

## Chapter 17

# Adaptive Strategies of Small Family Farms in the Face of Climate Change: The Case of the Tleta Watershed in Northern Morocco

**Mohamed El Amrani**

*National School of Agriculture of Meknes, Morocco*

### **ABSTRACT**

*Climate change is now an accepted reality. It is felt globally through increased temperature and precipitation regime disruption and increased frequency of extreme events such as floods and droughts. In the absence of effective mitigation and adaptation actions, these changes could have significant negative impact on the sustainability of agriculture and the resilience of populations especially in areas with fragile ecology. However, these changes remain an issue that is difficult to grasp and still not well integrated into management strategies at the farm, sector, and territory levels. The objectives of this research are to describe the production systems, and to study the resilience strategies, perception, and adaptive practices of farms in the Tleta watershed in Northwest Morocco in the face of climate change and landscape dynamics. It describes farming systems and activities, attempts to analyze how farmers perceive global changes in their landscape, and adopts innovative strategies and practices to adapt to them. It also shows that the actions of institutional actors in the area that can contribute to the resilience of the populations are numerous but remain fragmentary and lack integration.*

DOI: 10.4018/978-1-5225-7387-6.ch017

## **INTRODUCTION**

In recent decades, climate change is a major challenge facing humanity. Although difficult to define, the consequences of this phenomenon are multiple, irreversible and could exceed the response capacity of ecosystems and humans who are likely to be highly affected.

Actions that can be taken with regard to climate change are organized around two main components: reduction of emissions (mitigation) and adaptation (IFPRI, CIRAD). Adaptation to climate change covers very different forms of actions depending on the zones, geographical scales, and sectors. Its implementation challenges what is called “adaptive capacity”, which is not the same from one region to another or from one country to another (Driouech, 2010).

Morocco’s fragile ecosystems are affected by climate change and are influenced by several factors, including anthropogenic factors. This is the case of the northern zone of Morocco, which is experiencing an erosion rate of 20 to 30 m<sup>3</sup>/ ha/ year (Hammouda, 2010).

A study was carried out by FAO, the World Bank and national institutions (CIRAD, IFPRI) on the impact of climate change on 50 agricultural productions, in the main agro-ecological zones and according to several scenarios of climate change. This study revealed that the drier and warmer climate expected in Morocco would have negative effects on the main rain-fed; whereas, by 2050, the yields of common wheat would decrease by 10% in the wet year, compared with the current situation, but by 33% during the dry years; that several important irrigated crops would also be affected and that the negative impact would grow (FAO, 2008).

The Tleta watershed is a landscape mosaic with rain-fed agro-systems. This basin is located in the northern area of Morocco, in the heart of the Tangier Basin, between the two major urban centers Tangier and Tetouan. This basin has experienced in recent years low agricultural yields and damage to vegetation cover (Kabafing Kourouma, 2017). In addition, erosion losses are enormous and alarming and the Ibn Battouta Dam, which supplies the city of Tangier with drinking water, is continually sinking. Thus, the siltation of this dam over the period 1977-2003 was evaluated 2340m<sup>3</sup> / km<sup>2</sup> / year. As a result, its storage capacity is reduced by 70% after only 32 years of activity (El Kemmoune, 2009).

It is from these observations that the problem of this research has emerged, which attempts to describe and explain the adaptive practices of farms in rain-fed agro-systems in the Tleta zone in the face of climate change.

## **CONTEXT OF THE STUDY AND METHODOLOGY**

This chapter was guided by the following objectives:

1. To describe farming systems in the Tleta basin;
2. To analyze what would be the dynamics of the landscape in the future;
3. To study the practices adopted by the farms to adapt to climate change;
4. To analyze the roles of institutions in helping people to be resilient; and
5. To study farmers’ perceptions of the dynamics and evolution of their agrarian landscape.

The Tleta watershed is a hydrologic unit located geographically within the western Rif in northern Morocco (Figure 2). It is located in the provinces of Tangier and Tetouan. This watershed occupies an

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:  
[www.igi-global.com/chapter/adaptive-strategies-of-small-family-farms-in-the-face-of-climate-change/223771](http://www.igi-global.com/chapter/adaptive-strategies-of-small-family-farms-in-the-face-of-climate-change/223771)

## Related Content

---

### Examining the Role of CRM in Designing and Managing Effective Loyalty Programs to Enhance Repeat Business

R. Rejitha and G. Jayalakshmi (2025). *Multidisciplinary Approaches to AI, Data, and Innovation for a Smarter World* (pp. 1-20).

[www.irma-international.org/chapter/examining-the-role-of-crm-in-designing-and-managing-effective-loyalty-programs-to-enhance-repeat-business/376586](http://www.irma-international.org/chapter/examining-the-role-of-crm-in-designing-and-managing-effective-loyalty-programs-to-enhance-repeat-business/376586)

### The Trends and Challenges of 3D Printing

Edna Ho Chu Fang and Sameer Kumar (2019). *Advanced Methodologies and Technologies in Engineering and Environmental Science* (pp. 415-423).

[www.irma-international.org/chapter/the-trends-and-challenges-of-3d-printing/211888](http://www.irma-international.org/chapter/the-trends-and-challenges-of-3d-printing/211888)

### Global Implications of Sustainability and E-Society Infrastructure in Developing Economies

Biru Ramona (2018). *Promoting Global Environmental Sustainability and Cooperation* (pp. 162-183).

[www.irma-international.org/chapter/global-implications-of-sustainability-and-e-society-infrastructure-in-developing-economies/205739](http://www.irma-international.org/chapter/global-implications-of-sustainability-and-e-society-infrastructure-in-developing-economies/205739)

### An Empirical Review of Long Term Electricity Demand Forecasts for Turkey

Attila Odabasi and C. Sani Tiryaki (2016). *Handbook of Research on Waste Management Techniques for Sustainability* (pp. 227-243).

[www.irma-international.org/chapter/an-empirical-review-of-long-term-electricity-demand-forecasts-for-turkey/141898](http://www.irma-international.org/chapter/an-empirical-review-of-long-term-electricity-demand-forecasts-for-turkey/141898)

### Postharvest Management Strategies

Rohanie Maharaj, Dimple Singh-Ackbarali and Clement K. Sankat (2015). *Impacts of Climate Change on Food Security in Small Island Developing States* (pp. 221-254).

[www.irma-international.org/chapter/postharvest-management-strategies/118027](http://www.irma-international.org/chapter/postharvest-management-strategies/118027)