Assessing the role of Organic value chains in enhancing food system resilience

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1 Introduction

The ability of the **global food system** to meet the needs of a **growing population** is increasingly threatened by various factors, such as **unpredictable shocks** (e.g. drought), as well as **stressors** caused by global change (e.g. urbanisation). This project **assesses the resilience** of two model systems, **banana** in the **Dominican Republic** and **cocoa** in **Ghana**, to such shocks. The project seeks to understand how **Organic** and **conventional production systems** influence the **overall resilience** of the **food systems** they are part of.

2 Assessing resilience at the system level

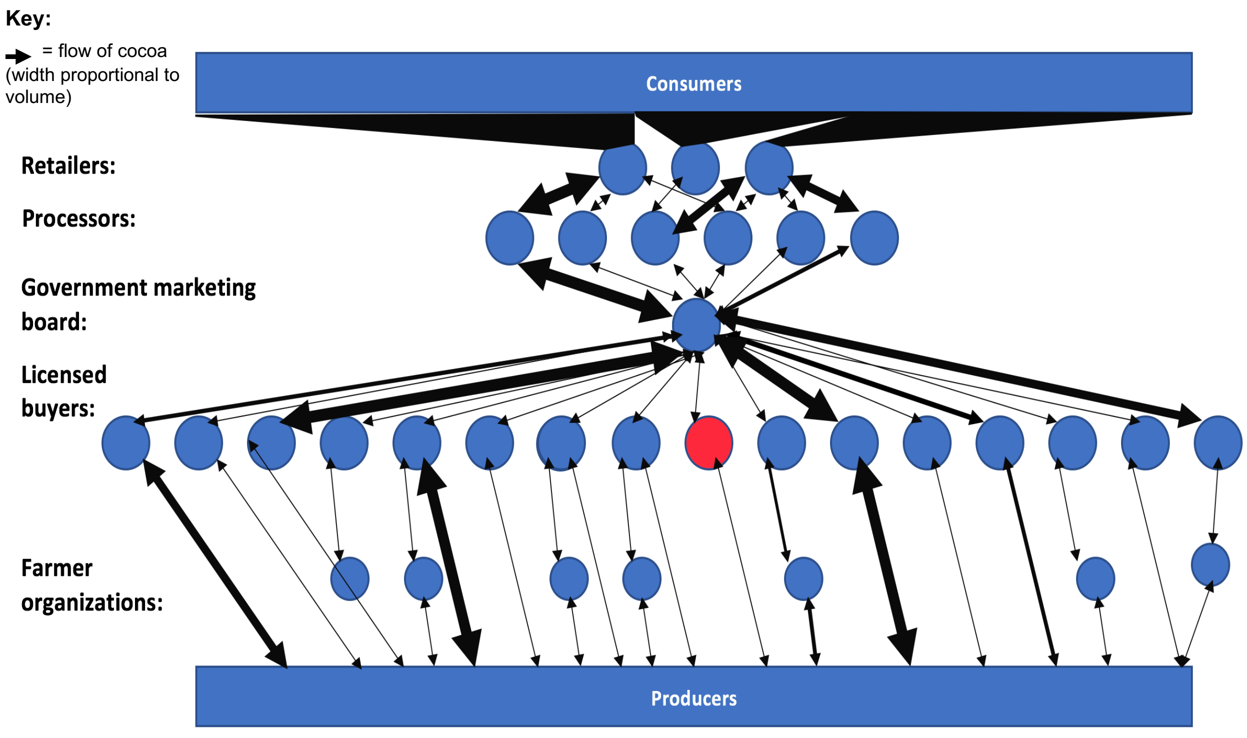

Fig. 1. A representative diagram of the flows of products in the Ghanaian cocoa value chain

The resilience of the **overall system** is understood by assessment **before, during** and **after** a shock (e.g. drought) by:

1) Quantifying the **state of the actors** (e.g. social, economic and natural capital)
2) Quantifying the **integrity of the network** (e.g. number of business relationships)
3) Quantifying the **function of the system** (i.e. to what extent are desired outcomes such as food security being delivered).

To assess network integrity and function the **flows between actors** must be measured. This diagram shows the flows of cocoa beans (and products) between actors in the Ghanaian cocoa value chain. In addition to those actors dealing in cocoa products, **secondary flows** (e.g. of capital and agricultural inputs) are also being measured.

3 Intergrating shocks to the value chain

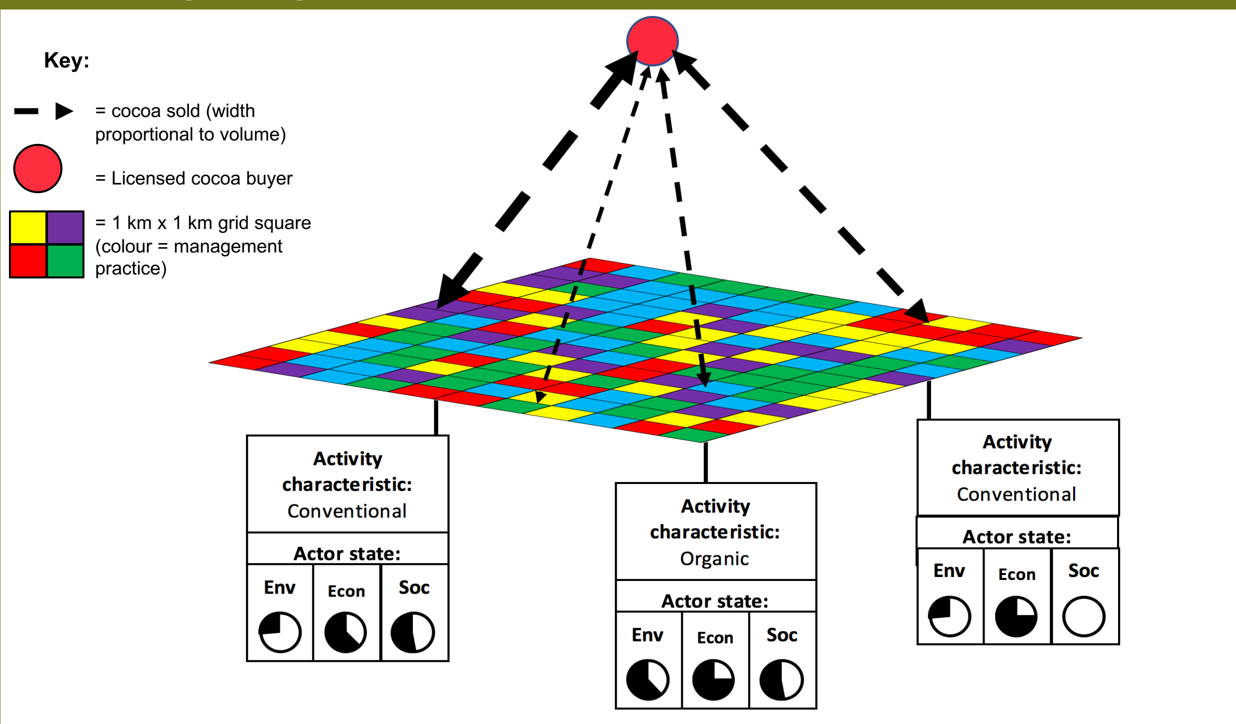

Fig. 2. A "producer footprint" showing different flows of cocoa to a buyer from different producers

To understand the impact of a shock on the overall system, the **magnitude** of the **shock** and the **"shock wave"** it sends through the system must be measured.

To quantify the shock (e.g. loss in volume due to drought) and "shock wave", all the **entry points** to the system are identified. In the case of a food system, the main entry point for shocks is the production activity.

The **producers are located spatially** and for each activity further along the supply chain (e.g. a processor) the specific producers that contribute the flow of food products are aggregated, so that **each actor has a producer footprint for shocks to be measured from.**

Fig. 2 shows the producer footprint for one buying company in the Ghanaian cocoa value chain, as well as the state of the producers and the flow of cocoa beans.

4 Coupling the shock and the system

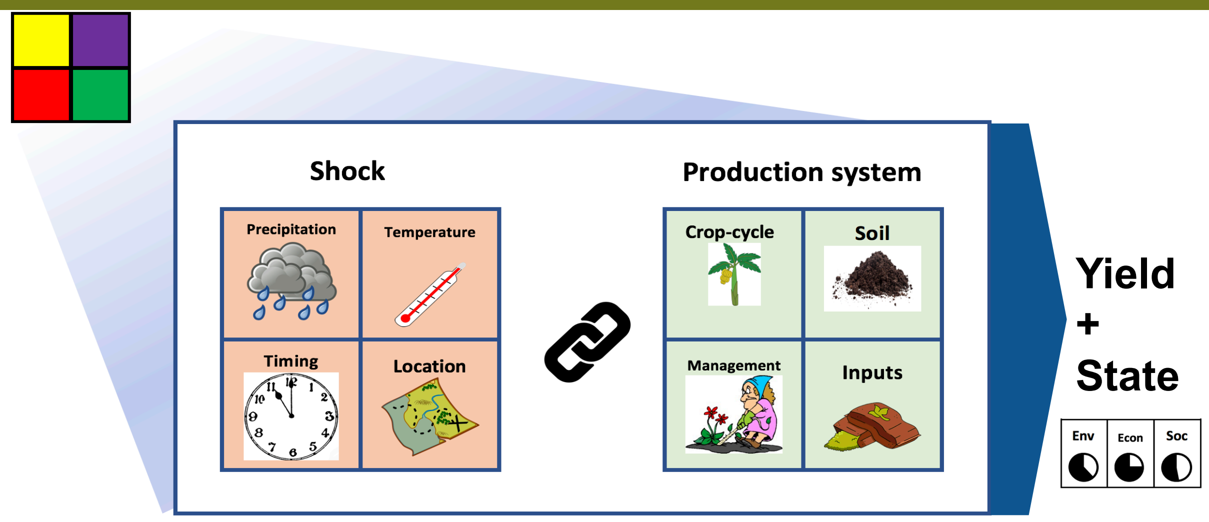

Fig. 3. Coupling shocks to agricultural production systems

To quantify the magnitude of the shock on an individual producer, in an actors "producer footprint", the shock is **characterised using remote sensed data** (e.g. precipitation) and then **coupled to the farmers production system**. This allows the assessment of the impact on farm output (e.g. banana yield), as well as the impact on the farmers "state". Process driven crop models are used for this stage (SUCROS-cocoa for cocoa, SIMBA for banana)

The different impact on actors at each level of the value chain can then be assessed, for both Organic and conventional systems, using this **quantified "shock wave".** The differences in resilience can then be elicited.

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