

Validation of stakeholder-selected upgrading strategies for natural resource management, food production and consumption

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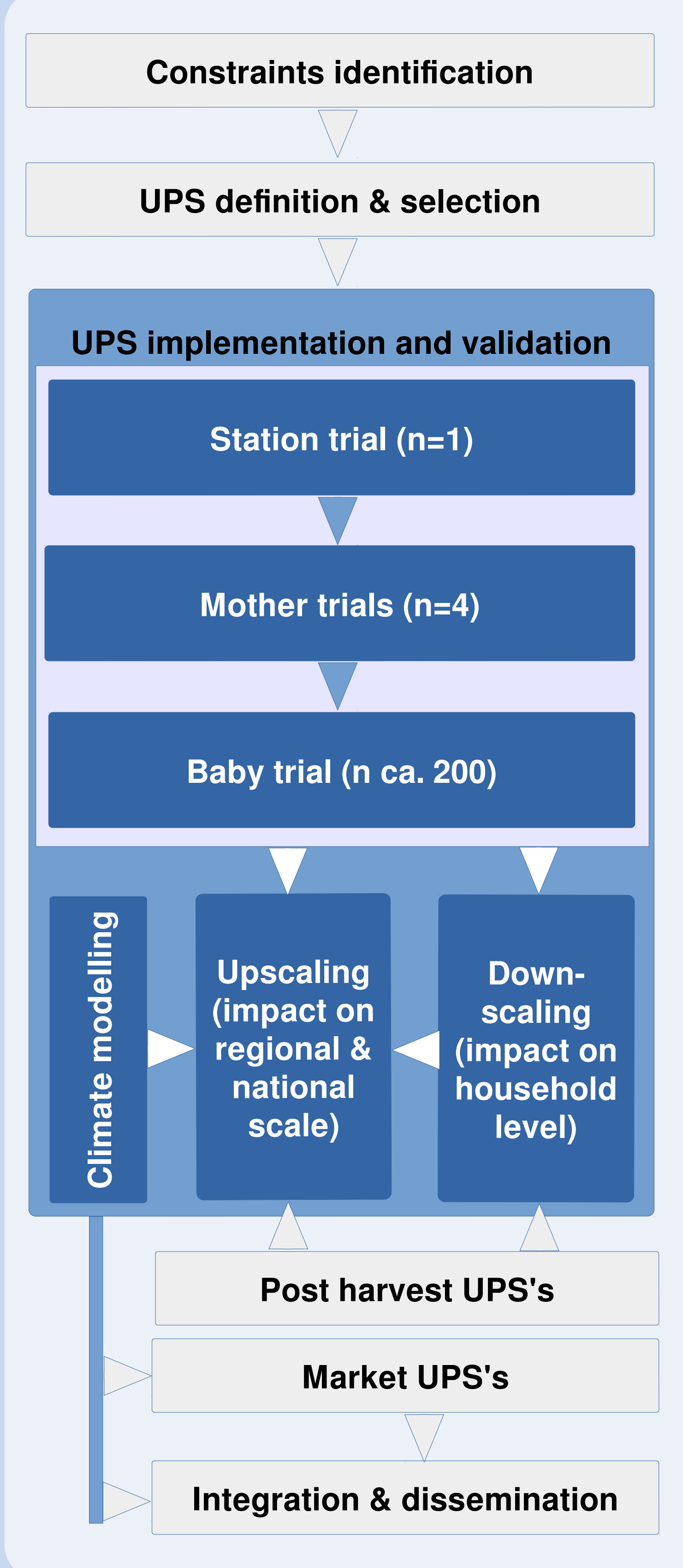
Introduction

Sustainable use of natural resources for agricultural production and efficient transformation of crops into valuable nutrient-rich food is an essential prerequisite for food security of Tanzania's continuously growing population.

The participatory food value chain analysis of the Trans-SEC project identified **sporadic and insufficient precipitation** and **poor soil fertility** as the major constraints to yields of staple and cash crops. Stakeholders made aware of a range of different technologies to address these limitations, selected **tied-ridging** as water management, **deep placement of fertilizer in small amounts**, and **soil moisture sensitive weeding** as their preferred strategies for upgrading (UPS) small-holder agricultural production systems.

The effects of the UPS's are studied under controlled conditions at Makutupora station and in case study site-based mother trials in the villages of Idifu and Ilo, Dodoma district and subhumid Ilakala and Changanawe, Kilosa district. UPS's in any combination preferred by the individual stakeholders are evaluated by themselves on their own farms in baby trials. The results of the baby trials serve to estimate the impact of the specific technologies and the UPS approach on food security household and regional level.

Methodology



The **on-station trial** aims at evaluating the effect of tied-ridging in combination with specific weeding strategies on the development and yield of sorghum, pearl millet, maize, sunflower, and upland rice. The influence of season and location on these measures is being assessed during the dry season through simulating precipitation patterns and tied-riding on the soil water balance via drip irrigation.

The **mother trials** in Dodoma evaluate the effect of tied-ridging and deep fertilizer placement on pearl millet and groundnut as mono crops, pearl millet and groundnut intercropped and sunflower in pure stand. In Kilosa the effect of the same two UPS's on maize in pure stand and intercropped with pigeon pea and sesame is investigated.

The **baby trials** are linked to the on-station trial through the mother trials. The farmers are guided by ARI³, latter receives support from SUA² and with scientific backstopping from UHOH¹.

Participatory terrain mapping and analysis of the basic soil properties of farmer field trials allow for a **spatial upscaling** of technology effects to the village level. Further upscaling is based on Web-GIS technology including a soil database, land evaluation procedures as well as basic modelling options. Seasonal forecast of productivity should thus be enabled.

On **household level** nutrition education workshops aim to improve food choice, preparation, storage and hygiene. A detailed nutrition analysis before and after UPS implementations provides information about the impact on food diversity, nutrient intake and related health effects (stunting in children under 5 years, haemoglobin content).



Station trial at Makutupora, Dodoma



Mother trial, Idolo village, Dodoma



Farmer baby plot in Kilosa

Expected results

- Determination of the potential of tied-ridging, deep placement of low fertiliser doses and soil water sensitive weeding to increase yields under different rainfall scenarios.
- Comparative evaluation of the stakeholder selected farming system upgrading strategies with conventional published approaches.
- Information of the quantitative and qualitative impact on the diet by stakeholder selected farming system upgrading strategies and nutrition knowledge transfer.
- Provision of a database on local and regional scale and an integrating Web-GIS solution to support planning and decision making.

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