Session: Climate Services in Agriculture

Climate information to support climate risk management in agriculture at different spatial scales
Climate services involve different processes

- Providing useful information to support decision-making on climate adaptation
Climate services are needed at different scales

- **Long term**
  - New IKI project SCARF on agroforestry (CIFOR-ICRAF & SAT)
  - Seasonal yield forecasting (PIK)

- **Short term**
  - Implementation of best practices in agriculture (TARI)

- **Present**
  - Building climate capacity in the East African Community (EAC)
Agenda session

- **Mr. Elirehema Swai**, Tanzania Agricultural Research Institute Makutupora (TARI)
  *Climate information to support the implementation of best practices in agriculture at the local level in Tanzania*

- **Ms. Rahel Laudien**, Potsdam Institute for Climate Impact Research (PIK)
  *Seasonal yield forecasting to anticipate risks in agriculture*

- **Mr. Valerian Kidole**, East African Community (EAC)
  *Building climate capacities and supporting the harmonization of data in agriculture in the East African Community*

- **Mr. Emmanuel Temu**, World Agroforestry (CIFOR-ICRAF) & **Yohana Haule**, Sustainable Agriculture Tanzania (SAT)
  *Presentation of new IKI project “Scaling agroforestry for holistic climate resilience-building in rural Tanzania” (SCARF)*
Seasonal yield forecasting to anticipate risks in agriculture

Rahel Laudien (Potsdam Institute for Climate Impact Research (PIK))
Why forecasting yields?

› Yield forecasts can help to take actions before the food crises occurred.

› Yield forecasts can be used to:
  › adjust food imports and exports
  › organise food aid

→ Yield forecasts can improve food security.
What is a yield forecast?
Methodology
Novel approach: Rigorous and transparent validation based on a two-stage validation to gain certainty in the skill of the forecast.
Results
Main findings

- High forecasting performance even with only 10 years of observed yield data used in training
- First nested out-of-sample validation applied for crop yield models
- Best predictor: cdd5 → high influence of extreme weather conditions on maize yields
Main findings

- Independent forecast for year 2019 reveals high performance for unimodal regions
- North and coastal regions might be impacted by the outbreak of the fall armyworm

<table>
<thead>
<tr>
<th></th>
<th>unimodal (n = 11)</th>
<th>bimodal (n = 10)</th>
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<tbody>
<tr>
<td>Level 2 –</td>
<td>NSE = 0.89</td>
<td>NSE = -7.73</td>
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<tr>
<td>LOOCV</td>
<td>R² = 0.90</td>
<td>R² = 0.03</td>
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<tr>
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<td>RMSE = 0.21</td>
<td>RMSE = 0.92</td>
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Rahel Laudien, Potsdam Institute for Climate Impact Research (PIK)
Distribution of results & follow up
Publication in Nature Scientific Reports

Authors:
- Rahel Laudien
- Bernhard Schauburger
- David Makowski
- Christoph Gornott

Title: Robustly forecasting maize yields in Tanzania based on climatic predictors

Accepted: October 2020

Journal: Nature Scientific Reports
News article in SciDevNet

**Title:** Tool forecasts maize yields six weeks before the harvest

**Date:** 03 Dec 2020

**Source:**
Forecast shared with MoA for 2020
MoU signed between TARI and PIK

Areas for cooperation:
• Promote research exchange and joint research
• Exchange of information and materials
• Organize study visits
• Conduct joint seminars and conferences and training programmes
• Preparation of joint scientific publications

Date: 06 June 2020
Conclusion

› robust maize yield forecast in Tanzania with a lead time of 6 weeks is possible with high accuracy

› study is potentially useful for operational forecasts because of:
  › low input requirements
  › high spatial coverage
  › strict and transparent validation

› forecast should be integrated with local expert knowledge

› forecasts can contribute to increasing food security
Thank you!
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Photos taken by Rahel Laudien in Tanzania