MAY 29-31

AIM for Scale Weather Partnership Convening



WEATHER PACKAGE

Keynote remarks with Professor Michael Kremer

AIM for Scale Weather Convening

Nairobi 30 May 2025





Innovation Commission: Climate Change Food Security Agriculture



Scaling weather forecasts

- 1. Farmers respond to weather forecasts.
- 2. Digital agriculture approaches have high benefit cost ratios when delivered at scale.
- 3. National governments, multilateral development banks can play key roles
- Governments often design systems that are hard for farmers to use, but respond well to support on human-centered design and A/B testing.
- 5. Potential for transformative improvement with AI.
 - a. Content
 - b. Communications

Weather forecasts can have high benefit cost ratios when delivered at scale

- RCTs from a range of settings estimate large benefit cost ratios at scale.
- Estimated value of gains from weather forecasting vary depending on weather realizations but some find gains of \$100+ per farmer per year.
 - Benin: Disseminating forecasts with an in-person training generated benefits of between \$100 and \$350 per farmer per year (Yegberney et al. 2023)
 - Colombia: Disseminating weather forecasts and price information by SMS found labor savings of \$100-\$280 per farmer per year (Camacho and Conover 2019).
- Digital advisory services in Odisha increased profits by \$30 \$47 per farmer in areas affected by excess rainfall (\$4.5 \$13 on average across all farmers).¹

National governments, Multilateral Development Banks can play a key role: the case of weather forecasts

- Agricultural advisory, weather forecasts are classic public goods
- Proof of concept for scaling in India
 - Provided technical assistance (weather forecast, assistance developing and piloting messages) to help Ministry send messages to 9 million farmers in 2024.
 - This year upgrading to AI forecasts based on benchmarking of open-acces AI models, targeting 40m farmers.
- Working with Asian Development Bank
 - Announced plans to invest \$300 million in weather forecasts for farmers 2025-2027.
 - Cooperating with ADB under MoU to prepare concept notes for loans in India, Bangladesh, Lao PDR including weather forecasting and agromet advisory.
 - Actively planning next round to include more more countries, including Pakistan and Indonesia.
- Working with Inter-American Development Bank
 - Announced plans to integrate weather into \$280 million digital agriculture portfolio.
 - Planning to work together on Bolivia, Chile, Colombia, and Peru on digital weather forecasts plus soil chemistry.
- AGFUND / BADEA announced support for digital ag project in Ethiopia to reach 10m farmers.
- In discussions with the World Bank and several sub-Saharan African countries, including Ethiopia, Kenya, and Nigeria.

Governments often design systems that are hard for farmers to use, but respond well to support on human centered design and A/B testing

- IVR system accessed by 6.96 million farmers.
- 1.04M calls from 241K users in 2024
- Focus groups and funnel analysis identified issues.
- A/B tests found one key source of gains was reducing information requests from users (e.g. postponing registration increases share of users accessing content from 52% to 63%).
- Government adopted.

Results from Walter et al., 2021



Quick win for LLMs in communicating with farmers

• LLMs plus experts could help translate agromet advice for government workers into useful messages for farmers (via voice, chatbots).

Condition			Suggested Contingency Measures		
Mid-season drought	Major Farming	Crop/cropping system ^s	Crop management	Soil nutrient & moisture	Remarks on
(long dry spell,	situation ^s			conservation measure	implementation ^s
consecutive 2 weeks					
rainless (>2.5 mm)					
period)					
At reproductive stage	1. shallow lateritic soil	Upland rice-fallow based	Crops should be suitably thinned out	If fertilizers are to be applied, foliar application is recommended.	
			Lifesaving irrigation if possible. Irrigate on ridge and irrigate every alternate furrow on rotation.	Wherever economically viable, mulching should be practiced in between crop rows using locally available mulch material	
	2.Laterite, lateritic, mixed red & yellow rainfed	Medium land rice- fallow based Arhar	Lifesaving irrigation from harvested rainwater. Reduction of conveyance losses while irrigating the light textured soils. Spread a polythene sheet in the field channel before	If fertilizers are to be applied, foliar application is recommended. 1% KNO3 spray , kaolinite clay 2%	



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Guidelines for the Day

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Today's Sessions

1

Co-creation Session - Agricultural Use Cases for Benchmarking and Forecast Generation.

Five groups, broken up by country

Co-creation Session -Identifying Training Needs and Developing a Weather Forecasting Curriculum

MET Services, broken up into two groups: technical track, joint track 3

Co-creation Session -Connecting the Dots: Roadmapping Forecast Generation and Dissemination by Country

Five groups, broken up by country

2b

2a

Optimizing Forecast Dissemination: A/B Testing and Other Tools

Ministry of Agriculture representatives



Key Word for the Day

CO-CREATION



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Questions? Feedback?







Social Media Toolkit

Available via

aimforscale.org/nairobi

Communications page



WEATHER PARTNERSHIP CONVENING SOCIAL MEDIA TOOLKIT

We're thrilled you're part of the AIM for Scale Weather Partnership Convening! Help us amplify the conversation and share your experiences. Here's a toolkit with suggested posts to make it easy. Feel free to adapt these to your own experiences and insights. Photos from the event can be downloaded <u>HERE</u>.

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DURING THE CONVENING OPTIONS

1. Excited to be in Nairobi this week at the @AIM for Scale Global Weather Partnership Convening to scale-up weather forecasts for farmers!

Hundreds of millions of farmers could benefit from greater access to high-quality, actionable, and timely weather and seasonal forecasts. It is time to bring those benefits to #Bangladesh, #Chile, #Ethiopia, #Kenya, and #Nigeria.

Proud to be collaborating with governments, researchers, and partners to transition evidencebased innovations to scale

2. Excellent conversations underway at the @AIM for Scale Global Weather Partnership Convening in Nairobi, Kenya.

Wonderful to see such a diversity of actors including governments, foundations academics, and mutiliateral development banks—collaborating to bridge critical gaps and effectively deliver weather forecasts that support farmers in low- and middleincome countries. 3. We are in Nairobi this week attending the @AIM for Scale Global Weather Partnership.

Today, we had the honor of hearing from Nobel Laureate in Economics, Michael Kremer — a global leader in using evidence to drive impact.

Professor Kremer chairs the AIM for Scale Advisory Panel, which identifies and champions innovations with the potential to transform lives.

The first? High-quality weather forecasting for farmers — already showing major impact across multiple countries.

We are excited to be part of the group of partners poised to scale this innovation in #Bangladesh, #Chile, #Ethiopia, #Kenya, and #Nigeria and look forward to collaborating to align on the next phase of this initiative.



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Workshop 1: Agricultural Use Cases for Forecast Generation

Adrienne e-mail address

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Workshop 1: Agricultural Use Cases for Benchmarking and Forecast Generation

Dr Ousmane NDIAYE

African Centre of Meteorological Application for Development

What decisions do farmers or agricultural actors make : where a forecast could help ?



After

Before

Exercise

- divide into groups by country + each group selects a spokesperson
- What decisions do farmers or agricultural actors make where a forecast could help in your specific country context ? Each idea on a yellow sticky note. (5 minutes)
- Each group : (15 minutes)
 - rank the top 3 use cases
 - cluster the yellow sticky notes into broader categories aligned with common use cases (e.g., planting, irrigation, harvest timing, pest control, etc. Groups may combine or rename categories)
- "What information, format, or delivery method would a forecasting tool need to support this use case?" Write each requirement on a green sticky note and place it below or next to the corresponding yellow use case (20 minutes)
- The group representative briefly share : available tools and forecasts and main challenges to meeting farmer needs (4 minutes per group)

Example of in-season operational management

- 1. Sowing and planting timing: Determining optimal planting windows based on forecasts of rainfall onset, dry spell probability, and soil moisture thresholds.
- 2. Irrigation scheduling: Adjusting irrigation frequency and quantity using short-term rainfall forecasts to optimize water use and crop health.
- **3.** Fertilizer application timing: Timing input applications to reduce runoff risk from forecasted heavy rainfall or leaching under saturated soil conditions.
- 4. Pest and disease management: Using temperature, rainfall, and humidity forecasts to anticipate and manage pest or disease outbreaks (e.g., locusts, armyworm).
- 5. **Removing shrub/herb :** good time to remove competing shrubs to the crop
- 6. Mid-season drought or flood contingency: Identifying management responses during the growing season based on updated forecasts or early warnings.
- **7. Temperature-sensitive crop monitoring:** Applying forecasted temperature data to support phenology management and prevent heat stress during critical growth phases.
- 8. Harvest timing: Planning harvest to avoid forecasted rains that could damage crops or hinder field access.
- **9.** Threshing and drying: Scheduling threshing and post-harvest drying operations during forecasted dry periods to minimize post-harvest losses.
- **10. Transport and logistics planning:** Aligning crop movement and market timing with short-term forecasts of weather disruptions or road conditions.
- **11. Storage** : design store (outdoor/ventilation/humidity) the crop for best selling period or part of it as seeds for next year

Example of in-season operational management

• What type of forecasts are needed to support the top 3 use cases in your specific country context?

• Are these forecasts currently being generated and delivered to producers?

 Do you have any tools to validate these forecasts? What kind of tool would you use for this?

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Identifying Training Needs and Developing an AI Weather Forecasting and Use Curriculum

Tufa Dinku, Katie Kowal

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Objectives of the Session



- Share draft curriculum modules on training for NMHS and MoA staff on how to run and evaluate
 Al weather forecasting models and apply these forecasts to real agricultural use cases to improve outcomes for farmers
- Co-develop curriculum that meets the training requirements for operational generation and use of AI-based weather forecasting;





Curriculum components

- **Technical track** for NMHS staff on running and evaluate cutting-edge AI weather forecasting models;
- **Applied track** for agricultural professionals focused on identifying priority use for AI weather forecasts
- Joint track to promote cross-sector collaboration and develop the building blocks needed to integrate Al forecasting into national systems.



Technical track for NMHS staff

Main Objective:

Strengthen NMHS ability to operationalize AI-based weather forecasting

Focus: Operational use of AI forecasting models, from data preparation to evaluation

Delivery: Seminars, hand-on exercise, group work

Duration: Four days





Technical track for NMHS staff

Modules:

- Forecast approaches used today: Compares traditional (statistical and NWP) and Al-based forecasting approaches,
- 2. Data quality and assimilation: Emphasizes the importance of observational data and outlines the full data value chain.
- 3. Install software and run checks: Guides participants in setting up open-source AI forecasting environments





Technical track for NMHS staff

Modules:

- 5. Generating Al-based forecasts: Hands-on exercise to execute Al forecast models with real datasets
- 6. Evaluating Al and NWP models: Covers evaluation techniques and metrics, enabling participants to assess performance and limitations.
- 7. Al downscaling and bias correction: Presents techniques to refine coarse-resolution outputs into locally usable formats



https://www.encyclopedie-environnement.org



II. Applied track: Staff from MoA or other related agencies

Focus: Understanding and operationalizing forecasts for agricultural decision-making

Modules:

1. **Review of climate concepts and forecasts:** provides foundational background knowledge.

2. Use of forecasts in agricultural advisory services: Highlights how weather forecasts are used in practice to support decisions



II. Applied track: Staff from MoA or other related agencies

Modules:

3. Identifying user needs for forecasts: Participatory exercise to map decision points in agriculture and determine what forecast information is most valuable and when.

- **4. Communication pathways for forecasts:** Reviews a range of delivery mechanisms and assesses which are most effective in various contexts.
- **5. Tailoring forecasts for farmer decision-making:** how to interpret and adapt forecast content for practical field-level guidance



III. Joint track: Staff Teams from meteorological and agricultural institutions

Focus: Supporting institutional integration of AI forecasting capabilities

Modules:

- 1. Forecast applications for agriculture: Explores use cases where weather forecasts can improve agricultural decisions.
- 2. What is technically possible today? An overview of the current frontier in AI forecasting across different lead times and variables.



III. Joint track

Modules:

3. Using national roadmaps as reference. Build on national roadmaps co-created during the Convening to explore how training outcomes can support national goals.

4. Cross-country framework design. Facilitates discussion on shared gaps, coordination opportunities, and common standards across countries participating in AIM for Scale.

5. CONOPS: Concept of Operations for Implementation. Outlines how AI forecasts can be integrated into institutional workflows from generation to dissemination.





Thank you

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Debrief Workshops 2.1 and 2.2

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Amir Jina

Debrief Workshop 2.1

- Introduction to the training program
- Technical Track takeaways:
 - 1. Actionable forecasting: Benchmarking for agricultural uses and applications
 - 2. Evaluation and comparison: What is the value-add of the models?
 - 3. Desire for downscaling: Bring in additional downscaling services
 - 4. Moving towards tuning models with local data
- Next steps:
 - Cloud services vs. local
 - Develop the curriculum incorporating feedback
 - Define practical examples





Debrief Workshop 2.1

- Joint Track Takeaways:
 - 1. Presentations during the training should be interactive
 - 2. Two days are needed for the joint track
 - Day 1 dedicated to the first three modules, building a shared understanding of what was discussed in the separate tracks and surfacing takeaways.
 - Day 2 country delegations can share out their individual roadmap in order to contribute to a shared global roadmap.
 - 3. Trainers should guide participants through pre-training content
 - 4. Clearly define participant requirements in advance
 - 5. Include a pre-training assessment to ensure participants are up to speed
 - 6. What are the new opportunities that AI-powered weather forecasts can create? How do they map onto the gaps uncovered above?





Debrief Workshop 2.2

- Overview of A/B tests for evaluating and optimizing dissemination
- Key takeaways
 - 1. There are a lot of opportunities to test messaging
 - different platforms, advice vs just info, timing of message, trust, contextually appropriate messages (tone, language, cultural details),...
 - 2. Teams generate detailed and concrete ideas of for tests guickly
 - 3. A/B tests can be powerful tools, often low-cost to implement
 - 4. Collecting outcomes related to engagement can be highly feasible, outcomes related to impacts are more challenging (e.g., how to learn about impacts of SMS messages)
- Next steps:
 - Question: how does this approach change with AI tools? 0
 - AIM can facilitate partnerships implement these approaches Ο
 - How can we institutionalise optimization or services using A/B tests at the beginning of 0 dissemination programs



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Workshop 3: Building the Pipeline -Forecast Generation and Dissemination by Country

Erin Coughlan de Perez - Tufts University

Observations	Forecasts &	Products &	Information	Ability	Decision
	models	services	receipt	to act	to act



For example...(Golding et al. 2022)



For example...

Observations

Forecasts & models

Products & services

Information receipt

Ability to act Decision to act



Observations	Forecasts &	Products &	Information	Ability	Decision
	models	services	receipt	to act	to act



Observation	Forecast	Benchmarking	Dissemination		
Network	Production (AI)	& Validation			
Observations	Forecasts &	Products &	Information	Ability	Decision
	models	services	receipt	to act	to act



Learning

Workshop 3 Instructions

- 10 minutes: Individually mark-up your mountains (printouts)
- 15 minutes: Share your reflections with the group (printouts)
- 30 minutes: **Coalesce on high-priority gaps** (flip chart red)
- 60 minutes: Package opportunities for investment (flip chart green)



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Key Takeaways and Next Steps