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Measuring national socio-economic aspects of sustainable agriculture and the interactions with environmental indicators

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Selected Poster prepared for presentation at the 2020 Agricultural & Applied Economics Association Annual Meeting, Kansas City, MO
July 26-28, 2020

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Measuring national socio-economic aspects of sustainable agriculture and the interactions with environmental indicators

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SESYNC

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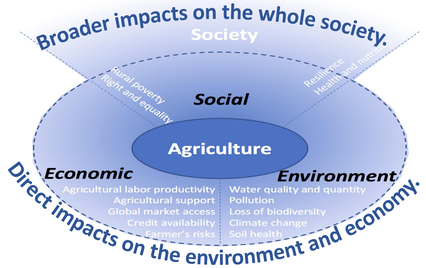
INTRODUCTION

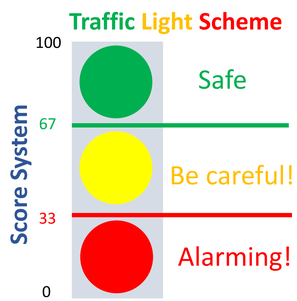
- Agriculture is fundamental to all three pillars of sustainability: **environment, economy and society**.
- The definition of **sustainable agriculture (SA)** is elusive.
- **Independent and transparent** measurements of national sustainability are essential to encourage **accountability.**
- SA measurements are more focused on the **environmental perspective, and socio-economic dimensions** are less studied.
- **SDG 2.4.1** explicitly states the importance of measuring SA.
- **UN FAO** has made efforts in developing indicators on **farm-scale level based on surveys.**
- Few studies have focused on assessing SA on **a national scale.**

SUSTAINABLE AGRICULTURE MATRIX (SAM)

- The concept of SAM is inspired by Swaminathan (1990)
- SAM is a collection of indicators measuring sustainable agriculture from **environmental, economic and social dimensions.**

	Major theme	Abbr.	Indicator Names
Environmental	Water availability	SUSI	Sustainability of irrig. water consump
	Pollution	Nsur	N surplus
		Psur	P surplus
	Land use and loss of biodiversity	LCC	Land cover change due to ag acitivities (lost forested area)
		GHG	Total GHG emissions from ag activities per harvested area including pastureland
	Soil health	SER	Soil erosion
Economic	Agricultural labor productivity	AGDP	Ag GDP per ag worker
	Credit availability	A2F	Access to financing score
	Farmer's risks	PVOL	Crop proce volatility
	Agricultural support	AEXP	Ag expenditure/ag GDP
	Market access	TROP	Ag trade openness: ag export revenues/ag GDP
Social	Resilience	RSH	Crop diversity (H index)
		RSE	Food afforadability, income resilience
	Health and nutrition	UDN	Prevalence of undernourishments
	Farmer's wellbeing	RPV	Rural poveraty ratio
	Equality	GGG	Global gender gap report score (GGG)
	Rights	LRS	Land rights





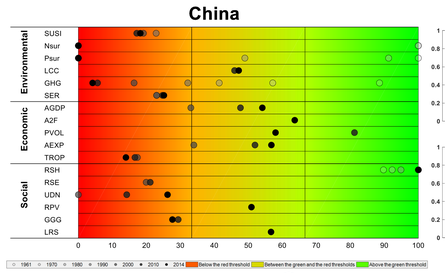
We identify two thresholds:

Green threshold

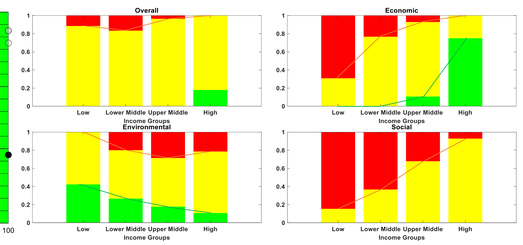
Red threshold

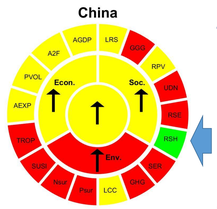
RESULTS AND DISCUSSION

Tracking the Historical Progress



Historical Performance and Economic Development



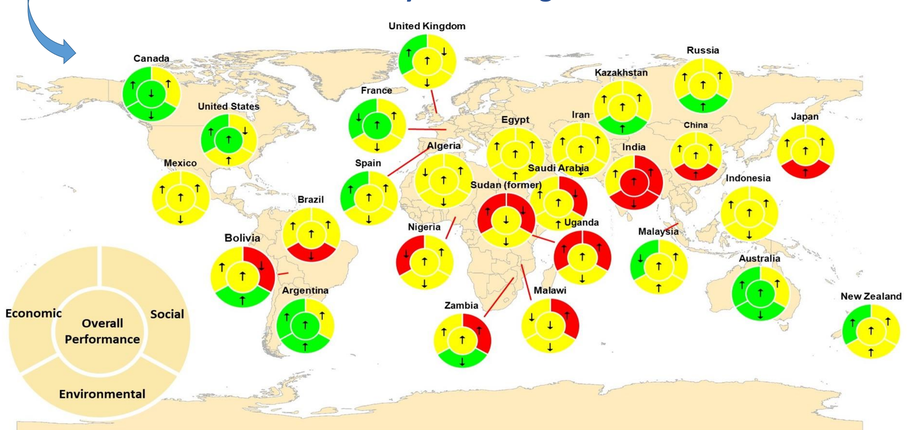


Tracks performance over time.

The indicator scores, the dimensional scores, and the overall performance in the recent 5 years.

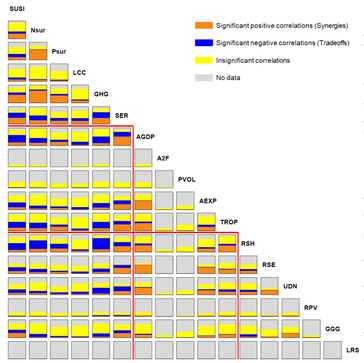
- Only the high-income group has countries with overall sustainable agriculture performance rated as "sustainable" (green).
- In economic and social dimensions, the performance increases as economy develops.
- In the environmental dimension, the share of green country diminishes but the green and yellow share first decreases and then increases as economy develops.

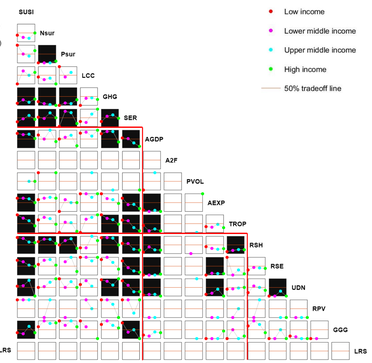
Sustainability State of Agriculture



No country has achieved sustainability thresholds for all indicators in all three dimensions.

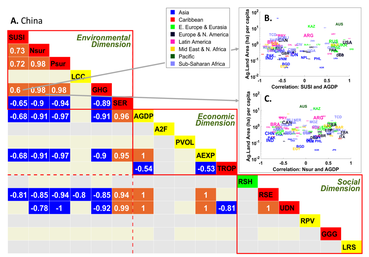
Synergies and Tradeoffs among Indicators





- None of the indicator pairs shows only tradeoffs and only synergies for all countries.
- The dominance of synergies and trade-offs display a strong income patterns.

An Indicator System to Inform Actions



- Panel A provides a tool to understand the interactions among indicators within each country.
- Panel B and C present the relationship between Ag-land area and the correlations, pinpoint where country A's interactions stand.

CONCLUSION

- Overall, we have developed a first-of-its-kind indicator system to systematically assess country-level performances in SA and multiple critical indicators within each dimension.
- The broad spatial and temporal coverage of the assessment enables a comprehensive view of the state of SA around the world, and an understanding of the tradeoffs and synergies among multiple sustainability targets.

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