Analyzing the resilience of tomato growers in a country facing rapid environmental and socio-economic changes

The case of fresh tomato in Morocco •

Kenza Benabderrazik[1] • Birgit Kopainsky[2] • Jonas Joerin[1] • Tazi Lina[3] • Johan Six[1]

ETH zürich

Context

In a world characterized by globalization of agricultural markets and climate change, farmers are increasingly exposed to various types of stresses and shocks, hence the **need to build their resilience**. For horticultural growers, this is all the more striking as vegetable production, such as **tomato, is input demanding** and therefore dependent on various exogenous factors.

→ **Tomato** is not only a key food crop for consumers all over the world but also a **key cash crop for the producers**.

This raises concerns about the ability of value chain actors, **in particular tomato producers, to be sustainable and resilient to unexpected changes, such as drought**.

Objectives

The goal of this project is to **explore the dynamics of the tomato growers capital in face of repetitive droughts using system dynamics modeling as a tool to analyze their resilience**.

Moroccan framework

In Morocco, the agricultural sector has evolved during the last decades around the willingness to **develop a modern agriculture** while **building up smallholders' welfare**. However, the agricultural development policies has rather fostered a **productivist model, contributing especially to increased stress on natural resources, such as water**.

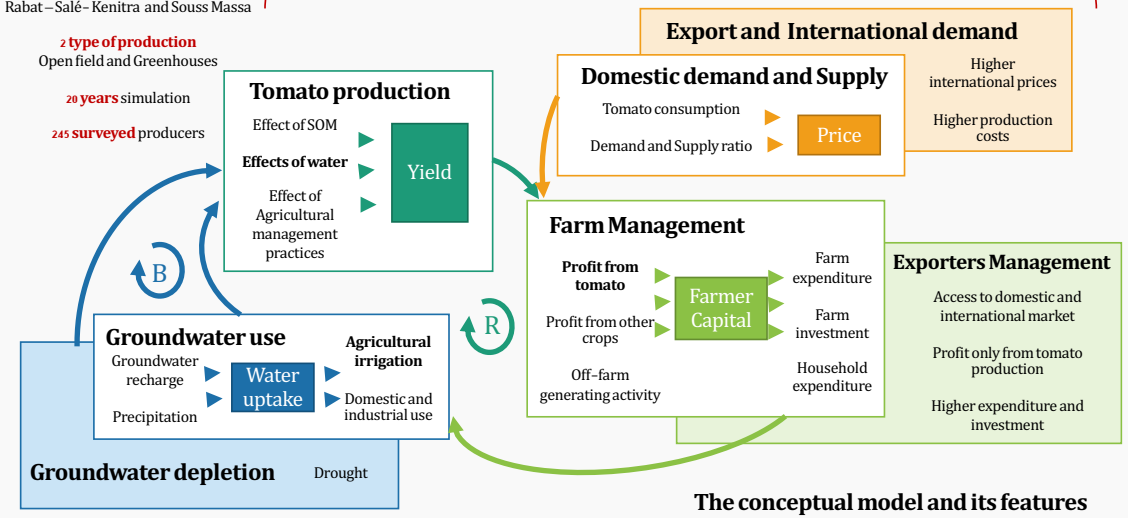
Extreme weather events such as drought have increasing impacts in the country, raising concerns on the ability of producers in both production systems to recover from those shocks, and build more resilience.

The model depicts the current situation in Morocco for tomato production, with:

1. **Smallholder farmers** that produce **vegetables all along the year and tomato** exclusively for the domestic supply, and
2. **Exporters** that produce **exclusively tomato** under greenhouses and for off-season international market.

Open Field smallholder farmers

Greenhouse exporters



The conceptual model and its features

Insights from the model

A more **resilient food system is one that is capable to limit the impact of a disturbance, and able to recover from it and increases its functionality**.

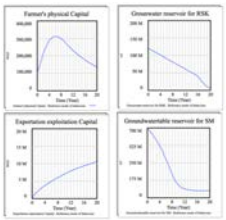
The model is characterized by 2 main loops :

Reinforcing feedback loop – Increasing production, increases the pressure on water availability for agricultural purposes

Balancing feedback loop – Increasing groundwater depletion affects agricultural production in the long-term and subsequently the farmer income.

The **reference mode of behavior is:**

1. **Groundwater depletion** over the last decades for both regions
2. **Smallholders capital decreasing** in the long-term while **exporters benefit from better market conditions**



In the Moroccan context, **long-term consequences of groundwater** depletion on yield, and subsequently farmers income, raise the **necessity to ensure a more sustainable agricultural approach in order to enhance the resilience on tomato growers in face of repetitive droughts**.

How can you help

DISCUSS	On any question and comments on the model , Food system Resilience, Vegetable production, Morocco, etc.
INFORM	If you have ever modeled natural resources depletion , agricultural production, Farmers decision-making in face of a change
SHARE	If you have pieces of models that you are eager to share in order to improve or complement the current model , send a mail to: kenza.benabderrazik@usys.ethz.ch

1) Sustainable Agroecosystem Group • Agricultural Institute • ETH Zürich • Tannenstrasse 1, TAN F 1, 8092, Zürich, Switzerland
2) System Dynamics Group • Department of Geography • University of Bergen • Postbox 7800, 5020 Bergen, Norway
3) Laboratoire de Biodiversité, Ecologie et Génome • Centre de Biotechnologie Vegetale et Microbienne, Biodiversité et Environnement • Université Mohamed V • Rabat , Morocco

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