation of land users to implement SLM
- ✓ increased production
- ✓ increased profit(ability), improved cost-benefit-ratio
- ✓ reduced land degradation
- ✓ reduced risk of disasters
- ✓ reduced workload
- ✓ payments/ subsidies
- ✓ rules and regulations (fines)/ enforcement
- ✓ prestige, social pressure/ social cohesion
- ✓ affiliation to movement/ project/ group/ networks
- ✓ environmental consciousness
- ✓ customs and beliefs, morals
- ✓ enhanced SLM knowledge and skills
- ✓ aesthetic improvement
- ✓ conflict mitigation
- ✓ well-being and livelihoods improvement

Sustainability of Approach activities
Can the land users sustain what has been implemented through the Approach (without external support)?
- no
- ✓ yes
- uncertain

The first step need external funds, but then, when the production will start, the benefits will cover all the costs of management and extension to cover more surface

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Productive project which generates economic benefits over the medium-term (How to sustain/ enhance this strength: As a result of the money earned, it will be possible to extend the area concerned and subsidies will not be necessary anymore.)
- The project is done in a participative way where different kinds of stakeholders are involved: administrators, politicians, scientists and the public (How to sustain/ enhance this strength: Maintenance of the interaction between stakeholders from the workshops, present results to other authorities and appropriate fora.)

Weaknesses/ disadvantages/ risks: land user’s view
- ✓ Selling alcoholic drink is not necessarily beneficial from a health and societal point of view
- ✓ Women particularly, are worried about the possibility of the increase in alcohol consumption

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's view

- ✓ Maintenance of campaign to reduce consumption and develop a responsible attitude to alcohol.
- ✓ Since alcoholic drink will be produced in a semi-industrial way for external market, it is not supposed to be consumed by the communities themselves.

REFERENCES

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Last update: July 10, 2017
Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/approaches/view/approaches_2454/

Linked SLM data
Technologies: Land reclamation by agave forestry with native species
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- SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES (SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES) - Mexico
- DESIRE (EU-DESIRE)

Key references
- DESIRE project Mexico partner (IRD 22): http://www.desire-project.eu/