Financial analysis on the Vallerani System

• Project outline

Numerous projects have successfully been treated with Vallerani System (VS). Extensive data collection has been analyzed and will be presented below.
The plough is working with a speed of 4-6 km/h allowing to elaborate 1.8-2.2 ha per hour, but different gradient and soil structures need to be considered. The results however are astonishing and in reforestation projects with direct seeding of local species 400 - 600 plants per hectare are leafy after 8 years.

Line spacing distance in meters (m)	**5**
Work length (1 micro basin + 1 underground water collection pocket) m	**7**
Plowed lines / ha	**20**
Plowed soil / ha	**10%**
Micro basins / ha / 1 m^3 each	**286**
Kilometer worked / ha	**2**

Table 1 - Project description

• Costs

The cost structure of degraded land worked with the Vallerani System is highly dependent on the amount of VS mechanized technical units purchased (each MTU is composed of a Delfino3 plough and a 240HP wheel tractor) and on the surface to be treated yearly.
Although variable, importation and transport costs as well as fuel, lubricant, consumptions and spare parts price are considered in the table below.
Moreover, the costs per hectare also vary depending on local work cost, soil structure, slope, wind and rain fall pattern, land size, seeds choice and special characteristics of the project.
The cost structure at hand bases on data aggregated in projects with reforestation and pasture improvement purposes on arid, desertified, rather flat surfaces in the Sahel area. Soil has mainly gravelly sandy clay texture and some areas present a calcareous layer. Climate is sub Saharan with a short rainy season and 200-500mm average rainfall.
With an area of 3000 ha treated each year, the costs per hectare are 97 €/year (Table 2). With a higher number of MTU's costs per ha are smaller mainly due to the lower relative expert costs: **if the distances between the working areas of the three MTU's are not too big, experts costs remain the same no matter if one MTU or three MTU are purchased. Planning, teaching and supervising costs can thus be minimized, which makes the projects much more cost effective.**

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Cost/ha [€]			
	3000 ha per year	**2400 ha per year**	**1800 ha per year**
1 MTU	97.47	107.46	124.02
3 MTU	77.50	83.04	91.53
Cost per micro basin/underground water collection pocket			
1 MTU	0.34	0.38	0.43
3 MTU	0.27	0.29	0.32

Table 2 - Costs per hectare and micro basin (2012)

Table 3 shows the structure of the costs and obviously the machines (plough, tractor, pick up, fuel and spare parts) make the largest share. In the case of working with one MTU costs for machines vary between 43 and 49% of total costs.

However, if the project works with three MTU's, machine costs make up a share of around 60%. The reason, as explained before, is the experts costs incidence.

Taking the example of a surface of 3000 ha and 3 MTU's, the costs per hectare are 26% lower and with a surface of 1800 ha it is even 35%!

3000 ha		**2400 ha**		**1800 ha**	
1 MTU		**1 MTU**		**1 MTU**	
Machines	49%	Machines	47%	Machines	43%
locals	21%	locals	21%	locals	26%
experts	29%	experts	33%	experts	15%
3 MTU		**3 MTU**		**3 MTU**	
Machines	61%	Machines	59%	Machines	57%
locals	26%	locals	26%	locals	26%
experts	13%	experts	15%	experts	17%

Table 3 - Cost structure of Vallerani System

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• Risks

The main risks of projects with the Vallerani System are similar to those of other projects where land use is foreseen. The land tenure and rights must be studied and considered in project planning, Furthermore the management and rights of use of the productions obtained on the treated surfaces such as nomadic pasture, wood, hay cut, etc, must be foreseen and discussed with the local population. Thus, social and legal preconditions must be fulfilled before or worked on while the project goes on; up to now this aspects have been an integrated part of the Vallerani System.
Another risk factor is connected to the introduction of a highly advanced and performing technology in a rural area. For the implementation of the project, participatory planning and monitoring are necessary. The overall strategy is thus focused on the following steps: knowledge of the human/sociological/political/economic/natural environment, information, awareness awakening, animation, organization, training, labour and sowing of the sites, monitoring the results and evaluation of sites. The experience has shown that the collaboration with locally integrated organizations such as NGO's or other organizations can be very useful and provide enriching experiences to all involved parties.

• Revenues

The benefits of Vallerani System can be classified according to the three dimensions of sustainability: environmental, social and economical. They can further be classified in short and long-term benefits, however this mostly depends on the project purposes. In the studied case of a sylvo-pastoral project most benefits appear in the mid or long-term while for agricultural project short and mid term benefits can be considered.

Environmental
The environmental impact, such as less erosion, improved quality and higher quantity of biomass production, reduced flood risk, protection against wind, water collection and deep infiltration, biodiversity enhancement, reconstruction of soil fertility and vegetation cover, restoration of degraded land, depends on climate, local precipitation patterns, soil type etc. as well as on the sown species. If the risks are considered carefully, the benefits are the same than with any other conventional reforestation project, but for much lower costs.
Table 4 shows the water retention capacity of the soil ploughed with Vallerani Systems. Further, reforestation fights desertification and sequestrates large amounts of CO_2.

Rainfall 200 mm/year	**1'100**
Rainfall 300 mm/year	**1'650**

Table 4 - Retained water per ha and year in m3

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Social

Local food production increases food security and can fight migration and thus ease social tensions - especially migration to urban areas where conflicts and environmental situation are increasingly worsening. all contribute to food security increase and the possibility of . Added value is further generated, if transport infrastructure and access to markets are available. Beside the long term impact on migration, training of skilled personnel by experts and employment in disadvantaged areas builds up the technical and economical capacity of local people. Besides greening the degraded land for cattle breeding, grass and timber is in many indigenous cultures an important.

Economical

The most important economical aspect is the increase in value of the treated landscape. Great extensions of unused land becomes productive within a very short period. The production of local crops, pasture, wood, and plants for special needs, the under wood products, the return of wild animals, the availability of timber as construction material or as cooking fuel etc has its direct economic value. Environment risk reduction as floods, wind storms, drought and degradation can also be considered under its economic aspect. Nevertheless, there is also a high potential for sustainable tourism.
There is further to be considered which value reforestation will be assigned to, since large landscapes are treated also large amounts of CO_2 are absorbed and can enter in the carbon offset credit market.

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