Report Treeplanting Oued Mahia – M'Hamid (South-Morocco)

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Introduction

In South-Morocco near the city of Ouarzazate a dam, called 'Barrage el Mansour Eddahbi', has been constructed in 1972. The dam was constructed to function as a reservoir for a permanent supply of water for nearby agriculture and palm plantations. Next to this the dam is the most important source of electricity for the whole area, including the downstream Draa valley. This information is important to understand the change in water supply to the region in question.

Since 1972 the government has regulated the water flow from the reservoir into the Draa valley and the river has stopped flowing unless there are extreme precipitation events. On average the government opens the dam three to four times per year to allow for consumption for agricultural practices. The question is whether this amount is enough to supply all the downstream palm plantations, which is, together with tourism, the largest source of income for the local inhabitants.

The general trend in all six oases from an environmental perspective is that the oases are decreasing in size, most probably due to the decrease in water availability. This decrease is a result of two causes; the first is the construction of the dam, the second is the change in climate (esp. precipitation) patterns. The decrease in size of the oases in turn causes economic stress on the local population. This stress often eventually causes the emigration of young males to the cities to supply for their families using other practices. Due to lack of education in the rural areas of the valley these migrants have a small chance of succeeding in finding jobs to supply for their family in the villages.

An environmental effect of the decreasing size of the oases is the desertification and salinization of the precious agricultural land in the valley. As more trees and other vegetation vanish the sands of the deserts dominate, making the germination of new vegetation virtually impossible. In order to halt this desertification process it is important to manually plant and grow vegetation that is accustomed to the local desert conditions, and can withstand the effects of high soil salinity. The Tamarisk (already found in the desertified areas of the valley) is the perfect candidate, except for the fact that it is difficult for the plant to germinate. This, combined with tactical spacing, is why human intervention is necessary to properly combat the sands of the desert.

In the last three years the Sahara-Roots Foundation together with L'Association Zaila from M'hamid has initiated a tree planting project at the border of the oasis and the desert, near the town of Oued Mahia in the M'hamid district. This research will look at the influence of the techniques used in the past three years on the survivability of the trees planted.

Area under consideration

The area considered was at the southern border of the oasis near a historic Kasaba. See figure 1 for a satellite image of the oasis of M'Hamid. The orange circle indicates the area under consideration. The area is at the south border of the oasis, farthest from the river and most exposed to the dune desert to the south of the oasis.

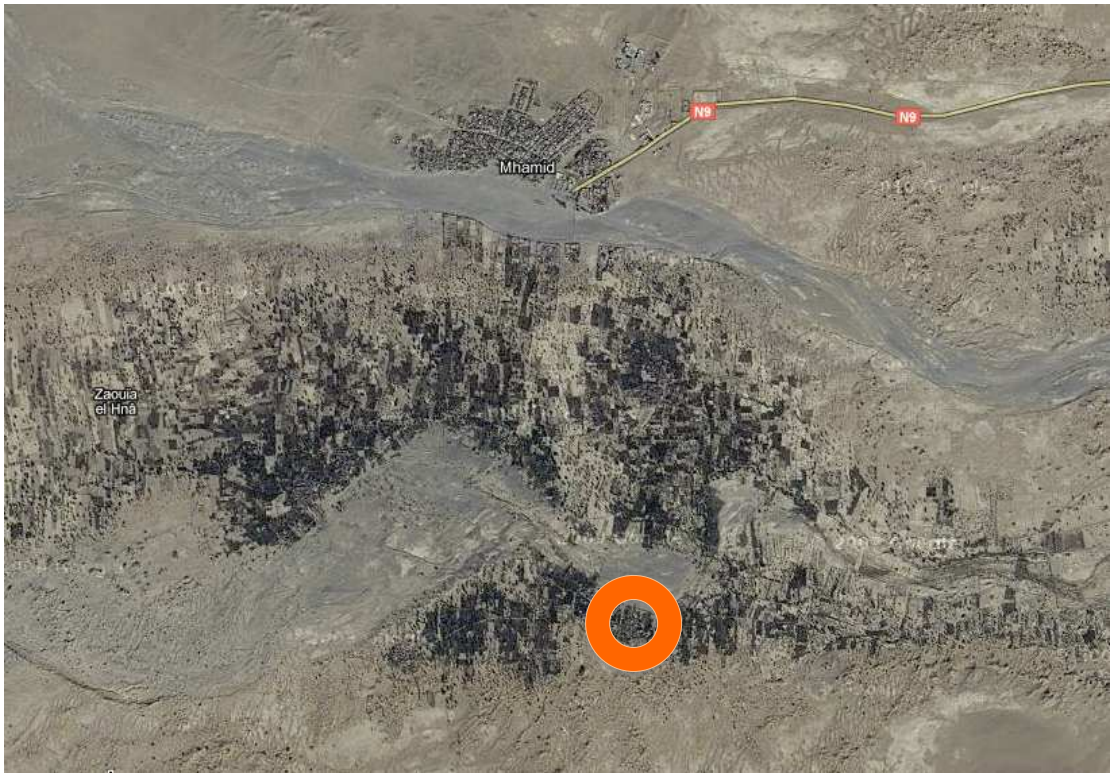


Figure 1. Satellite image of M'Hamid oasis. Orange circle indicates the area under consideration.

Tamarisk

The trees that have been planted in the area is the Tamarisk. There are five different species of Tamarisk but they generally have the same characteristics. The species planted is most probably the Tamarisk aphylla species. This plant is often used in arid environments for different purposes. The most widely spread use is as windbreaks and for shade. The wood can be used for carpentry or firewood. In China the species has been used in anti-desertification programs. Generally the leaves are unpalatable to most livestock due to the presence of phenolic acids, though not for all. The flowers of the tree are an important source of nectar for the European honeybee, but the seeds are mostly infertile. It colonizes through sprouting of roots or from broken off limbs. It is drought resistant (requires 400mm of rain annually) and tolerant of alkaline and saline soils.

Growing rate of trees planted in Oued Mahia

May 2009

May 2010

Data & Conclusions

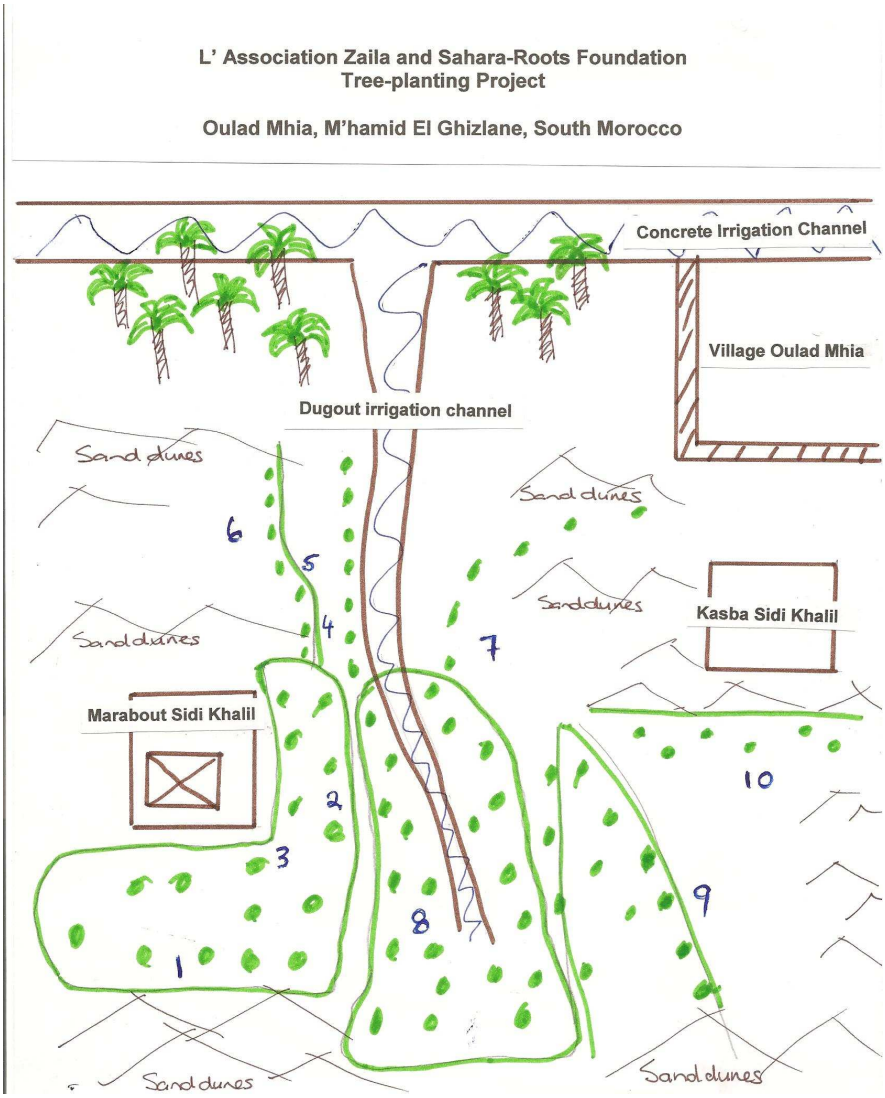
Table 1 shows the raw data for the tree counting. In total 125 trees had survived of the estimate 400 planted. The distance between the plants was on average 2 meters.

When combining the table data with the Figure 2_map it becomes apparent that the trees that were exposed to water from the canal had a far higher survivability. The channel follows from tree line 7 to the Marabout, around which growth was impressive. Tree line 9 was being overwhelmed with sand, making it the most important line but the one at most risk. It is impressive that 16 trees have survived in this line without being constantly supplied with water.

Figure 2: shows a sketch of the area in more detail. It shows the Kasbah, Marabout, planted tree lines and channel dug towards the site.

Tree Line	Tree Count
1	8
2	14
3	8
4	26
5	0
6	0
7	19
8	34
9	16
10	0
Total	125

Table 1 Results of the tree survey held at Oued Mehila



Conclusion

After discussions with the local caretaker of the plants we concluded it is better plant limbs that will sprout than to plant small plants. This is in accordance to the literature that states that sprouting is the natural form of colonization, not seeding. In addition the distance between the trees also has an effect on its survivability. The closer together they are the larger their initial survivability but the more they will compete in the grown state. This is a tradeoff to be considered. If there is plenty of water the trees can be placed closer together but with limited water availability they should be placed farther apart.

The most important conclusion that can be drawn from this investigation is that to increase survivability of the trees in the initial growth phase, there needs to be access to the canal water. It is unknown what the survivability would be without access to canal water after this initial growth phase, though seeing as the roots should have tapped into the groundwater, it should be far greater. In general a ratio of 1:3. 4 is good for such stringent conditions.

Discussion

In order to assess the success of this project we need to let more time go by. So far, most of the trees had not reached the sizes at which they can effectively act as windbreaks. Nor can they survive on their own yet. It may seem as though , so far, it has been a waste of water to have these trees grow without providing any services but we need to continue so that eventually the trees will have time to mature and help fight against desertification.

Grazing can also lead to heavy stress on the growing trees. Therefore it is imperative to avoid any grazing whatsoever. It is quite apparent that the trees on the Oulad Mhia site have been subject to occasional grazing, which can immediately kill a sprouting individual.

Tire tracks were also identified going straight through the newly planted tree lines as well as the canal dug by the caretaker. Trampling sprouting trees can also have disastrous effects, although the greatest damage was done to the canal.

In order to avoid 4x4 or shepherds moving through the area it is advisable to hang up signs (in English, French and Arabic) informing people about the intentions of this project and the harms of the trespassing. If this also does not work then fencing is the next option if possible, although this is not desirable, as it does not fit in the ideal picture of a desert. It is advisable that the caretaker is informed of these ideas and notes when and what type of individuals trespass.

Water management system

The presence of some water management system is necessary for the initial survival of the trees. So far this was in the form of the canal dug towards the site. This canal is very brittle and requires a lot of time to maintain and is water inefficient. Alternative methods are necessary to raise initial survivability of the newly planted trees.

Groasis Waterbox

One possibility is the use of the 'Waterbox', a bioplastic that through natural processes collects water around the basement of the tree, thus supplying it with enough water to grow through its initial phase.

After two years the bioplastic will be broken down and be decomposed naturally. The waterbox has been shown to increase survivability of newly planted trees in the Sahara from 10% to over 80% after 3 years. This method is especially beneficial as it supports the tree until it reaches a size at which the tree should be independent and it is highly water efficient. For more information consult the website: www.groasis.com

Drip systems

Another possibility is the use of drip systems. This is network of closed pipes with pores or openings only where there is a plant, allowing water to slowly drip from the pipe. It requires a reservoir to supply water and a pump (or gravity) to supply pressure. It might initially be an expensive alternative but the maintenance requires far less labor than a canal and the water efficiency is far higher. A summary of the different systems is represented in table 2.

System	Short term costs	Long term costs	Water efficiency	Maintenance labor	Requirements
Canal	=	+	-	++	Caretaker
Drip	++	=	+	+	Caretaker, materials & reservoir
Waterbox	++	-	++	-	Supply of waterboxes

Table 2 shows a summary of the pro's and con's of the different systems considered above.

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