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SUSTAINABLE FOOD PRODUCTION FOR FARMING HOUSEHOLDS IN ARID ZONES: THE CASE OF SIDI-BOUZID IN TUNISIA

Ahmed Ferchiou, Florence Jacquet and Hatem Belhouchette

Arid zones make up more than 40 percent of the total land where more than a third of the world population resides. Agricultural ecosystems in dry areas have undergone significant socio-economic transformations to meet increasing food needs. Despite the improvements in living standards of local populations thanks to this evolution, their environment has been irreversibly damaged in several situations.

Beyond the question of agricultural productivity, these societies now face a more complex challenge in trying to guarantee sustainable food production – consider production, food-consumption and natural resources. Questions arise concerning this challenge and the actions to be taken under climatic and socioeconomic pressures that pose a threat to population viability in arid zones.

We consider the case of Tunisia, whose population doubled between 1960 and 1990, worsening the trade balance due to food demand increase in the late 80's. As a result, Tunisia adopted the structural adjustment program in 1986 to emphasize on agricultural reform, which reflected the government tendency towards liberalism and supported an agricultural modernization process based on the exploitation of natural resources and technical improvements causing significant agrarian transformation. One such adjustments was the privatization of land which led to a growing shortage of rangeland and the transformation of a pastoral society into an agro-pastoral society and to the introduction of lands into the economic cycle. There had also been a progressive liberalization of the hydro-agricultural resources, therefore further underlining a two-tier Tunisian agriculture: a productive capitalist agriculture vs. a family-based agriculture. These "productivist" measures have nonetheless made it possible for Tunisia to establish a good position in terms of food security, less than 5 percent of its population being underfed. However, health studies have shown the importance of chronic food-related diseases, suggesting the unsustainability of the Tunisian diet.

To illustrate these transformations and the resulting threats, we chose Sidi-Bouزيد, a Tunisian rural arid zone where the Tunisian revolution was triggered in 2010. The area has undergone considerable agricultural development since

the late 80's through intensification, using irrigation and the privatization of land ownership. This has neither led to the development of other sectors, nor made up for the low diversification of the economic fabric. Sidi-Bouزيد suffers from rural depopulation due to job seeking in urban areas, at a time when the area is going through a farm labour recruitment crisis. The agricultural sector, which employs more than 40 percent of the active population of Sidi-Bouزيد, faces a crisis caused by the overexploitation of hydro-agricultural resources and rangelands, which shows the limits of Sidi-Bouزيد's rural development. It has been made worse by climatic uncertainties that indicate a probable 7mm decrease in annual rainfall and a 1°C temperature rise by 2020.

The changes realised at the level of production structures have generated a certain disintegration of rural society, moving from a homogeneous system of pastoral producers with low productivity and self-produced diet to a mixed agro-pastoral system with higher productivity but a market-dependent diet.

Several responses to the challenges of structural change regarding globalization have been observed, the most striking of which were irrigation, pluriactivity, size decrease of herds and market-based diet.

To identify and study the different components of this system, an integrated assessment must be realised by analysing the behaviour of farming households at the level of the three significant issues at stake.

The first relates to the farming household's monetary income, which includes farm and off-farm incomes; the second relates to family labour (including that of women). The third issue represents the household's consumption, which includes self-consumption and other means of food supply. Based on this approach, farming households in Sidi-Bouزيد can be classified as follows:

- **Producers - consumers households:** associated with the extensive dominant rainfed production system, they show high levels of self-consumption and their source of income is sheep farming. Highly exposed to climatic and market vagaries and most affected by the deterioration of rangelands, the contribution of family labour on the farm is more significant during rainy

years, forcing members of the household to look for additional income during dry periods when agricultural income comes exclusively from livestock (products and decapitalization).

- **Producers - consumers - traders households:** associated with semi-intensive production systems, their source of income is irrigated market gardening. Less exposed to climatic vagaries thanks to their access to water through surface wells and irrigated public perimeters for the most part. They are most vulnerable to market vagaries and to the overexploitation of water. The contribution of family labour on the farm is more frequent but with a significant recourse to hired labour. These households produce for the market while showing a considerable share of self-consumption and strong crop diversity.
- **Producers-traders households:** associated with an intensive production system, they are hardly faced with climatic vagaries and their source of income is irrigated fruit arboriculture. Their production systems rely on permanent and seasonal hired labour and on the market, with an opening onto international markets. Mostly from other provinces than Sidi-Bouزيد, these producers, whose access to natural and financial resources has been encouraged by the state and they are considered as entrepreneurs rather than farmers. They are marginal, but based in zones with strong natural potential (water and soil). They require a significant mobilization of hydro-agricultural and financial resources.

These three models of rural households coexist within one single territory. We consider a set of solutions that must be defined and targeted for each model, via monitoring of resource use for trader-farming households, development of an industrial agribusiness fabric for rainfed crops of trader-consumer households, and promotion of crops diversity for irrigating households.

Other transverse or national solutions can also be envisaged, like promotion of the consumption of nutritionally "efficient" products, creation of farm work service cooperatives.

After the revolution, the authorities showed an increased interest in food-production sustainability. The state, which has always maintained an active profile must:

- Consider actors' diversity in Sidi-Bouزيد where



the first and second systems out of the three systems as describe above (family-based) have a significant geographical importance, and the second and third systems have a significant economic position (most productive systems).

- Design reforms connecting the various actors within the different sectors. Just like the three achievement goals, three types of indicators will serve as a simulation base for each "farm-household" system: production indicators like household work productivity, self-consumption value, and farm performance. Consumption indicators like food diversity, which we consider as a way to approach the overall diet quality, caloric input, and the quantity consumed per "recommended" product. Finally, natural resources use indicators such as agricultural water consumption, soil water conservation and soil erosion which are key issues in dryland areas.

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