

---

# Unpacking climate-food security trade-offs in commodity crop value chains in Sub-Saharan Africa

Alexandros Gasparatos

Professor



東京大学未来ビジョン研究センター

Institute for Future Initiatives, The University of Tokyo

# Background: Intersections between climate change and food security

---

Climate change is a major **direct driver** of ecosystem change (IPBES, 2019)

This change often has negative effects on food security through multiple context-specific mechanisms and pathways, e.g....

- Loss of productivity due to shifts in agro-ecological zones
- Loss of harvest due to extreme weather events

## **BUT....**

Climate change is also an **indirect driver** of ecosystem change

Climate change can incentivise the development of land-based mitigation and adaptation strategies, e.g....

- Nature-based mitigation and adaptation solutions
- Renewable energy (e.g. bioenergy)

Such strategies can create multi-dimensional trade-offs between climate change and food security

# Background: biofuels in Sub-Saharan Africa

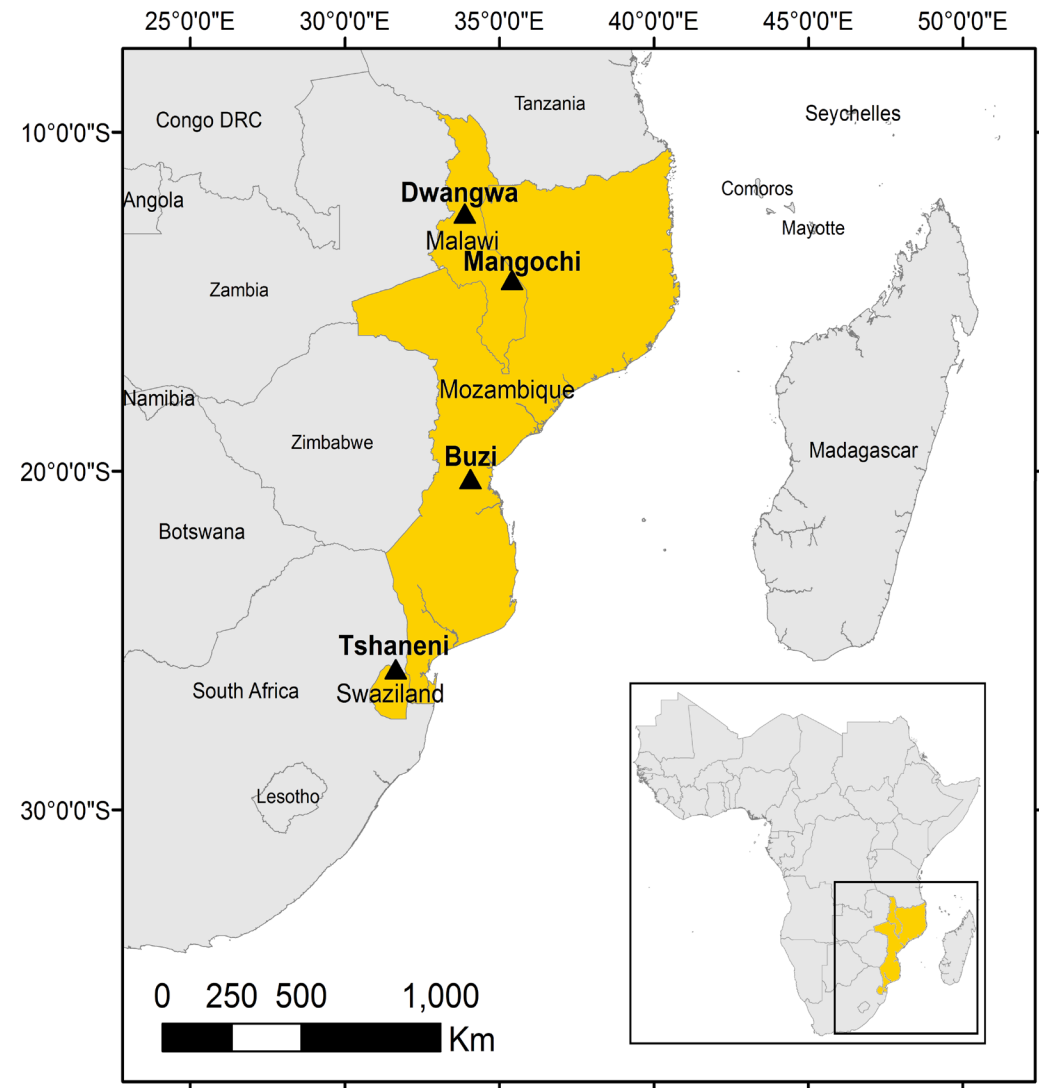
**Biofuels** are a type of liquid fuel derived from biomass through different chemical processes.

**Transport:** biofuel can be added or completely substitute conventional transport fuel (e.g. E15)

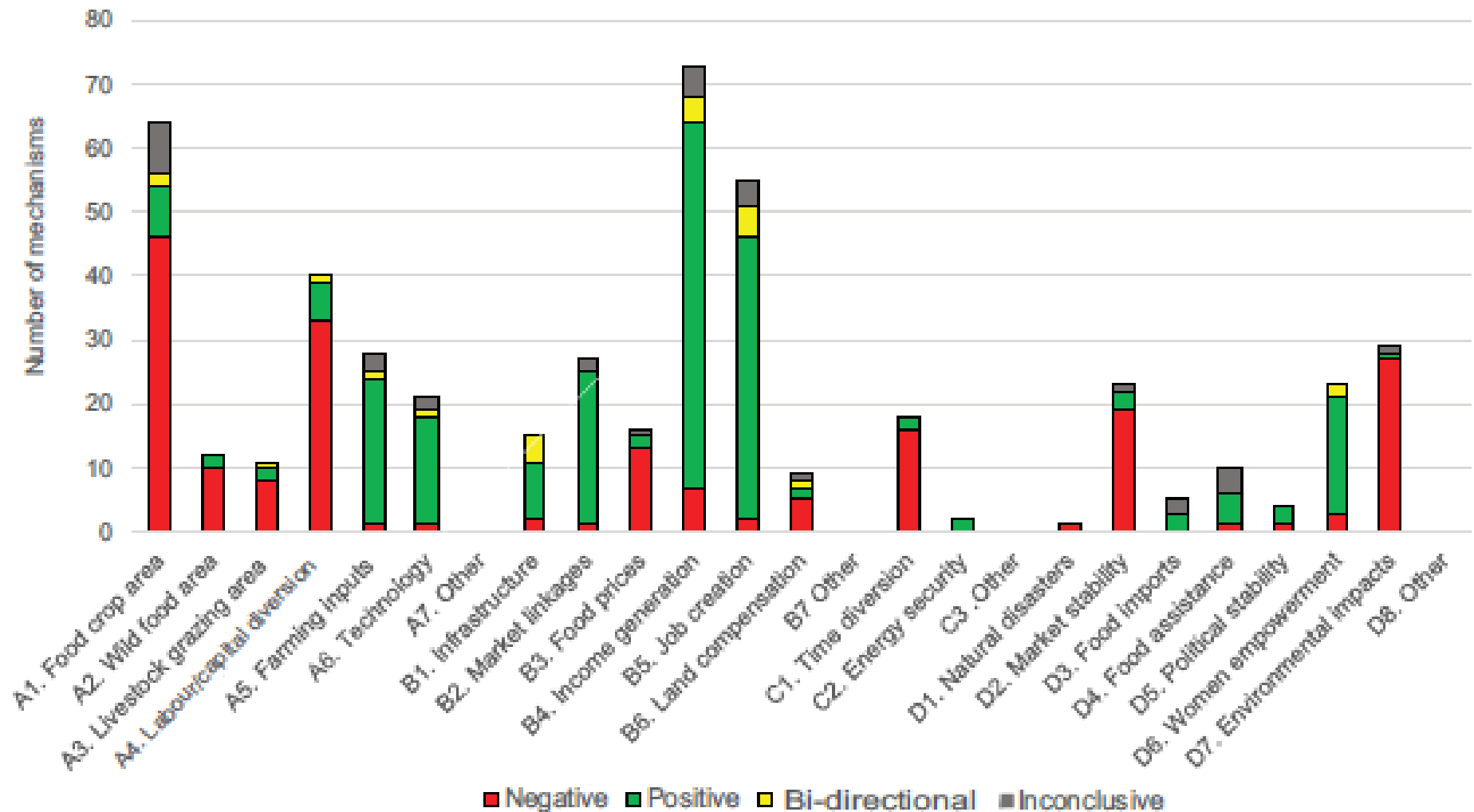
Promoted heavily in many parts of Sub-Saharan Africa in 2005-2015 for **domestic use and exports**.

## Examples

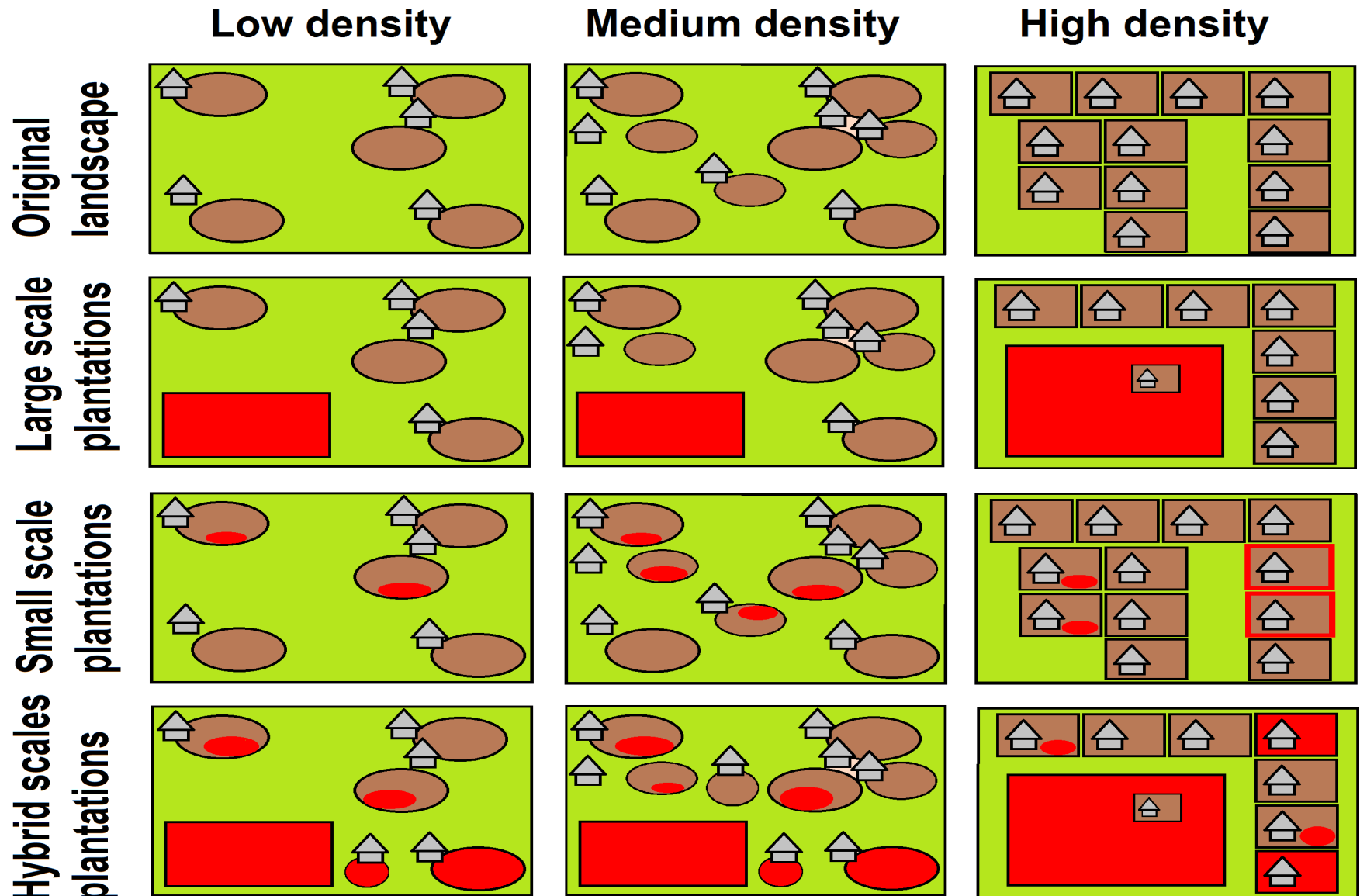
- Sugarcane ethanol
- Jatropha biodiesel



# Multiple impact pathways to food security



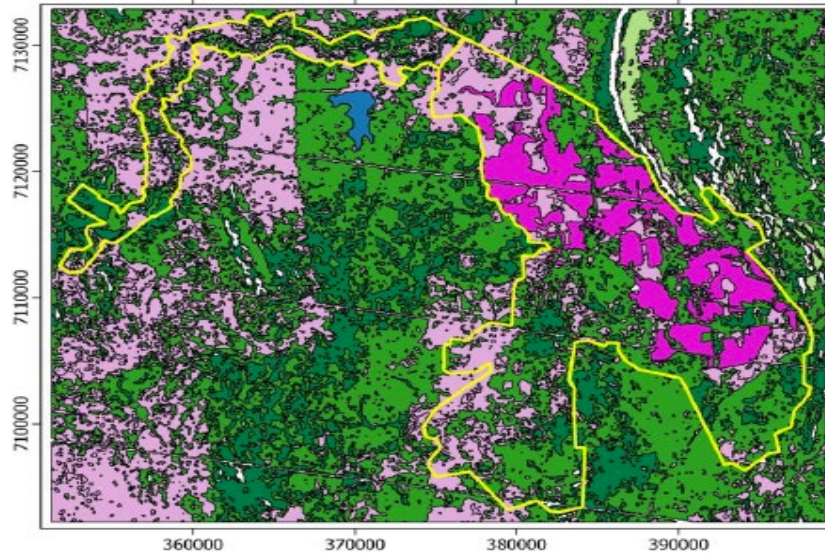
# Different production models



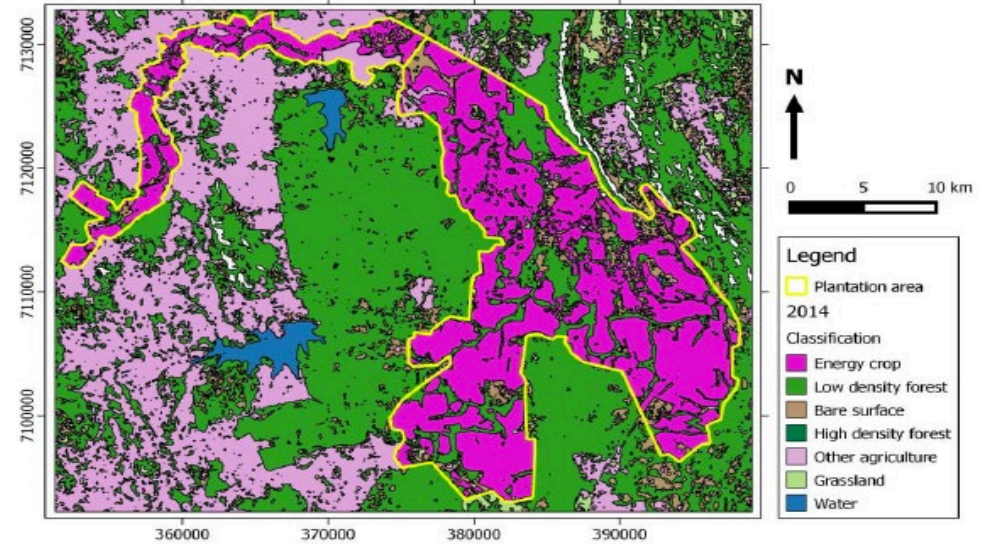


# Land use change

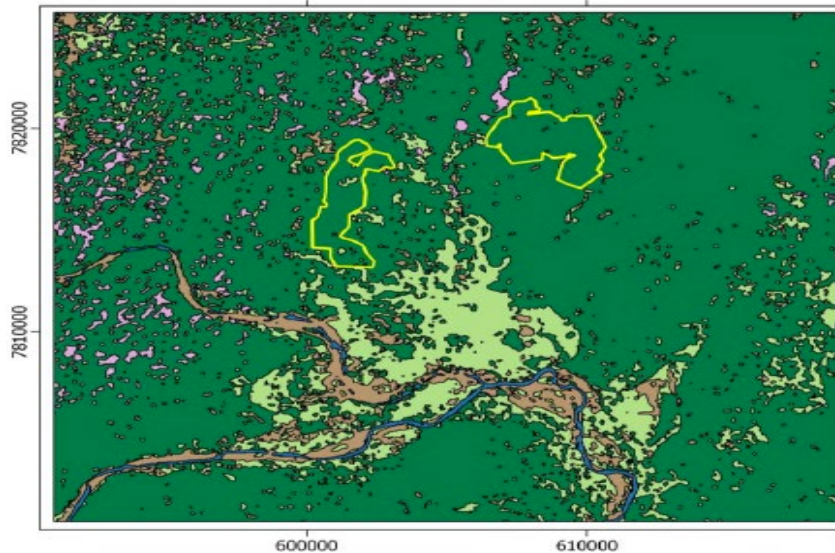
**SWADE + RSSC, Swaziland 1976**



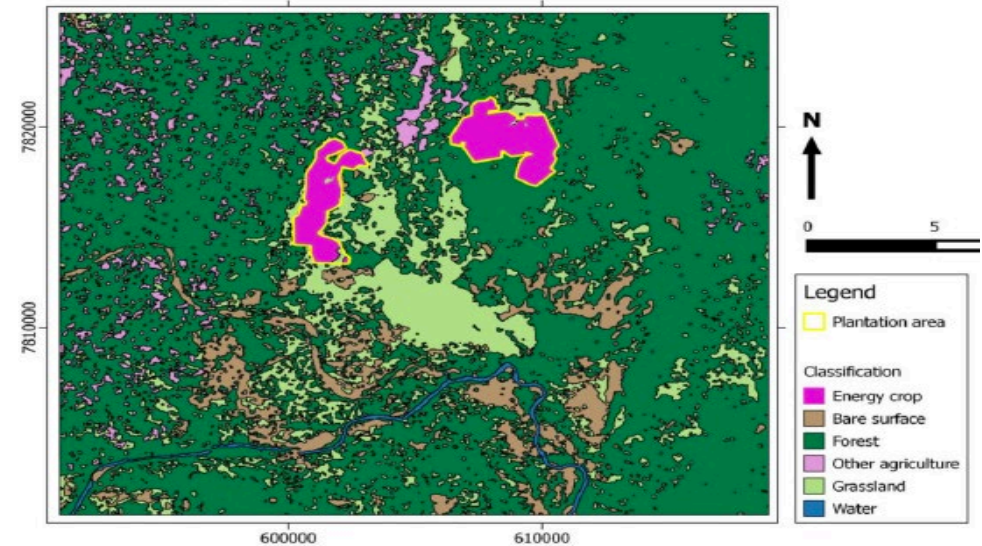
**SWADE + RSSC, Swaziland 2014**



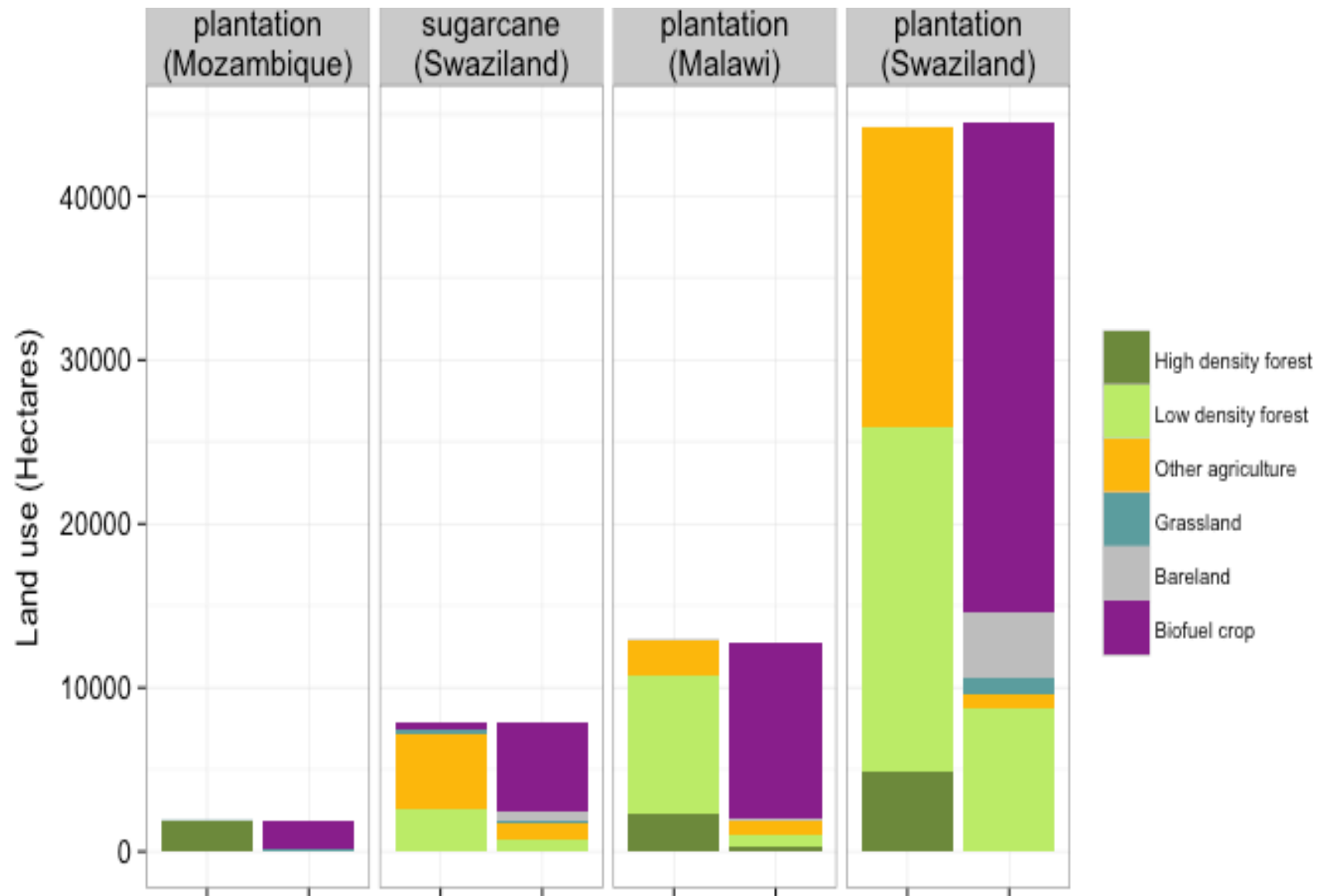
**Nigel, Sofala, Mozambique 2007**



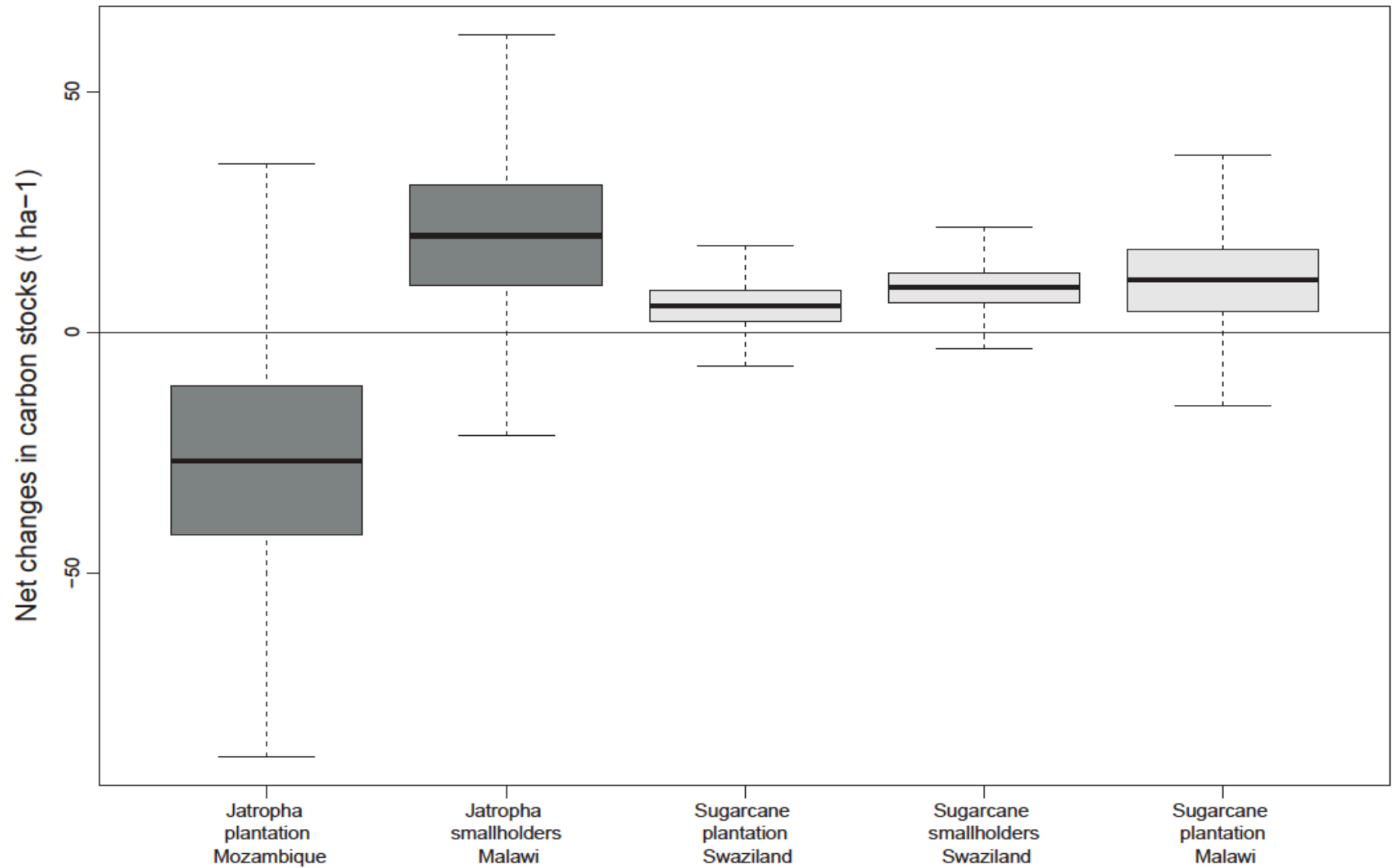
**Nigel, Sofala, Mozambique 2014**



# Land use change

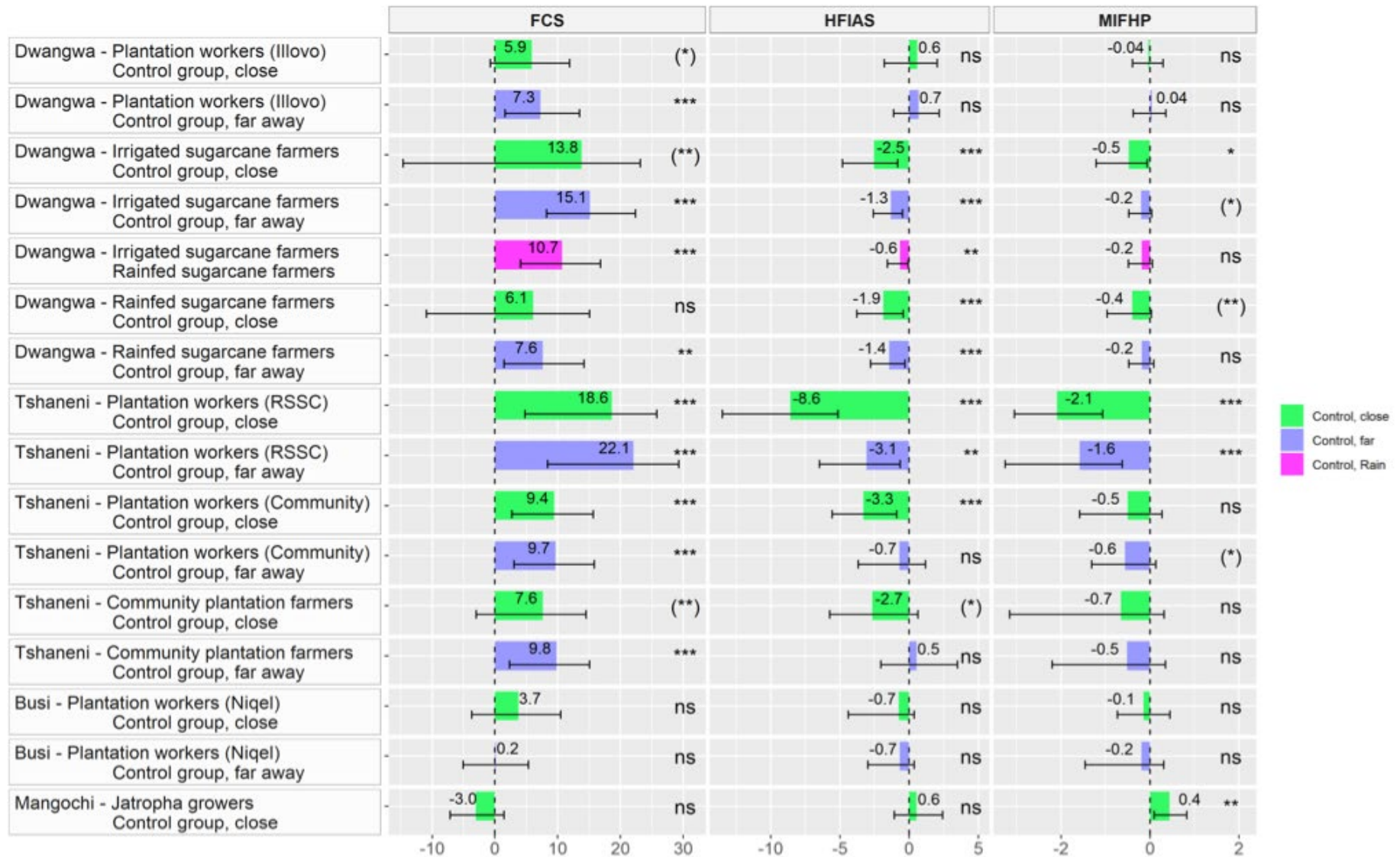


# Carbon storage

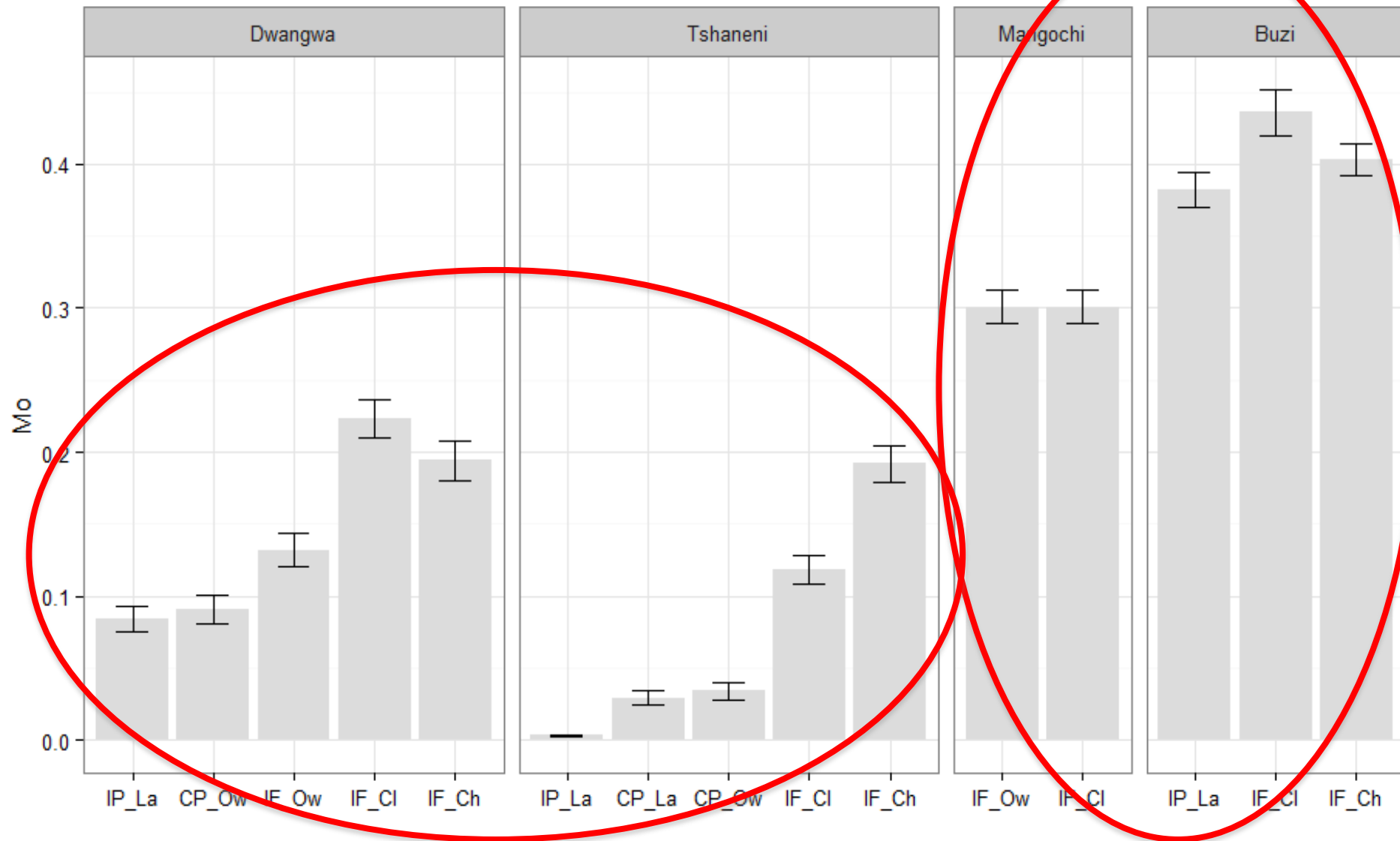




# Food security



# Multi-dimensional poverty



# Synthesis and discussion

---

**Trade-offs can be diverse and depend between locations, production models, and technologies**

**Most of these trade-offs are mediated by institutional factors**

Land governance

- Land access and tenure mechanisms
- Land consolidation and compensation processes

Payment structures

- Level of payments
- Periodicity of payments

Markets

- Incentive and regulation structure
- Market maturity and sustainability



---

Thanks for your attention

Any questions?

[gasparatos@ifi.u-tokyo.ac.jp](mailto:gasparatos@ifi.u-tokyo.ac.jp)

[www.gasparatos-lab.org](http://www.gasparatos-lab.org)