

What works where and for whom?

Farm Household Strategies for Food Security across Uganda

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Objectives

1. Understand how on- and off-farm activities of Uganda's rural households contribute to their food availability.
2. Identify how food availability and its relationship with different activities vary across Uganda.

Methods

Data sources

Agricultural household survey data from the World Bank LSMS-ISA with 1927 households across Uganda (Figure 1)

Data analysis

1. Household food availability

We used a production and cash balance based food availability (FA) indicator (Figure 2):

$$FA = \frac{\text{produce consumed} \& \text{ food purchased}}{\text{household energy need}}$$

2. Regression analysis

Regression models (linear & zero-inflated beta distribution) explain variability of food availability and contributing activities using environmental factors as explanatory variables

3. Spatial interpolation

Kriging of regression residuals identified spatial patterns

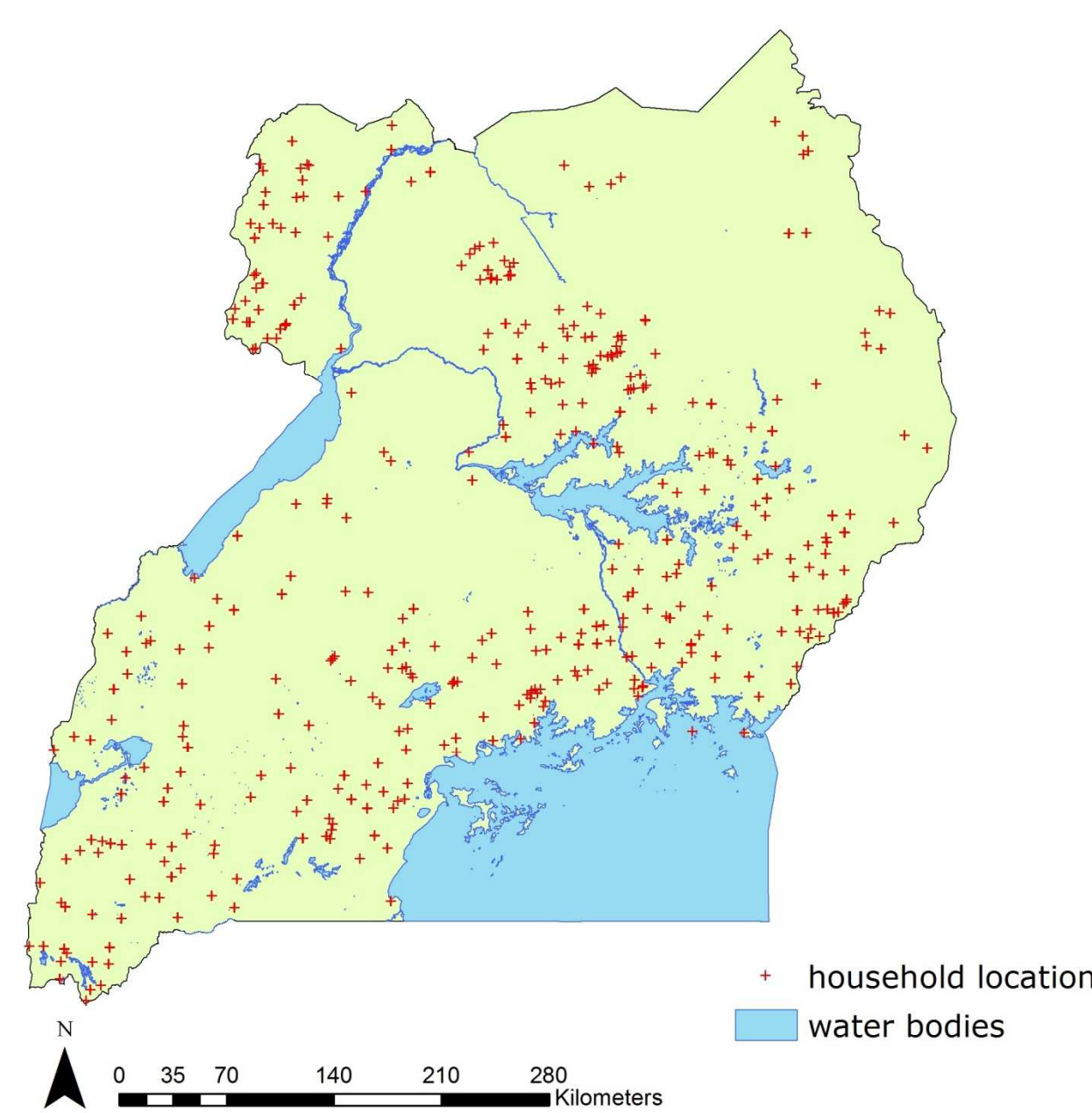


Figure 1: Locations of the households in Uganda

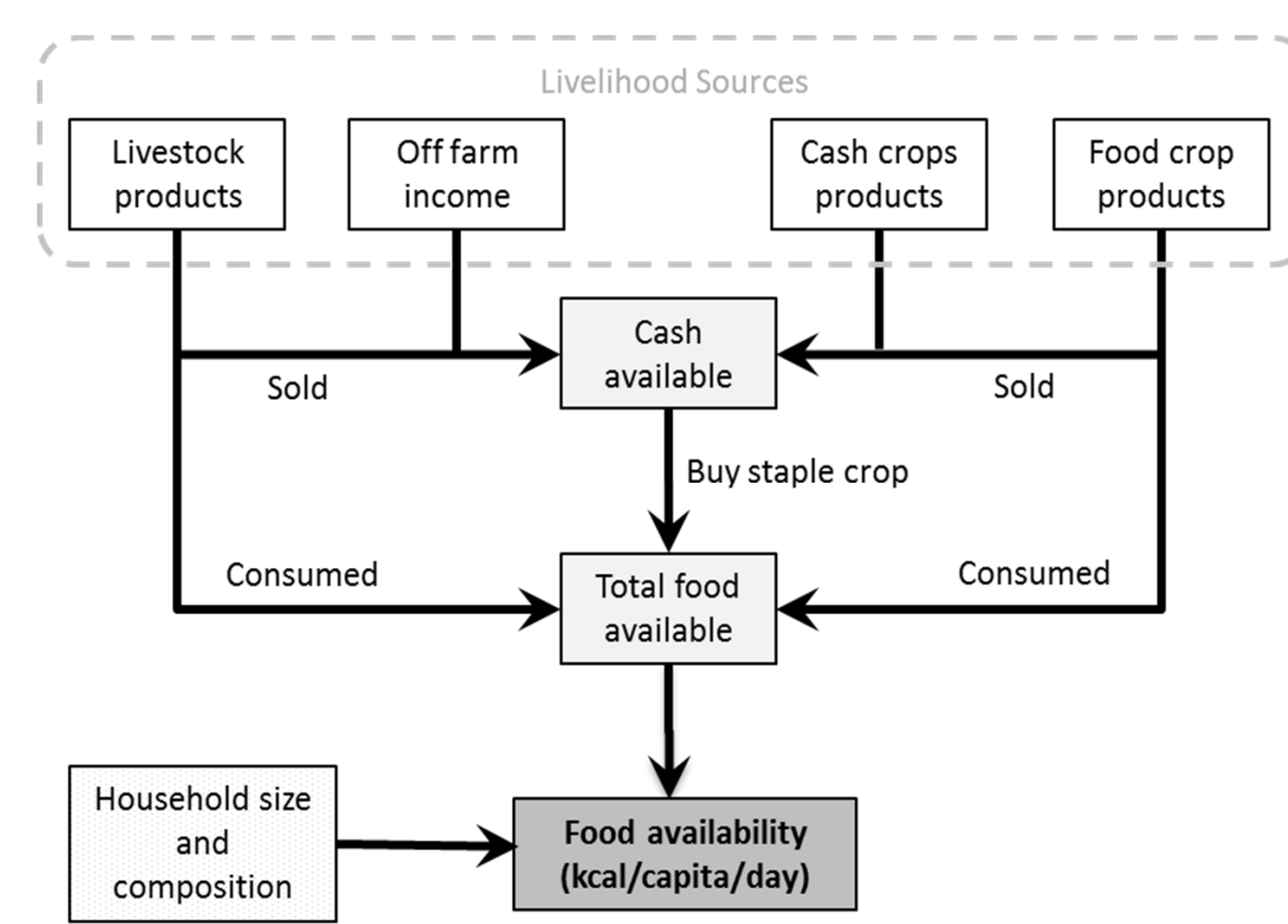


Figure 2: Components of the food availability indicator

Results (Objective 1)

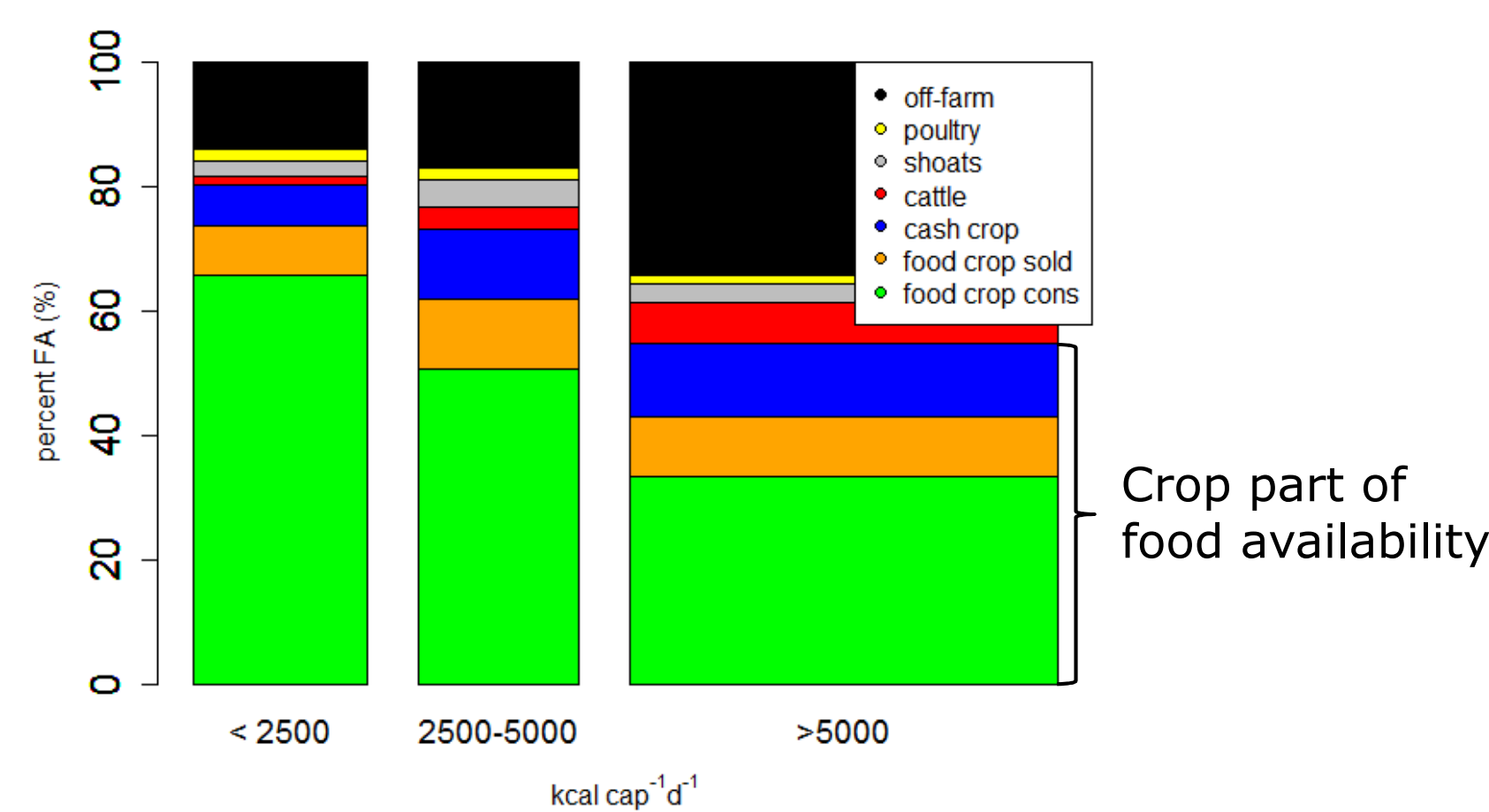


Figure 3a: Relative contribution of household activities to food availability per FA Class

Class 1: not enough food available < 2500 kcal cap⁻¹ d⁻¹; Class 2: roughly enough food available between 2500 and 5000 kcal cap⁻¹ d⁻¹; Class 3: more than enough food available >5000 kcal cap⁻¹ d⁻¹; Thickness of bars represents relative size of households in FA class

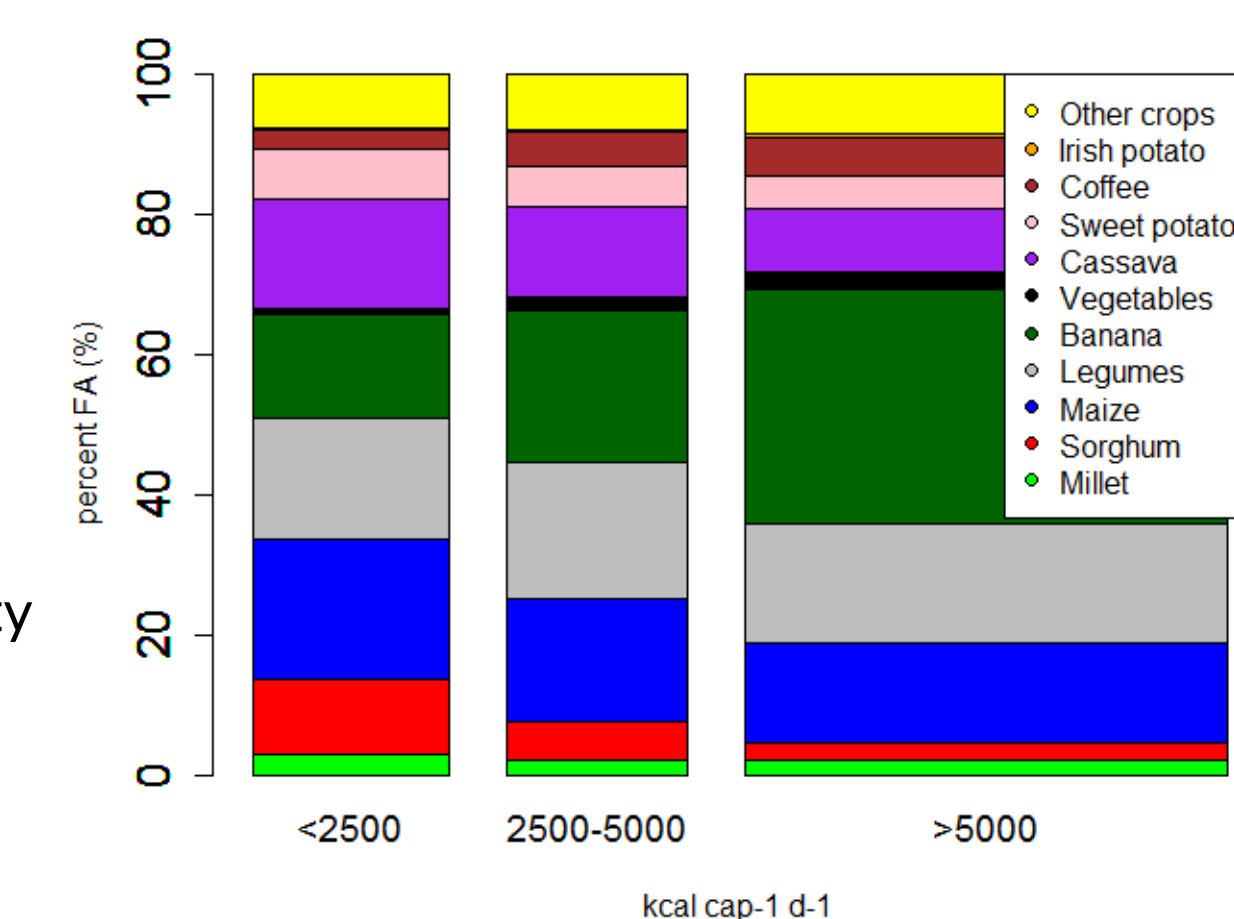


Figure 3b: Relative contribution of crops to the crop part of food availability per FA Class

Results (Objective 2)

Table 1: Performance table of the regression (explained variables Figure 4-7)

Explained variable Y	Explaining variables*	Squared correlation fitted & observed Y	ΔAIC** (AIC _{final} - AIC _{ini})
1 Food availability	LGP, T _{max} of warmest month, P _{seasonality}	0.076	~***
2 Off-farm income contribution	PopDen, C _{mean} , Distrib _{chicken} , Distrib _{pigs} , P _{seasonality}	0.028	77
3 Banana contribution	T _{max,a} , P _{annual}	0.36	979
4 Maize contribution	T _{min} , coldest month, LGP, P _{warmest quarter} , P _{driest quarter}	0.037	146

LGP = length of growing period, T = temperature, P = precipitation, C_{mean} = mean carbon stock, PopDen = population density, Distrib_{chicken} = distribution of chicken, Distrib_{pigs} = distribution of pigs

*1) forward selection; 2-4) forward & backward selection

**AIC: Akaike information criterion. AIC_{final}: indication for relative quality of the final model compared to initial model (model without explaining variables, AIC_{ini}).

***optimized by R-Squared

- Temperature and precipitation explain part of the variability of banana contribution to food availability (Table 1)

- Food availability and off-farm income contribution (Figure 4 & 5): Spatial patterns but a high uncertainty (*data not shown*)
- Banana and maize contribution (Figure 6 & 7): Strong spatial patterns and a lower uncertainty (*data not shown*)

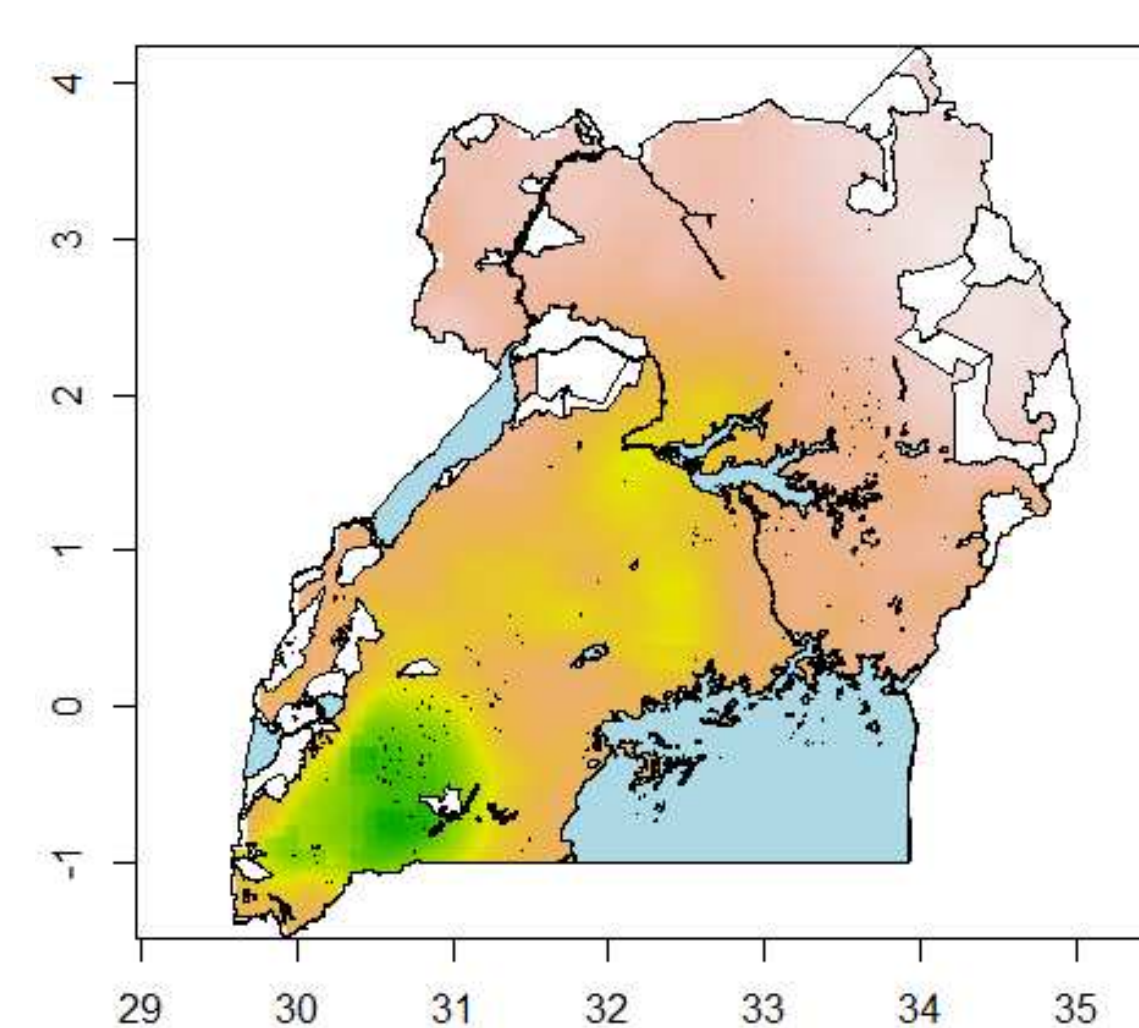


Figure 4: Interpolation of household food availability (kcal cap⁻¹ d⁻¹)

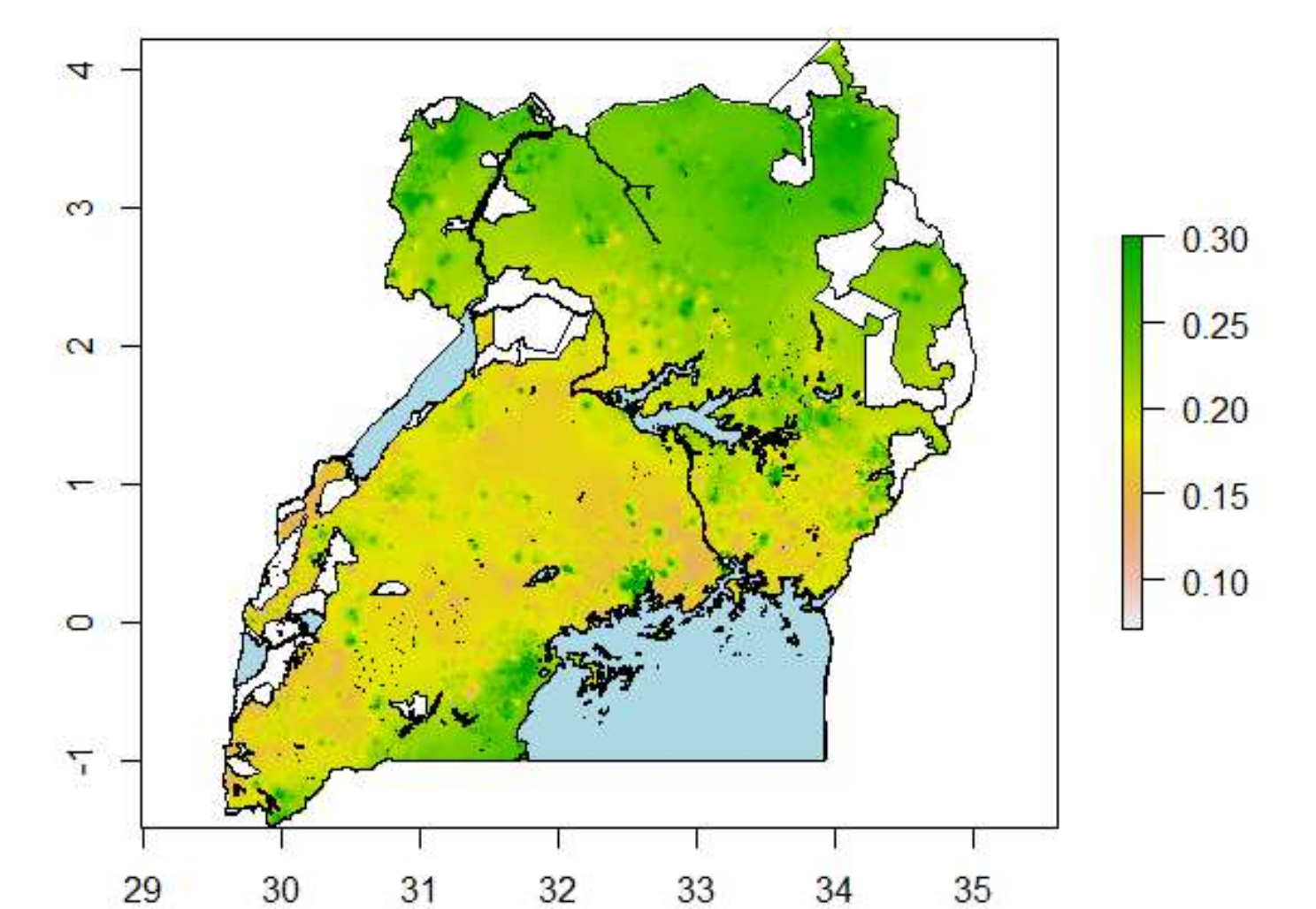


Figure 5: Interpolation of relative contribution of off-farm income to food availability (upper threshold = 0.3)

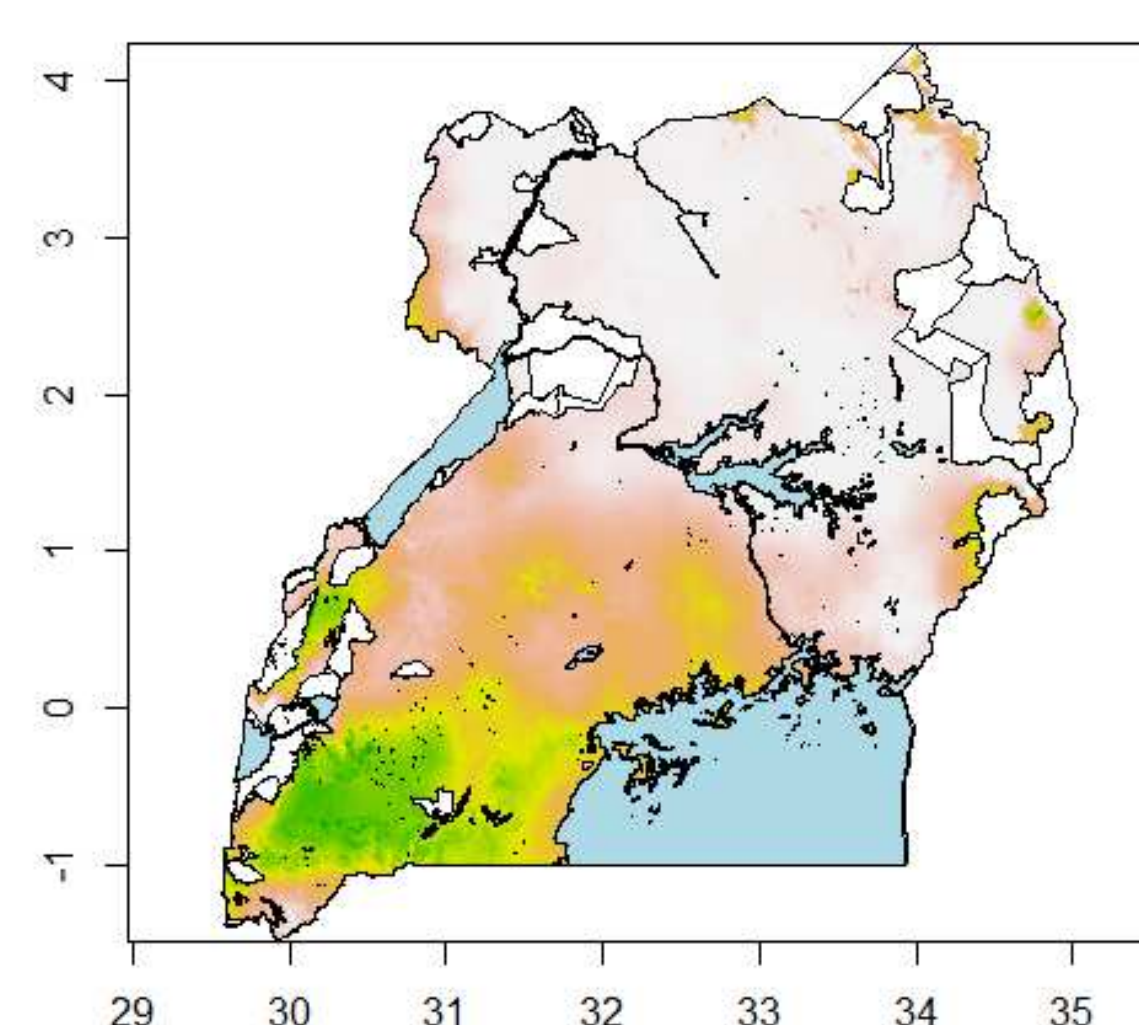


Figure 6: Interpolation of relative banana contribution to the crop part of food availability

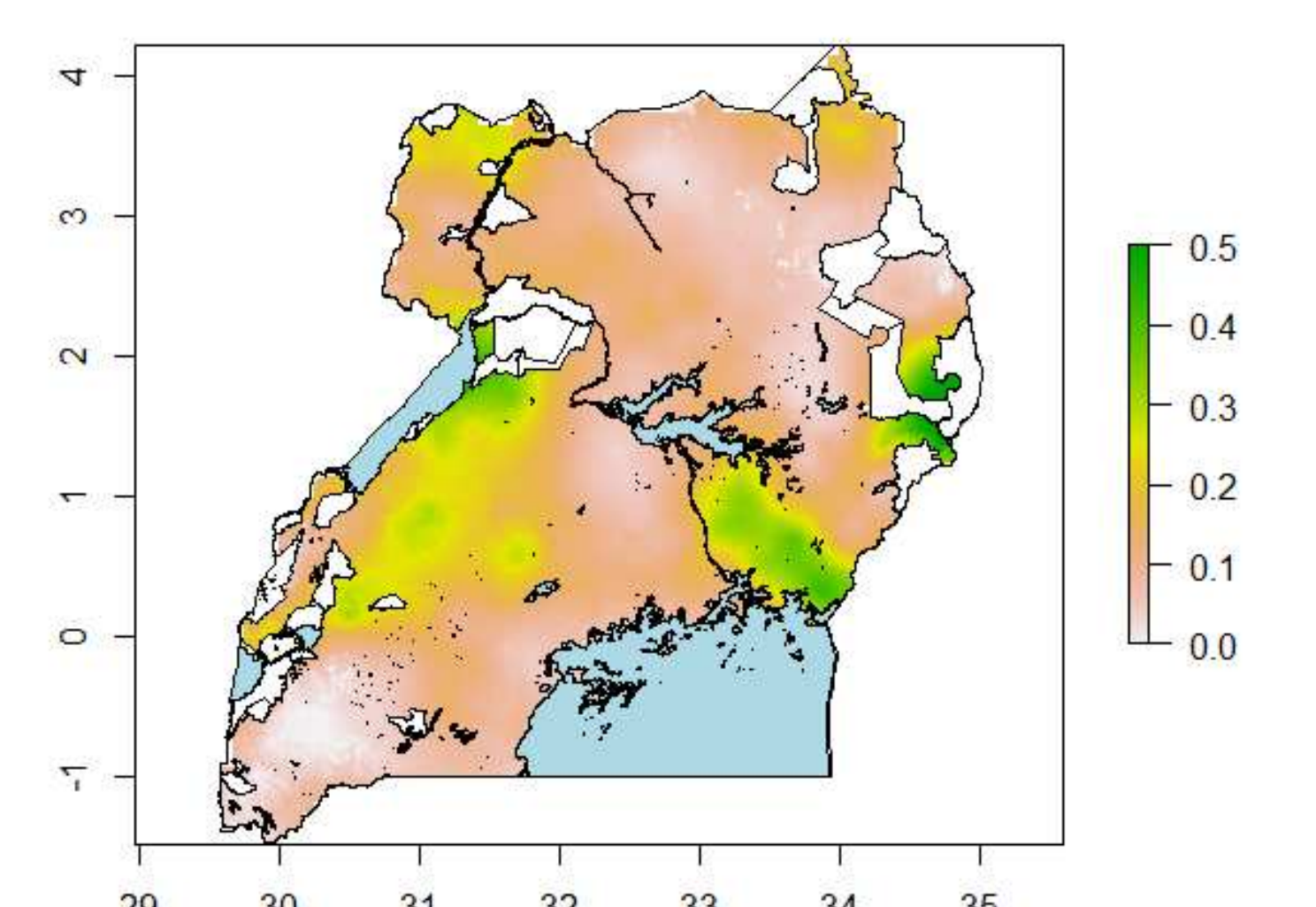


Figure 7: Interpolation of relative maize contribution to the crop part of food availability (upper threshold = 0.5)

Conclusions

- Contributing off-farm activities increase in importance with increasing food availability, while contributing crop consumption decreases (Fig. 3)
- Food crops (banana and maize) show larger scale patterns, while short-distance variability of food availability and of off-farm income contribution is large introducing uncertainty in the maps (Fig. 4-7)
- **Next step:** Use spatial information to determine the effects of agricultural interventions on food security across Uganda