Decentralized Decision Support System for Climate Smart Agriculture: Economics of a Dashboard Approach

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Global evidence for dashboard construction

The broader One Health approach to achieving CSA targets focus on soil health, plant health, ecosystem health, human health, and animal health contemporaneously, and protection from the impact of CC (Vara Prasad, 2021).

Food systems - system related to food production, processing, packaging, distribution, retail, market access, and consumption. Food systems approach to improving resilience in the face of shocks and CC (Bhargava 2021; Fanzo et al., 2022; Hendriks et al., 2022; Ulimwengu et al., 2022).

Covid and CC have simultaneously accentuated global food crises (Laborde et al., 2020; Schmidhuber, 2020; Swinnen & McDermott, 2020).

The Agricultural Model Intercomparison and Improvement Project (AGMIP), connects climate, crop, economic models, and digital methods and forecast agricultural production. Driven by Representative Concentration and Shared Socio-economic Pathways (RCPs and SSPs).

Triple planetary crisis of CC, pollution, and biodiversity loss (UNFCCC, 2022). As Jacqueline Hughes, ICRISAT DG aptly puts it *"Unless consumers demand food produced in ways good for the environment, farmers have little incentive to adopt technologies"*

Choice of indicators for dashboard construction (30+ in total)

Water deficit, Rainfall, Irrigation, Evapotranspiration,
Precipitation/hail
Soil health/Air quality
Labor & wages
Agroforestry, plant and human health
Crop productivity/ Pests/Crop Disease
Integrated farming/Livestock/Home-gardening
Greenhouse gas emissions
ICT & gender
Predicted values from different modeling exercises

Interpreting the CSA dashboard vertically

Week no	Region	Variables	Real-time Status 1	Real-time Status 2
1	Burdwan	X	WP	BA
2	Burdwan	X	BP	WP
3	Burdwan	X	WP	WP
4	Burdwan	X	BP	BP
5	Burdwan	X	WP	WP
6	Burdwan	X	WP	AA
7	Burdwan	X	WP	BA
8	Burdwan	X	AA	AA
1	Golaghat	X	AA	AA
2	Golaghat	X	WP	BA
3	Golaghat	X	WP	BP
4	Golaghat	X	BA	AA
5	Golaghat	X	AA	WP
6	Golaghat	X	AA	BP
7	Golaghat	X	WP	AA
8	Golaghat	X	BA	WP

Block 1

Read vertically,
Were extreme events clustered?
For a particular variable, select or most?
Is so why? Take immediate action.
What strategies can help to reduce GHG emissions?
What strategies can reduce losses?

Climate Smart Agriculture: Big Data Performance using a Dashboard Approach

Day	Month	zila/Mouza/Vill	Real-time status 1	Real-time status 2	Real-time status 3	Real-time status 4	Real-time status 5	Real-time status 6	Real-time status 7	Real-time status 8	Real-time status 9	Real-time status 10	Real-time status 11	Real-time status 12	Real-time status 13	Real-time status 14	Real-time status 15
1	Jan	Nalgonda															
2	Jan	Nalgonda															
3	Jan	Nalgonda															
4	Jan	Nalgonda															
5	Jan	Nalgonda															
6	Jan	Nalgonda															
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19	Jan	Nalgonda															
20	Jan	Nalgonda															
1	Feb	Nalgonda															
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15	Feb	Nalgonda															
16	Feb	Nalgonda															

ALERT!
Block 1

CAUTION!
Block 2

Block 1: All four columns show that the real-time status of the four variables shows a sudden change in status from either WP to BP or BP to WP. Alarming situation. We have chosen at random a block of random dimensions. The inconsistency in performance across interconnected indicators across different dimensions also represents the disconnect across different dimensions of CSA.

Block 2: Caution as there are sudden WP cells with most of the cell BP across rows and columns. It probably hints at extreme events, say sudden heat waves causing a rise in temperature or cyclones reflecting crop damage or increased precipitation.

Methodology

Compute a statistic of choice (benchmark), say the variable's median value or the long-term average, particularly for the climate indicators. Calculate the median across weeks/ months/ years, or at the district-level, state-level, or the country average. We can choose the benchmark depending on the ground-level realities/decision of the agricultural extension officer.

Compute the distance from the median and standardize it. This value represents the present condition or status.

We can identify outlier week/month/year/districts by plotting box plots.

Based on the computed value in the second step, we can club the data points into different quartiles and make a judgment call on sorting data points by quartiles.

We can accordingly classify the quartiles into **WP – Worst Performing**, **BA – Below Average**, **AA – Above Average**, **BP – Best Performing**

Concluding remarks

Unified approach to analyzing **historical, real-time, and predicted data** in one space. Ensures **minimum dead-weight loss**, and **maximizes equity and efficiency** across the climate-smart food system. Helps bridge the debate between policymakers on CC adaptation and mitigation. Ensure daily concerted efforts towards CSA. Rattan Lal - ***Agriculture is a solution to climate change and integral to it***.

Mobile application as an ICT tool for CSA and rural development – **JOIN OUR TEAM!**

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ASANTE SANA