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The role of community values and social capital in combating soil degradation in Central Chile dryland region.

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Abstract:

The unirrigated Mediterranean region of Central Chile is characterized by high levels of soil degradation and rural poverty. However, in most cases, these issues have been approached and analyzed separately. In one hand, soil degradation has been mainly attributed to “poor agricultural practices” conducted through the years by the small farmers and peasant communities that inhabit the region. In the other hand, rural poverty is commonly attributed to the low access to economic opportunities and quality education. The public proposals to address these problems have taken a linear and common path; promoting the entrance of the forest industry and the migration to urban areas. Besides these actions, from a macro point of view, it has been established the introduction of agricultural machinery and intensive agricultural methods as an answer for development, which are far from being suited for the ecological and cultural context. This paper analyze the main historical and socio-cultural factors behind this socio-environmental issue, emphasizing in how qualitative factors related to the loss of social capital and the disintegration of communities have had fundamental implications in the environmental problem of soil degradation. Also it attempts to propose causes and solutions that go beyond the technical and neo-Malthusian explanations for this case, presenting social cohesion and territorial empowerment as the bases for a sustainable agriculture in environmentally vulnerable regions.

Keywords: Land degradation, Social capital, Social cohesion, Forestry, Sustainability, Traditional Agriculture.

1. Introduction

Land degradation is a long-term loss of ecosystem function and service, caused by disturbance from which the system cannot recover unaided (UNEP, 2007). This environmental issue has been for a long time in the frontline of global concerns (Andersson, 2011); it has progressively become a priority in the international agenda (UNEP, 1997 & 2007; FAO, 1993) and in the sphere of development and conservation programs (Ramirez, 2002). This can be perceived through the quantification of the important amount of international projects that incorporated land degradation in their main scope for the last decades (UNCOD, UNCED, UNCCD, WWS, etc). This is mainly attributed to the fact that land degradation impacts an estimate of “2.6 billion people in more than a hundred countries, covering over 33 per cent of the earth’s land surface” (Adams and Eswaran, 2000 in Gisladdottir and Stocking, 2005). A second characteristic is that, as many other environmental issues, land degradation progressively becomes a bigger threat every second, where approximately “73 per cent of rangelands in drylands are currently being degraded, together with 46 percent of marginal rainfed croplands” (Ibid.). Above this global characteristic, these drylands are also the regions where world’s poorest and most marginalized population live, the number of poor rural people living in drylands is estimated to be close to one billion (Dobie, 2001). The largest populations living in drylands are located in Africa, Asia and South America, for this last region around 87 million people lives in drylands, corresponding to the 30 per cent of the total area (in Gisladdottir and Stocking, 2005).

Within South America context, the case of Chile is not at any better state; soil erosion is currently one of the more significant environmental issues, especially for the forestry and agricultural sector (Araneda et al., 1999; Bonilla et al., 2010 in CIREN, 2010). This is mainly because soil resources are highly vulnerable to anthropic actions and the variable conditions of global climate change (Yoma, 2003 in CIREN, 2010). In Chile, despite parallel efforts in soil erosion research, there has been pretty few initiative covering the relation between human behavior and land degradation (Homer and Casanova, 2011 in Casanova et. al., 2013) most of them has focus on farming practices instead of the whole spectrum of human activity.

In terms of land degradation one of the most representative regions in Chile is the “Secano Interior” (Interior dryland), this is a sub humid Mediterranean climate region in the central segment of the country (DESIRE, 2010), from a geographic point of view is characterized for been mostly located on the coastal mountain range, this implies the presence of three different types of soils (granitic, metamorphic and vertisols) (Ibid.) with high level of erosion (the main cause of land degradation in the country) and a chronic deficiency in organic matter. With a territorial area of 75.49 M ha, 46% (34.491 M has) are affected by erosion of different degrees every year (CIREN-CORFO, 1979 in CIREN, 2010). From a climatic point of view, this region faces six months of drought (from October to March), having a very concentrated rainfall during June and July. It also presents very wide temperature range, having an average minimum of 4.8 °C in the coldest month (July) and an average of 29 °C in the warmest (January).

All this data can help us understand in some degree a very complex environmental issue in a particular region; however the complexities behind any environmental phenomena may only be comprehended through a holistic and interdisciplinary approach, especially in the case of land degradation, where human behavior plays a fundamental role. It is crucial to move toward a socio-environmental

perspective where human agency is completely embedded. This is a first step in order to attempt to extrapolate this particular and local dynamics to other similar contexts.

2. Results and Discussion

The human role in land degradation

Although, the scientific community has realized the fundamental role of humans and how they have modified the landscape (especially in this case; the soil) there has been a continuous debate through time about the characteristics of this impact, especially how direct or indirect it is (Comas, 1998). In terms of land management, human behavior has been constantly associated to their socioeconomic reality, especially in terms of how some communities overexploit their land resources accelerating soil erosion (Brown and Wolf, 1984). This approach led to a more specific debate, which integrated the political economy of land degradation, linking factors as poverty and power inequalities (Blaikie, 1985). The work of Blaikie, among others, was relevant because it got over the classic “tragedy of the commons” argument, in which shared resources are depleted by individuals acting on self-interest. It also led to a debate where there was an awareness that behind this socio-environmental problem we may find much complex dynamics than simply population growth, overexploitation and “poor agricultural practices”, there was a socioeconomic and cultural background that needed more attention (Alibekov and Alibekov, 2008; Little, 1994).

One approach that is becoming to develop in relation to the socioeconomic and cultural background of land degradation is the integration of concepts as social capital (Kushner and Sterk, 2005) and social cohesion (Jenson, 2010) and the need to measure them (Bouma, 2008). The incorporation of these concepts is relevant because “for as long as people have managed natural resources they have engaged in forms of collective action” (Sobels et. al., 2001). However the study of these relations in the context of small farmer production, especially in South America hasn’t been extensive.

Social capital has become a very useful research conceptual tool because it can be associated to a series of social dynamics, as trust (Möllering, 2001; Bravo et. al., 2012), cooperation patterns and values (Uphoff 2000; Falk and Kilpatrick, 1999) fundamentals in the context of community resource management (Bouma et. al., 2008). Production ceremonies (as sowing, harvest, threshing, etc.) are a great example of social capital applied to community cooperation, in this “ceremonies” community gathers in order to help each other through labor, but as will be explained later, the implications of this goes beyond production, it also promotes social cohesion (Wolf, 1966).

Among the reasons of why social capital and social cohesion are so important variables in relation to land degradation is because they seem to be really connected, through dynamics of trust and cooperation, to the process of depopulation of the rural areas (Falk and Guenther, 1999). Abandonment of rural areas and the migration to urban spaces have had an important impact in land degradation (Blaikie and Brookfield, 1987), mainly due to the “abandonment of agriculture and the dilapidation of the houses” (De Vlieghe, 1993). However, this is a much more complex phenomenon, where a series of “vicious cycles” take action enhanced by migration and environmental change (Black et. al., 2011; Warner, 2010).

There are multiple ways and approaches to assess land degradation and social cohesion, however to incorporate both phenomena can be difficult sometimes; this is because there is a large diversity of

ecological and cultural contexts, and every combination of these can shape in a different way how we conceptualize degradation (Stocking and Mumaghan, 2000). For this reason case studies have a big potential as a starting point in order to address a global phenomenon, which is the reason why this paper focus in the dynamics, especially the “vicious cycles” outlined above, of a particular region as the “Secano Interior”.

Socio-cultural scope of land degradation in the “Secano Interior”

Probably the first issue that comes out during an interview with a producer in this region is the lack of people, especially the lack of labor. The problem of depopulation is embedded in the discourse core of everybody; every narrative is constructed towards this issue. This may be easy to understand just by observing the landscape; it is actually hard to find somebody in these desolated and eroded properties. Another characteristic of this scenario is that most of the few people that still inhabit this region are elderly. This has a huge impact on the traditional economic system because they are no longer physically capable to perform the traditional agricultural activities, having the impossibility of plowing the land as the most representative example. This activity has been always performed by the younger members of the household; otherwise the producer had the option to ask a neighbor or another relative, he could also pay someone, however nowadays neither of these possibilities are reliable.

The main socio-cultural generation gap is sustained on education and aspirations; in the case of the elderly their only path to follow was to learn how to produce and to maintain this system through the years, in the other hand, their sons and grandsons have as main goal to graduate from school and found a job in the city. Which are much more stable than agriculture, and also less drudgery. This is also one of the main reasons behind the abandonment of the rural areas, not only in the “Secano Interior”; this is a transversal global phenomenon that has occurred in rural areas around the world since a long time, however for the “Secano Interior” this process is occurring along with other complex socio-environmental events.

One of these events is the introduction of agricultural machinery as the new, and only, model for agriculture. This process, enhanced by globalization and neoliberal economy, has become an important push for many farmers in Chile and around the world, however for the particular context of small scale agriculture it had a major negative impact, especially in the ecological context of the “Secano Interior”. The most evident of these impacts can be understand through analyzing the cost of this new technology, the machinery cost is only a part, because the change to an entire new model involves new expenses (fuel, specific fertilizers, machine operators, training, etc.) that peasant producers and small farmers cannot cover.

On the other hand, a less evident repercussion of the introduction of agricultural machinery is highly related to the landscape and the socio-cultural factors behind traditional agriculture. The “Secano Interior” is located in an area of hills with high slope and very unstable soils, is particularly in this places where the poorest peasant families are located. Is for this same reason that along with the high cost, machinery is not suitable for this particular landscape as explained by don Juan, a 70 year old producer:

"Agriculture is finished, we are totally going to lose agriculture because no one works, and when the agronomist and others engineer, those who know, said: 'no, we will rise up the agriculture because the government will give

resources and machinery for sowing'. In the valley maybe, but here in the hills is for a Christian to get kill while tilling with a tractor in the slope, no way, we need oxen and people to work, we are going to lose everything"

This is directly related to the geographical and ecological characteristics of the region, the significant presence of hills determines a huge problem for the agricultural machinery to access and function in much part of the crop-able land, so, as farm equipment is being presented as a great assist and opportunity to the farmer who cultivates in the low valley, at the same time it has become a threat to the farmer who farms in the hill, where only the yoke of oxen can access, and where it has been completely undermined the possibility of hiring people at a fair price or to receive help from their neighbors.

The above paragraph opens a window to understand a more socio-cultural related implication of the introduction of agricultural machinery. Before the massive process of agricultural extension and introduction of machinery, mainly promoted by governmental development programs, the production system was sustained by the community. In the traditional system producers relied on the help of their neighbors and relatives in order to produce, in this context families that lived on the valley helped their neighbors in the hills and *vice versa*. With the introduction of machinery, which was only adopted by the people who lived in the valley, the whole reciprocal system was broken, in this new scenario the families that lived in better and flat soils didn't need the help of their hill neighbors, they had tractors to do the job.

The families that live in the more difficult areas for production didn't had nothing to offer now, in socioeconomic terms the community was divided. This traditional system was sustained in a framework of community values and cooperation, which were materialized in production ceremonies. These production ceremonies are summoned when a family group is undergoing a process in the production cycle that would be impossible to achieve without the collaboration of a group of people much bigger than the family unit. These instances are essentially during sowing and harvest, which is why traditional ceremonies as the "*mingaco*" (for wheat and other crops) and the "*vendimia*" (wine harvest) used to be essentials.

These ceremonies are the core of argumentation for the present study, for that same reason it's going to be more developed later on, however at this point is important to highlight some of the implications of this process of community dissociation, and probably the best way to do this is through the words of the main stakeholders, the people that has witnessed all this changes; don Cripiano a 72 year old producer explains part of the issue:

"We can't work much, only what we can do for ourselves, sometimes some relatives help us to sow, years ago what we use to do was the "mingaco", we sowed so much, we helped each other, and that is completely lost, because now there are too many machines, time ago we did the "mingaco" and we helped each other, sometimes one family was in charge, then it was the turn of a different one and so on. All these traditions are lost, years ago there were many "vendimias", but now, people have forgotten the vineyards. There is no people, and the few people that remains doesn't want to work, and don't even start me talking about the young. The countryside is going to be deserted in the future, or they are going to sell it to the forest company, no one produces".

This testimony is very important because besides exposing the loss of production ceremonies it also introduces and leads the discussion related to the second socio-environmental event that have taken part in the region in the last decades; the overwhelming entrance of the forest industry in the "Secano Interior". Since the end of the 70's mayor forest industries have take over an important area of Chile, the arrival of these (in most cases) multinationals has been promoted by the government as job source,

economic development and environmental management. Especially for the case of the “Secano Interior” reforestation has been presented as the greatest solution for land degradation.

These industries have progressively reforested and important percent of the region, however this has gotten out of control where not only the most vulnerable soils are planted but also good quality farm lands. For this they use introduced species as pine (*Pinus radiata*) and eucalipto (*Eucalyptus*) producing very dense forests, which have led to another environmental issue: water scarcity. However, for this particular study the most important implications of these forests are related to traditional agriculture.

In the current scenario of low prices and markets where small agriculture cannot compete, many producers have realized that their farming is progressively becoming less and less sustainable. Adding to this the high level of erosion and all the government programs and projects, some are choosing to change their land use to forestry. However, this produces a similar effect as the introduction of machinery, because this activity is characterized by the individualism of the plantation owner. He or she doesn't require doing any specific job, and more important, he or she does not require any help from the rest of the community. The forestry company handles both planting and harvest of the forest, which requires virtually no maintenance of any kind, now the ex-farmer only expect to be paid (in about 15 years) for providing his land and natural resources for forest production, he doesn't need to associate, or ask for help that could then be asked back.

In this context where is possible to observe the replacement of community work by individuality, in most cases supported by new technological means, is important to pay attention to the cultural and psychological implications, many small producers feel threatened, besieged by forest plantations in every direction they look and not knowing how they are going to survive in the next season. Fromm and Maccoby (1995) refer to this threat explaining that:

"But along with the new techniques new values are born that push to max consumption, the subordination of man to the requirements of the machine and profit, alienation, the destruction of traditional peasant culture and thus the value of the enjoyment of trans-utilitarian life" (pp. 20-21)

However, above all most producers remain in a strong position of continuing with their traditional ways of life, and living in the countryside, because is not only what they best know, but there is also a powerful attachment to everything that involves this way of life, with its sorrows and joys.

Production ceremonies and social capital

As it was pointed out before, one of the main issues that in some way materializes and clusters different stages in this socio-environmental crisis is the abandonment and loss of production ceremonies. These ceremonies are part of a complex cultural and economic system, where in order to make a living small farmers and peasant families engage in different strategy to meet their needs and repeat the production cycle next year. These strategies belong to different funds (consumption, replacement, ceremonial and rent) as noted by Eric Wolf (1966) explaining that:

“All social relations are surrounded by such ceremonial, and ceremonial must be paid for in labor, in goods, or in money. If men are to participate in social relations, therefore, they must also work to establish a fund against which these expenditures may be charged” (p. 7)

So, why it is so important to satisfy this fund? Because social relations are essential to sustain rural traditional production systems, and the “Secano Interior” is a great example of that. This is where the “*mingaco*” and the “*vendimia*” become so important. These are gatherings where different families, neighbors and friends meet for a meal, or even a full day of sharing and eating. The goal of these meals is not only the need to summon the guests, but also to nourish and give energy to those who work in the planting, harvesting, weeding, mooring or any activity involved in production.

These ceremonies are summoned by one of the families, this community subgroup offers a feast in return to the guests work. One of the main features of these ceremonies is that it determines a social network that integrates and excludes cooperation depending on participation. To illustrate this lets imagine that the “A” family calls for a “*vendimia*” or “*mingaco*” but the “B” family does not attend, it is very likely that in the future if the “B” family is the convener the “A” family will not attend, by this dynamic, families are implicitly forced to collaborate so that then the rest will cooperate with them. Thus, ceremonies, especially productive ceremonies, work reciprocal relating hosts and guests vice versa.

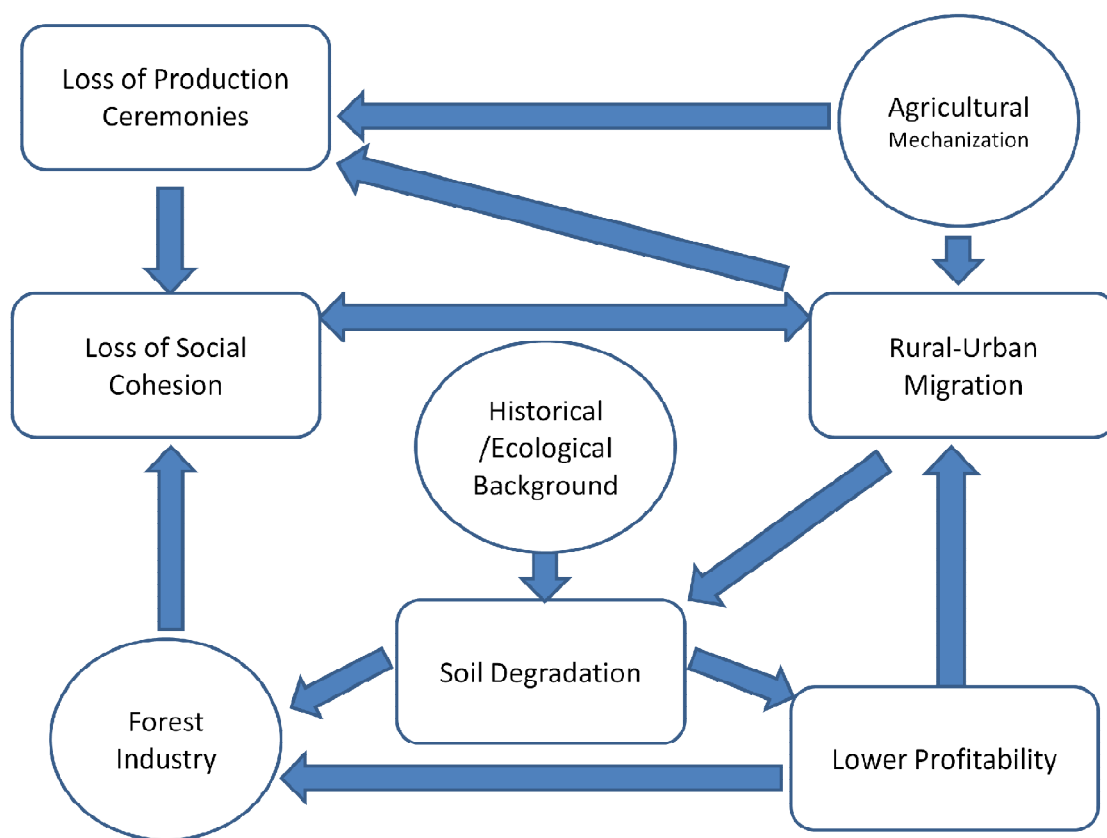
However, as Wolf (Ibid.) would say: “But social relations of any kind are never completely utilitarian and instrumental”, this reciprocity plays not only a purely economic role and is not only rooted in a conscious need, it also meets symbolic functions which are highly imbedded in the community trust dynamics. When this trust networks became to fail is the beginning of the community breakdown, which in many cases can promote migration, the abandonment of the properties in a vulnerable state and hence lead to land degradation.

3. Conclusions

Is important to highlight that most (if not every) environmental crisis around the world is composed by a series of dynamics and process that must be addressed from a holistic approach. Where we must understand that human agency is always involved in some way, for that same reason is important extend our perspective to what people has to say about their life and the landscape they inhabit. The case of the “Secano Interior” is a great example of this; land degradation may appear as the most noticeable and evident issue, however, there is a huge spectrum and chains of causation behind, and it is very likely that we can never unveil them all.

For this specific case it is possible to, in some way, notice a complex “vicious cycle” that combines environmental, socio-cultural and economic issues. This cycle doesn’t necessarily have a *starting point*, however it is possible to recognize three main events that can help us understand some of the forces that are currently working: the historical and ecological background, agricultural mechanization and forest industry. The interaction of these events in the context of the socio-environmental crisis in the “Secano Interior” can be visualized in the following scheme:

Figure 1. Cyclical interaction model of socio-cultural factors and socio-environmental events in the “Secano Interior”.



Beginning with the issue which probably had the greater emphasis in the present study; the agricultural mechanization. This process boosts a decrease in the amount of labor required in the rural context, since some of these machines and their respective operators can perform tasks that would involve an important congregation of workers, so it is no longer necessary to hire or summon them in any productive ceremony as the “*vendimia*” or the “*mingaco*” for example. These productive ceremonial instances as others, such as recreational, religious, etc., play a key role, allowing the interaction of people, the construction of trust networks, family ties, which is ultimately the unit that established in a territory and appropriates it. An individual without an important link to a group (family) or to the territory is much more likely to migrate, and therefore, to leave the territory.

Here is where one of the most frequent diagnoses made by local farmers come to light, they perceive that the major factor in land degradation is the abandonment of it, this is because the soil changed from a protected state (native forest) to a vulnerable state (cleared for production), it will degrade unless is used for production and maintained with a vegetative cover.

This is related to other fundamental “event” or in this case “state”; the historical and ecological background. The current environmental state of the “Secano Interior” is in a big part a consequence the overexploitation of land since the arrival of the Spanish “*conquistador*”, since that an intensive wheat production system was implemented, this led to the burning and destruction of almost the entire native forest in order to meet the high demand for wheat. This was a progressive process which had its pinnacle during the half of the nineteenth century in the “gold rush” (Montaldo, 2004). The incorporation of unsuitable regions for wheat production was necessary, where unsustainable production systems were implemented; this is the case of the “Secano Interior” (Mellado, 2007).

This degraded state of the land has been approached as a problem that must be improved as soonest possible, this is where the reforestation program has taken most of its power, multinational forestry industry have taken over promising development and sustainability. However, the methodologies used only have maintain the problem in a state called “no-apparent erosion”, where the degraded soil is covered with very dense forests and after they are harvested it is possible to notice the same degraded state. In the other hand, when farmers abandon agriculture in order to plant forest it is possible to observe how the individuality of this activity weakens cooperation networks and boost the vicious cycle.

Finally, in terms of approaches needed for this particular case, rather than struggle with the cycle dynamics, the most imperative action is to promote a virtuous circle in response, only by a inclusive approach we can expect to not only preserve the current status of the producers and the soil, but also improve it. Clearly it is essential to promote empowerment and *detritorialization*, but that's not enough, it is fundamental to advance in a research program that takes into account social values, traditional practices and knowledge. This may be the only way to approach a decentralized concept of sustainability.

Conflict of Interest

The authors declare no conflict of interest

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