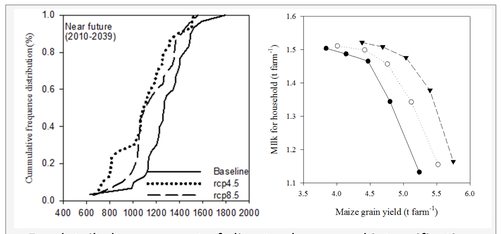
Farming systems analysis and modelling in the Livestock Systems and Environment group of ILRI

Mark van Wijk, Sabine Douxchamps, Randall Ritzema and Romain Frelat

We deal with questions like:

- Can we identify robust interventions that cut across systems and socio-economic scenarios?
- Can we upscale strategies to quantify investment needs in interventions?

We follow a circular approach in which participatory evaluation of our methods and indicators by local experts and farmers is key (see the central diagram for a few examples). Current analyses focus on the quantification of (components of) food security across a wide range of systems in the developing world



For detailed assessment of climate change and intensification options more detailed analyses at farm household level are performed. Here examples of a maize yield risk analysis (in kg/ha; left) and a trade off analysis in the use of crop residues (5 allocation strategies at 3 levels of manure use efficiency for a system in central Zimbabwe.

(Rurinda, 2014; Rusinamhodze, 2013; PhD theses, jointly with Wageningen University)

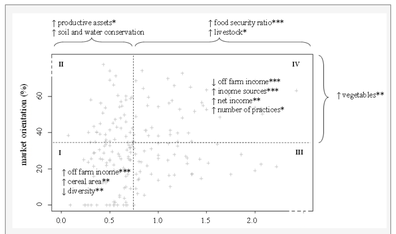
Participatory evaluation of indicators and calculations

Adapt indicator list and analyses methods

Calculate **diversity of indicator levels** within farm populations

Quantify **outreach potential** of interventions based on back-of-the-envelope calculations

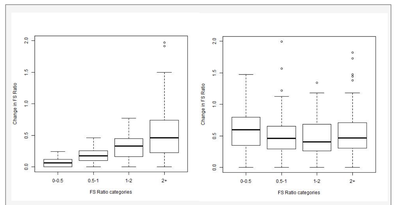
Zooming in: perform detailed site specific evaluation of interventions with models



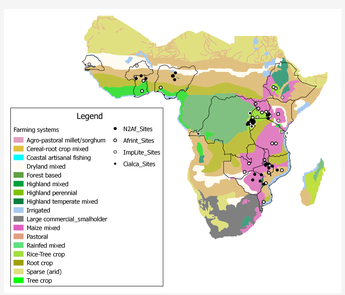
In a wide range of systems livelihood typologies have been developed and key indicators for these types have been quantified. Above an example from West Africa, with market orientation and food security as key indicators for the 4 types. These four types are then related to adoption rates of climate smart practices.

We have developed an extensive toolkit:

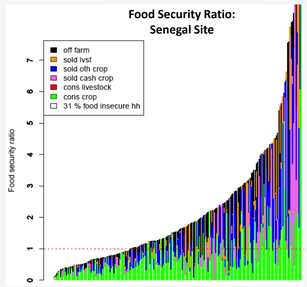
- Comprehensive and mini surveys to collect panel data
- A range of household models
- A data base of household panel data (SSA, CA and SEA
- Standardized tools for food security analyses



We assess the potential of different interventions to make a difference in the livelihoods of smallholder farmers. Here an example of the limited effects of even a 50% yield increase on the livelihoods of the poorest farmers (left; FS (food security) ratio group between 0 and 0.5), showing that for them transformational change is needed (right, a scenario with an opportunity for a yearly $200 off farm income)



In collaboration with partners at Wageningen U., Lund U., CSIRO, IITA, ICRAF, CIMMYT and others we have built a database of more than 25k farm household level panel data (the sites analysed (12k) are shown here)



We have developed tools to quickly assess simple food security (FS) indicators, and to quantify the contribution of different on and off farm activities to FS. Here an example of analysis results we have now for more than 12k households across SSA

Some key recent references

S. Douxchamps et al. Linking agricultural adaptation strategies and food security: evidence from West Africa. Global Environmental Change, submitted

R.S. Ritzema 2014. Aqueous Productivity: An enhanced productivity indicator for water. Journal of Hydrology, 517(0): 628-642.

M.T. van Wijk. From global economic modelling to household level analyses of food security and sustainability: how big is the gap and can we bridge it? Food Policy, in press.

M.T. van Wijk, et al.. 2014. Farm household modelling and its role in designing climate-resilient agricultural systems. Global Food Security 3, 77-84.

Klapwijk L, M.T. van Wijk, et al. 2014. Trade-off Analysis in (Tropical) Agricultural Systems. Current Opinion in Environmental Sustainability 6, 110 – 115.

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