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The Drylands Development Model in Argentina's Central West: the Case of Mendoza Province¹

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Abstract – Argentina's central west encompasses a vast dryland territory, organized on the basis of a great contradiction: the confrontation between oasis and rainfed area (desert lands with no irrigation). Within a territory under arid conditions with different desertification levels, Mendoza is a paradigmatic case. The development model fostered at the end of the 19th century was based on the supremacy of strategic resources: water and soil. A mode of regional development reliant on irrigated lands was since then supported to consolidate the wine export model. Nowadays, Mendoza's non-irrigated lands and their people are marginal, not merely by the effect of a restrictive environment but also by the combined action of a fragile environment and the weightier social, political and economic forces that have banished them to the system's margins. Analysis of the region's history informs that non-irrigated spaces provided both strategic natural resources for development of irrigated areas and labor for starting productive activities. Simultaneously, non-irrigated lands were curtailed in their right of access to strategic resources for their social reproduction: water and land. This report delves further into the analysis of the dynamics of territory construction whereby some territories stand as central while others are relegated to marginal positions. The analysis goes deeper into a case study with signs of a serious process of territory impoverishment, social exclusion and progress of desertification.

Keywords – *drylands; desertification; development model; Mendoza province, Argentina*

1. Introduction

Continental Argentina stretches between latitudes 22° and 55° south, for as long as 3700 km, over an area of 2,758,829 km². This vast extent of land determines a wide variety of climates, from subtropical in the north to cold climates in the southern end and mountain regions, with predominance of temperate climates in most of the country. According to a water regime, the country is divided into three great regions: the humid region, occupying 21% of the land area; the sub-humid and semi-arid region, covering approximately 27.50%, and the arid region – the largest one – that represents 51.50% of the country's area, extending along the western and southern part of the continental area, in the shade of the Andes mountains. Thus, Argentina is the South American country with largest proportion of arid, semiarid and dry sub-humid lands. The relationship between precipitation and potential evapotranspiration defines areas with predominance of deficient water regimes in 70% of Argentina's

territory (figure 1).

About 30 % of the country's population lives in these drylands. Approximately one third of these people live below the poverty line. Despite the magnitude attained by drylands at national level, and the severity of the desertification processes affecting them, this has not translated into public policies that help prevent or control degradation processes. Argentina is known more for being the "world's breadbasket" than for being the "country of drylands" (Abraham et al., 2009). With promotion and development policies historically focused on the productive centers of the humid Pampas, the other regions remained peripheral to the State's interests and were inserted, in a subordinate fashion, as providers of inputs, natural resources and labor. Since colonial times, the design of our country's lines of communication and transport converge on the capital, to facilitate concentration of wealth and communication with abroad, fundamentally through the port of Buenos Aires. The best territorial expression of this policy is the macrocephalic Federal Capital. This sit-

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Figure 1: Drylands of Argentina. Source: SIG desert LADYOT, IADIZA-CCT-CONICET Mendoza

uation changes only relatively with the consolidation of regional economies. Although in the late 19th and early 20th centuries, the provinces lying outside of the Pampas region would launch regional development projects that enabled them to engage in the development guidelines issued from Buenos Aires, trying to compete with produce from the Pampas region, they would replicate in their own territories proposals for development that resulted in new polarities and imbalances. The Argentinean drylands would remain systematically excluded from the development projects that country and provinces endowed to themselves. The national policy relative to natural resources is inscribed in our constitution. In a federal state, every province is the master and sovereign of its natural resources, among which is water that, in the case of irrigated lands, is inherent to the land. This legal framework resulted in very different situations, depending on the political-institutional maturity of each province, but overall signaled by a repetitive abuse of dryland resources which were the basis for building the wealth of central territories, whereby the provinces were excluded from the process. The province of Mendoza, lying in Argentina's central west, is highly illustrative of this situation: its total land area is under dry conditions, with strongly fractured structuring patterns (Abraham et al., 2009). On the

one hand are the concentrations of cities and rural areas that developed with the benefit of irrigation (oases) and on the other hand vast rural territories with no irrigation and dispersed rural population primarily centered on livestock production (figures 2 and 3). This panorama of extreme polarization between oasis and desert is complete if one considers that the province has developed relying on its oasis territories, whereas there is a striking absence of policies for non-irrigated drylands. Such scenario depicts a situation of strong territorial imbalance (figure 4). The notion of desert here retrieved alludes to those territories showing hyper-arid and arid conditions, that is, negative precipitation-evapotranspiration balance. Clarifying this is necessary in the case of Argentina because the term desert has been strongly criticized for having been used as a legitimating argument to legitimize one of the major extermination campaigns recognized in national history (Campaign of the Desert). Even admitting that those criticisms must be particularly taken into account, avoiding the desert-depopulation association, its use in this work tries to recover the environmental particularities that desert spaces exhibit and turn them into unique places in the planet, such as is acknowledged in specialized international literature. The objective of this paper is to analyze the causes of desertification in Men-

doza relating them to the historical dynamics of territorial construction.



Figure 2: Vineyards under irrigation in the oasis



Figure 3: Goats for subsistence activities in non-irrigated dryland



Figure 4: The border between irrigated drylands (oasis) and non-irrigated (desert)

2. The development model that generates territorial imbalance, social exclusion and marginalization

2.1. The causes of the desertification in Mendoza

Mendoza, at the foot of the Andes range, lies in the central west of Argentina, between latitudes 32° and $37^{\circ}35'$ south and longitudes $66^{\circ}30'$ and $70^{\circ}35'$ west, over an area of 150,839 km², with a total population of 1,741,610 people (INDEC, 2010). From the viewpoint of its geographic position, it is strategically located at the crossroads between the two southernmost capitals in South America (Santiago de Chile and Buenos Aires), which is reflected in space through increased flows of trade and people. The province features a heterogeneous natural landscape, signaled by aridity, constrained water and soil resources, biodiversity loss, natural hazards and desertification, revealing sharp economic and territorial imbalances, whose maximum expression is the contrast between irrigated areas (oases) and non-irrigated areas (desert). Since the late 19th century, with the consolidation of a regional economy focused largely on an irrigated viticulture model, at the expense of the degradation of the non-irrigated area and extraction of its natural and social capital, we can speak of the existence of two Mendozas: the green forested city, a place of abundant water and prosperity, and the desert, a place signaled by critical desertification processes. This Argentinean province provides an interesting scenario for analyzing the macroeconomic policies that favored desertification processes for it enfold an apparent paradox: it exhibits environmental problems of considerable gravity, intimately associated with its location in drylands, and is at the same time perceived in the national context as a successful regional economy that has managed to overcome and capitalize on its arid conditions, in favor of a productive activity that finds in them the main source of comparative advantage. A series of natural conditions –low rainfall, a broad temperature range, long sunlight hours and scarce humidity– associated with actions for territory modeling substantiated in a wide irrigation network, gave birth to three oases in Mendoza that allow development of viticulture. Outside these oases, however, similar environmental conditions have resulted in critical desertification processes. The possibility of accounting for this apparent paradox leads to assume that the historical process of forming irrigated and non-irrigated territories has promoted in Mendoza a differentiated and polarized development of oasis areas, which concentrate resources, people and, most of all, power, and non-irrigated areas that are incorporated in a subordinate position to the oases and which will be the areas exhibiting the strongest evidence of desertification. The fact that non-irrigated lands are the ones to show the most severe desertification processes should not, however, lead to assume that the causes of degradation are not confined to overgrazing resulting from irrational individual actions (Torres, 2010). Quite on the contrary, the structural causes of desertification would be related to large, temporal deep processes, closely linked to the regional development project that the province and its hegemonic groups have promoted

over time. In short, although inscribed in unique territories from the environmental perspective, the causes of desertification in Mendoza will not be found associated with locally expressed natural or human-induced disturbances, they will be found in strong association with a regional development project, clearly hegemonic, which prioritized inserting Mendoza into the national context and Argentina into the global context and which, in so doing, subordinated its dryland territory.

2.2. Political and macroeconomic conditions of desertification in Mendoza: recovering the historical dimensions of the process

Upon arrival of the Spanish, which in Mendoza was by the year 1551, the province was occupied by four ethnic groups: Huarpes, Puelches, Pehuenches and Olongastas (Prieto, 1985). The Huarpes settled in the northern part of the present territory of Mendoza, always in the vicinity of the current course of the Mendoza River. Some inhabited the piedmonts and depressions that make up the present “Mendoza’s northern oasis” and others the surroundings of the Guanacache system of lakes and wetlands, in the lower part of the basin (currently “non-irrigated drylands”). On the basis of a scattered settlement pattern, the people located in depressions and piedmonts were distributed in villages, with water provided through ditches, a basic infrastructure for water management that allowed them to harness snow melting from the mountains and overcome the region’s arid conditions and made possible the development of some crops. Relatively far away from these groups, the Huarpes inhabiting the plains also showed a scattered pattern of settlement along the margins of lakes, rivers and streams (Abraham and Prieto, 1981). The main productive activity was associated with the lake system and combined hunting, fishing and collection, in addition to cultivation of some plant species when the temporary overflow of rivers allowed it. Strong linkages developed between both territories over time, not only because of their common dependence on the same watercourse (currently Mendoza River) but also because of an active interchange of products between both groups. Once settled in the north of Mendoza, the Spanish focused on occupying the irrigated lands, which housed two thirds of the Huarpe population (Prieto and Abraham, 1994) and which they had modeled by building ditches and canals. The progressive displacement of the Huarpe groups soon proved insufficient to the expanding Spanish groups, so these went on to conquer new territories, now more distant, which were incorporated to the fledgling oasis by expanding the irrigation network. The whole colonial period would witness this dual process of growth, namely, expansion of irrigated lands onto non-irrigated lands, and cornering indigenous people in territories with low likelihood of being irrigated. At the same time, although the interchange process would not stop, they would show growing trends towards imbalance, so that whereas the former would focus on irrigated cultivation of cereals and forage, on fattening livestock for later sale to Chile and on producing alcohol and wine (Prieto

and Abraham, 2000), the “downstream” territories home to the displaced Huarpe groups would become the major source of particularly personnel and fish for the oases (Abraham and Prieto, 1981:127). It is at this stage that a territorial development model strongly associated to water begins to take shape, which would enable consolidation of the “Viticulture Model” across the 20th century and would allow the region to link up, without competing, to the Humid Pampas-Port axis, already hegemonic at that time. In the context of the international division of labor, Argentina in the late 19th and early 20th centuries stands as a supplier of agricultural and livestock products coming from the humid Pampas, with Great Britain as their main destination. The productive specialization achieved in the country, serviceable to foreign requirements, brings increased foreign investment, expansion of the railroad network, an exponential increase in exports and setting up of a policy of attracting immigrants aimed at meeting growing demands for labor. The interior of the country would have to quickly adjust to the national scenario. Some regions would do so by avoiding the great Pampean competitor, maximizing the comparative advantages derived from their soils and climate. Such is the case of sugar cane production in Tucumán and wine making in Mendoza, both mounted on experiences that had been developing since past times and that, however, consolidate definitely in the context of a national organization according to the role assigned to Argentina in the international scenario (Romagnoli, 1997; Campi and Richard Jorba, 1999).

Throughout the 20th century, the vine and wine industry consolidates definitely in those territories of Mendoza that managed to get hold of irrigation water and of the most suitable agricultural soils. Migration flows from Europe, many of them coming from regions with a wine making tradition, would in turn provide the knowledge and labor required for model tuning. Always depending on mountain snowmelt, but increasingly caught in the irrigation network, the Mendoza River flows would, over time, cease to provide water to the “downstream” territories in the northern oasis, jeopardizing the water supply that fed the lake and wetland system that supported fishing and crops (figure 5). The demands for water posed by the expanding oases will soon be joined by rising demands for timber by Mendoza city, and in the same way as with water, timber will be extracted from the territories lying east of the city, “downstream” of the Mendoza River (figure 6).



Figure 5: Drying of Guanacache Wetland (Ramsar site)



Figure 6: Dry bed of the Mendoza river in the lower basin

2.3. Current situation: recommendations to decision makers

Throughout the 20th century, there are three concurrent processes on the plains in eastern Mendoza: sustained decrease in surface water available (now destined for the oasis areas), massive removal of forest resources (destined for urban areas) and progressive but nonstop introduction of goat livestock, the only one which due to its characteristics could cope with increasingly restrictive environmental conditions. Towards the end of the 20th century and beginning of the 21st century, the vine and wine industry in Mendoza experiences a deep restructuring process that drives it away from the making of common and table wines to undertake the making and trading of fine wines destined for the international market (Bocco, 2003). Again, it is the world-system transformations that provide an enabling framework for these changes, directed to position local products in international consumer markets. Concomitantly, desertification processes advance and become deeper in non-irrigated drylands. Thus, even though it is usual to associate desertification with overgrazing, and in this region the greatest responsibility is also ascribed to the latter, the analysis should necessarily lead to reflection on the also traditional association, which some

authors promote, between overgrazing and irrational individual action (Thomas et al., 2011). Rather the contrary, a sensitive look on the history of these territories reveals that the differential situations now existing in Mendoza are the result of complex frames of unequal relationship sedimented through time, where irrigated spaces have made an extractive use of the resources –natural and human- of non-irrigated spaces. The consolidation of viticulture and oases commands at the same time the subordination of other actors and territories and, moreover, determines removal of certain natural resources that are invariably put to the service of a regional economic project disputed outside the territories currently exhibiting visible signs of desertification. The presented case reveals that, although the dynamics of unequal relationship between irrigated and non-irrigated lands acquires a territorial dimension, it does not come down to disputes explainable in strictly environmental terms. In any event, these are territory-anchored disputes which express and result from power relationships. Nature, therefore, does not play a particular role; on the contrary, the parts of nature that become a resource, because of the use that is made of them, give materiality to exploitative processes that find a way of expression in desertification. Finally, if at the provincial territorial scale these processes and dynamics are to be considered structural causes of desertification, at local scales their visualization should necessarily invite to review the arguments placing on victims the exclusive responsibility for problems. Drylands exhibit conditions of territorial imbalance and a lack of political and social equity. The pattern of economic and demographic concentration is similar in the irrigated territories, which have managed to capitalize strategic resources such as water, soil and population, to detriment of non-irrigated drylands. From this emerges the recommendation to repair this situation by restoring the goods and services of these degraded ecosystems and restoration the rights of access to land and water by local populations. Knowing the real causes of desertification and its consequences for these territories becomes a real matter of historical repair.

3. Conclusions

With a territory fully extending under dry conditions, with different levels of desertification, the province of Mendoza is a paradigmatic case of organization based on a great contradiction: the confrontation between irrigated drylands, “oases”, and non-irrigated drylands, “desert”. The major causes potentiating the risk of desertification lie in the weakness of integral and inter-sector coordinating policies, which translates into territorial imbalance with negative effects on social, economic and environmental dimensions, policies that have historically been practically absent from non-irrigated territories in contrast to a diversity of policies for the oases and promotion of their activities (Abraham, 2009). The development model encouraged by dominant groups at the end of the 19th century was based on mastering two strategic resources: water and soil. From there, a model of regional

development was favored, which was strongly centered on irrigated lands in order to consolidate the wine export model. "Downstream" territories were not paid the same attention; rather, they were integrated in a subordinate way in the exclusionary model of regional development posed by local elites. This being so, current desertification processes, particularly critical in these lands, are not the exclusive result of restrictive environmental conditions, rather, they are imbricated with the historical dynamics of territorial construction. Analysis of the region's history reports that non-irrigated spaces worked as providers of strategic natural resources for the development of irrigated areas and of labor for implementing the dominant productive activities. Simultaneously, non-irrigated territories were curtailed in the exercise of their right of access to strategic resources for social reproduction (Abraham and Torres, 2011). When strategies are designed only for the oases, by omission, decisions are being made for the rest of the territory. The challenge to take on is planning with a system criterion that articulates the relationship between oases and non-irrigated areas, while giving way to historical repair actions.

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