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

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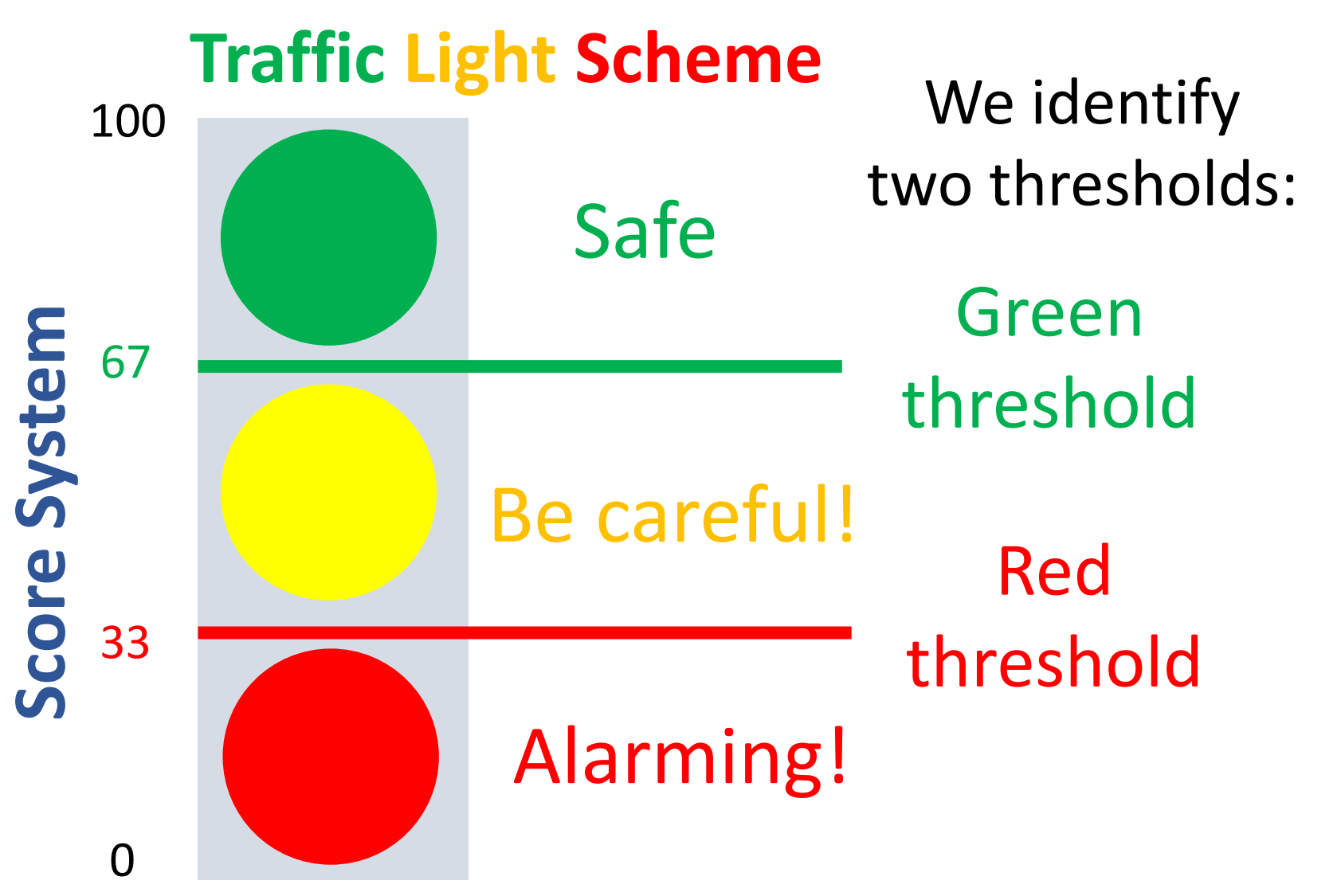
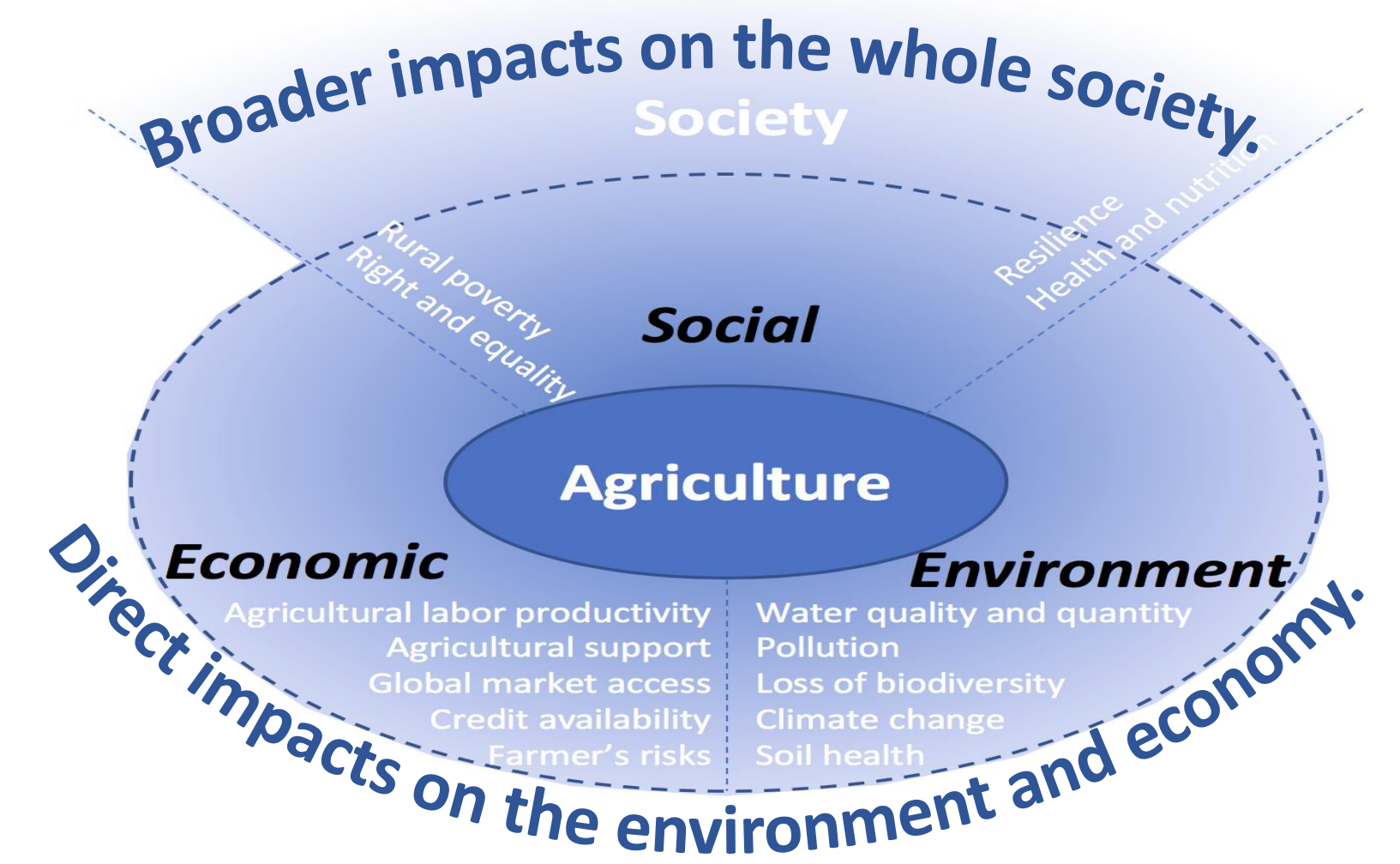
## INTRODUCTION

- 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)

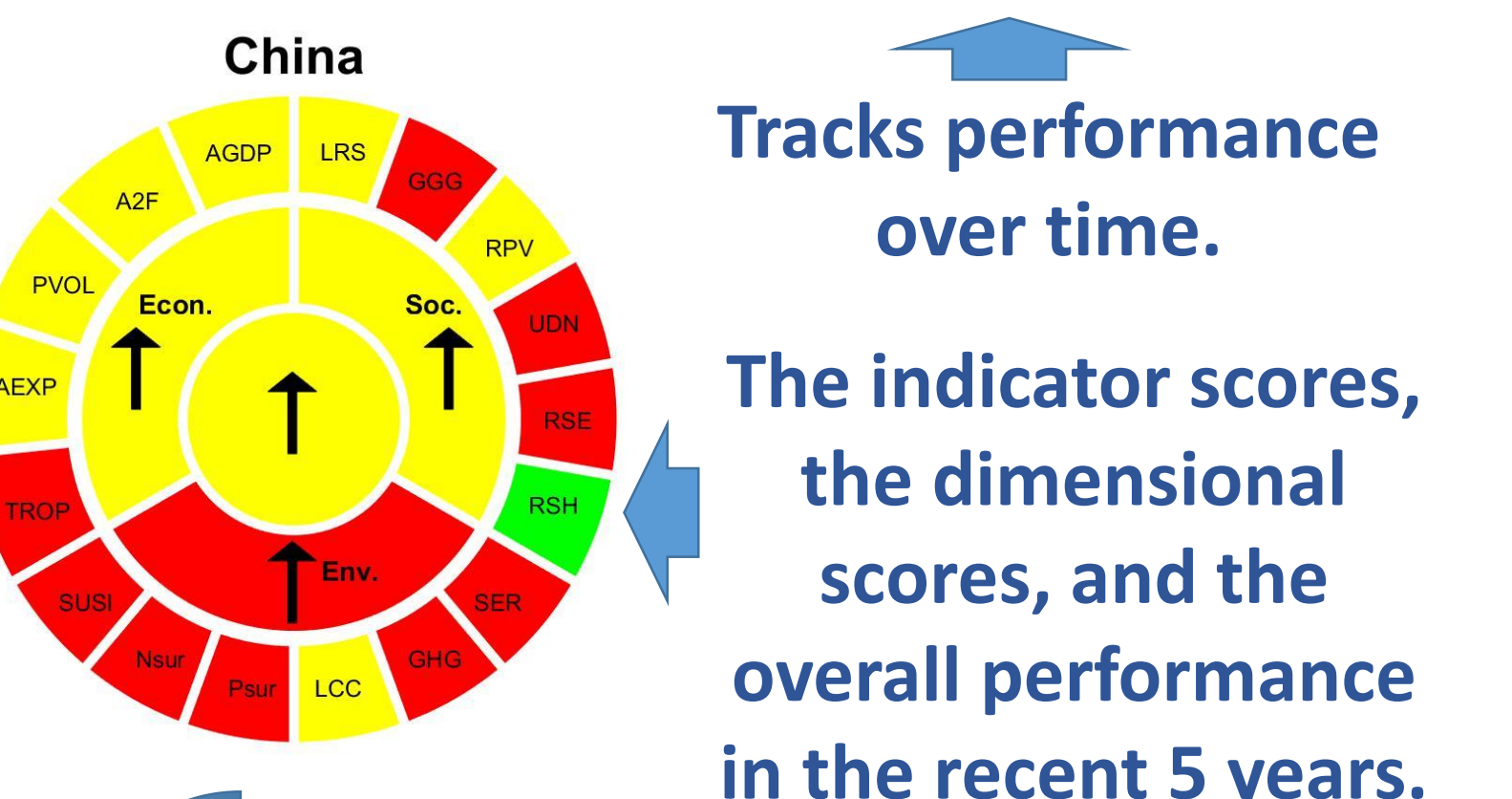
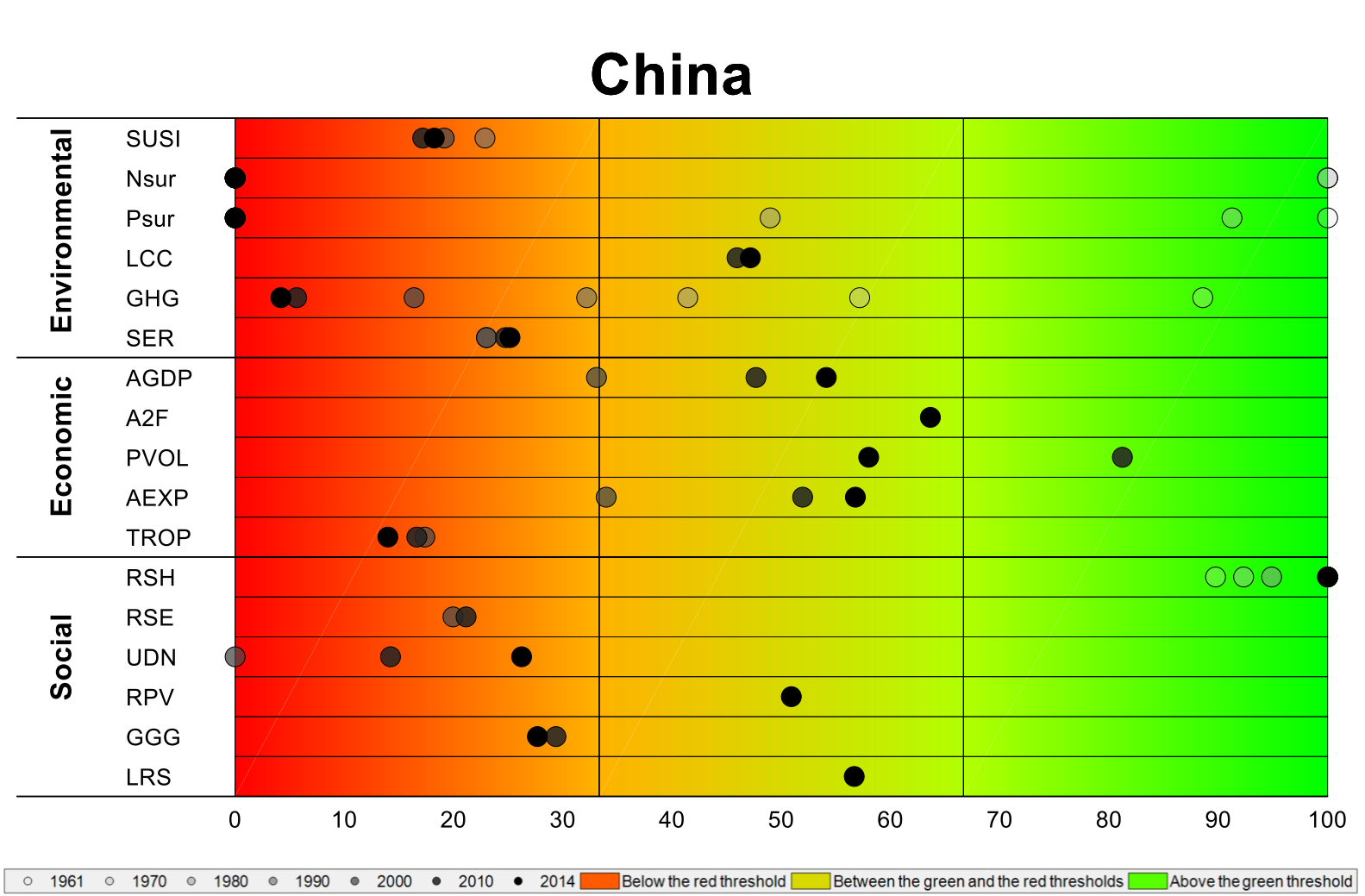
- The concept of SAM is inspired by Swaminathan (1990)
- SAM is a collection of indicators measuring sustainable agriculture from **environmental, economic and social dimensions**.

Major theme	Abbr.	Indicator Names
Environmental	SUSI	Sustainability of irrig. water consump
	Nsur	N surplus
	Psur	P surplus
	LCC	Land cover change due to ag activities (lost forested area)
	GHG	Total GHG emissions from ag activities per harvested area including pastureland
Economic	AGDP	Ag GDP per ag worker
	A2F	Access to financing score
	PVOL	Crop proce volatility
	AEXP	Ag expenditure/ag GDP
Social	TROP	Ag trade openness: ag export revenues/ag GDP
	RSH	Crop diversity (H index)
	RSE	Food affordability, income resilience
	UDN	Prevalence of undernourishments
	RPV	Rural poverty ratio
	GGG	Global gender gap report score (GGG)
	LRS	Land rights

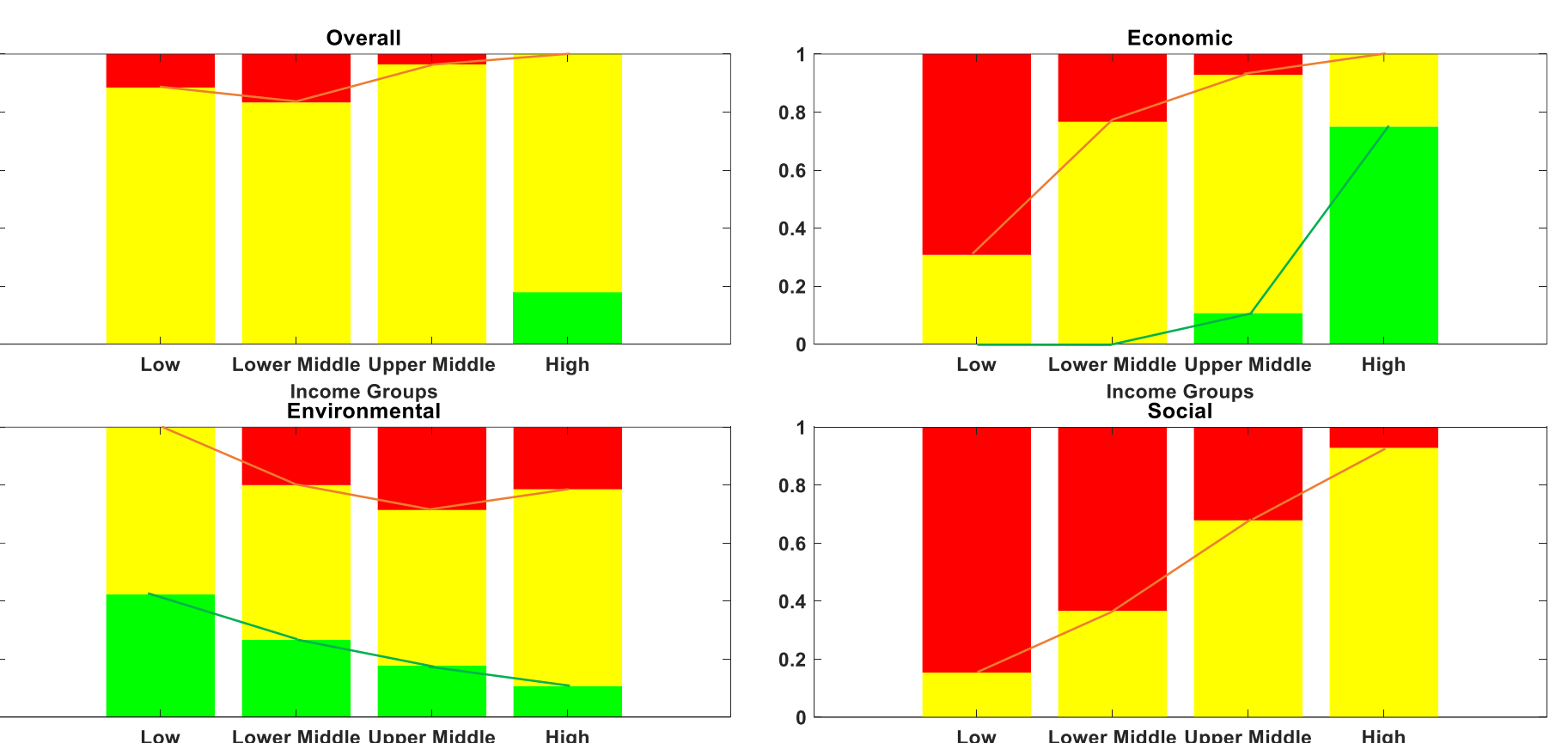


## RESULTS AND DISCUSSION

### Tracking the Historical Progress

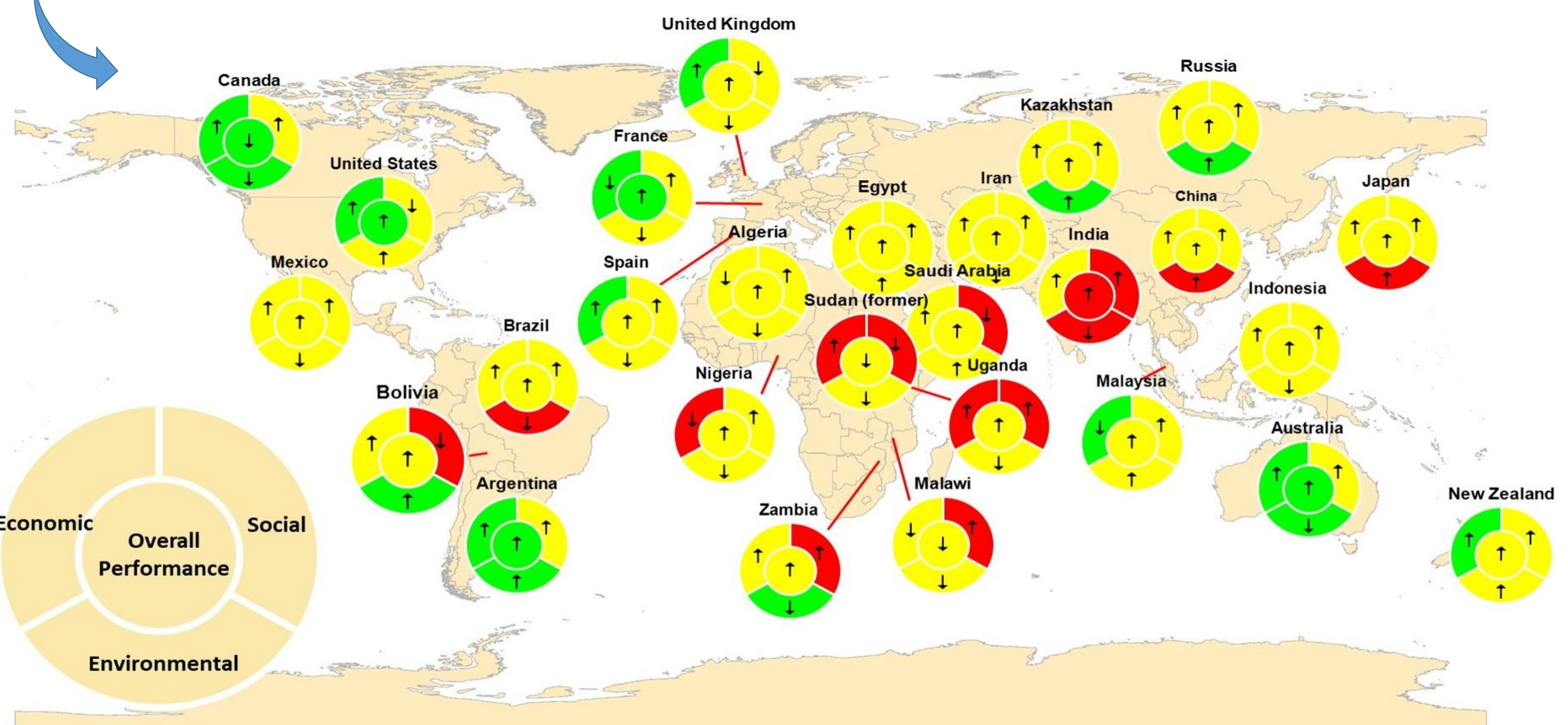


### Historical Performance and Economic Development



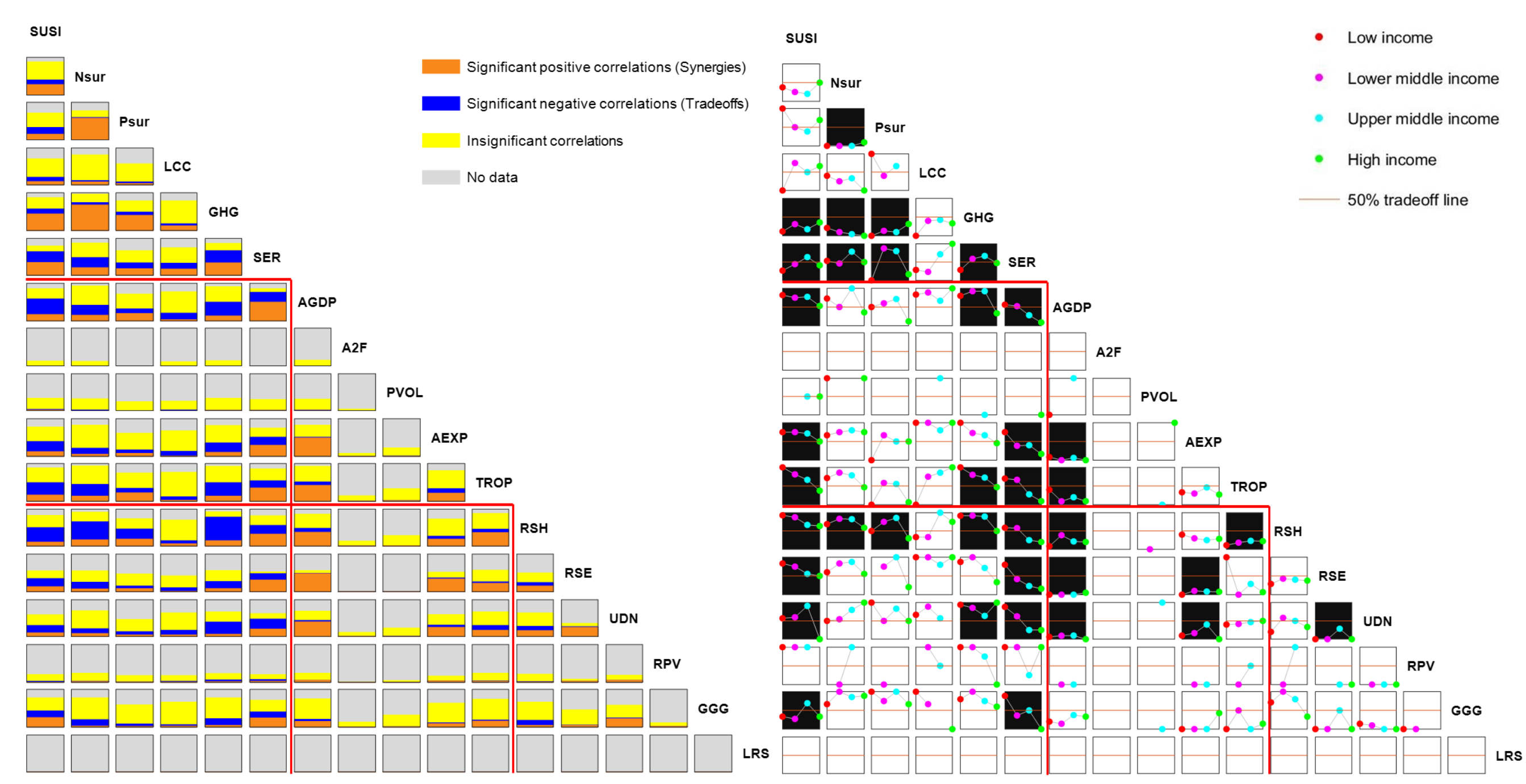
- Only the high-income group has countries with overall sustainable agriculture performance rated as "sustainable" (green).
- In economic and social dimensions, the performance increases as economy develops.
- In the environmental dimension, the share of green country diminishes but the green and yellow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

### Sustainability State of Agriculture



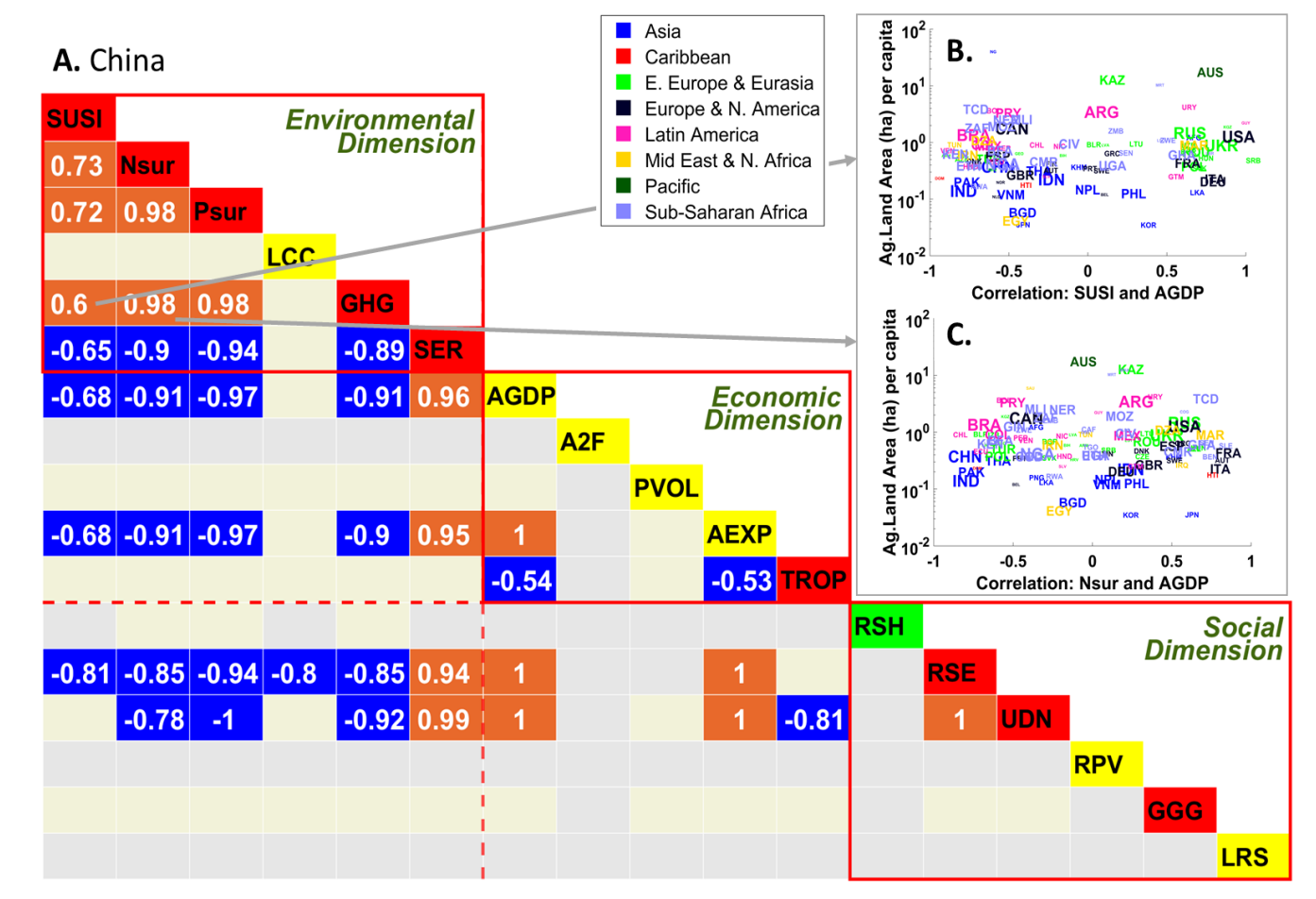
No country has achieved sustainability thresholds for all indicators in all three dimensions.

### 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.