Sustainability Metrics: Do we Really have the Data for Meaningful Measurement?

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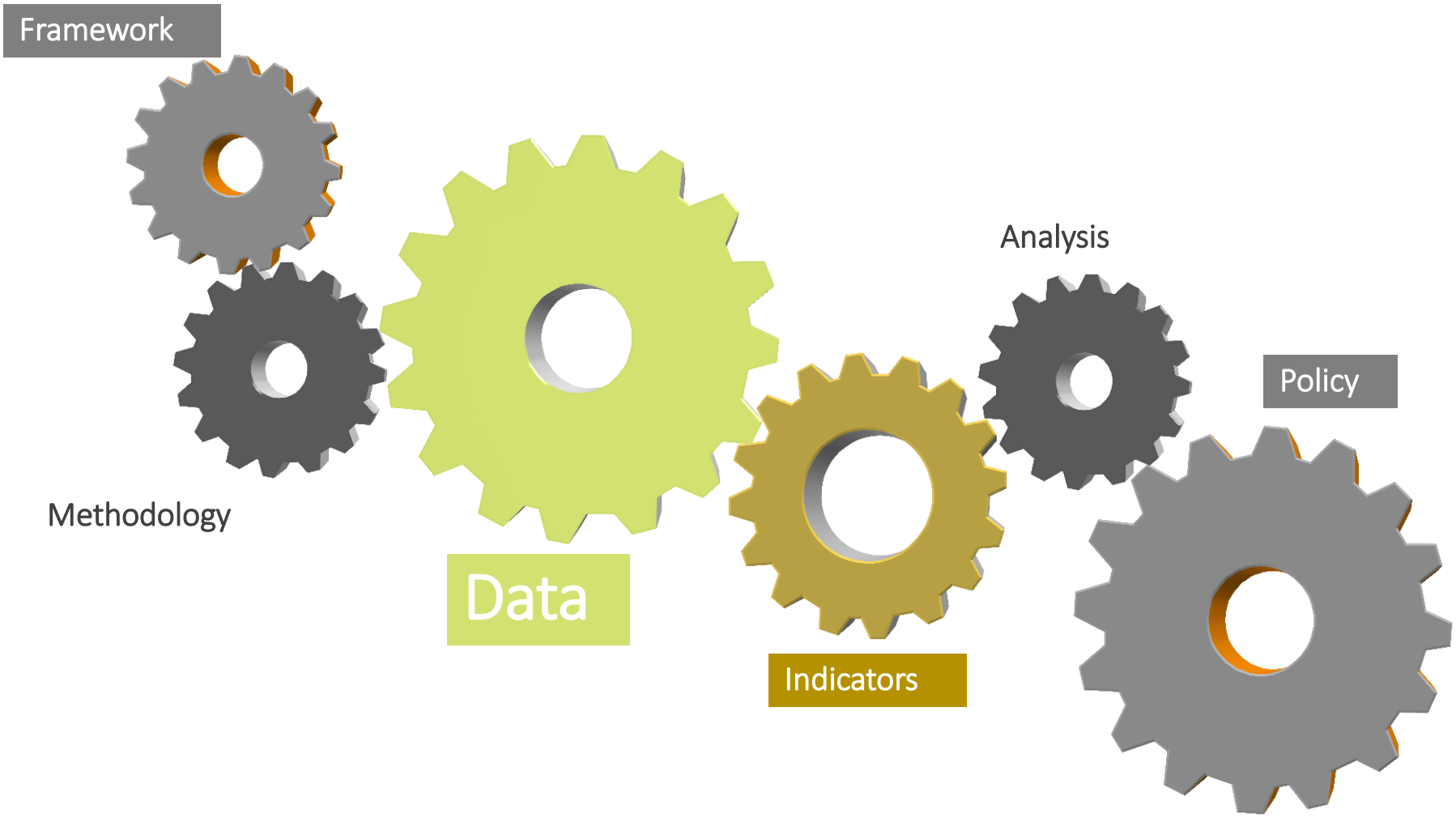
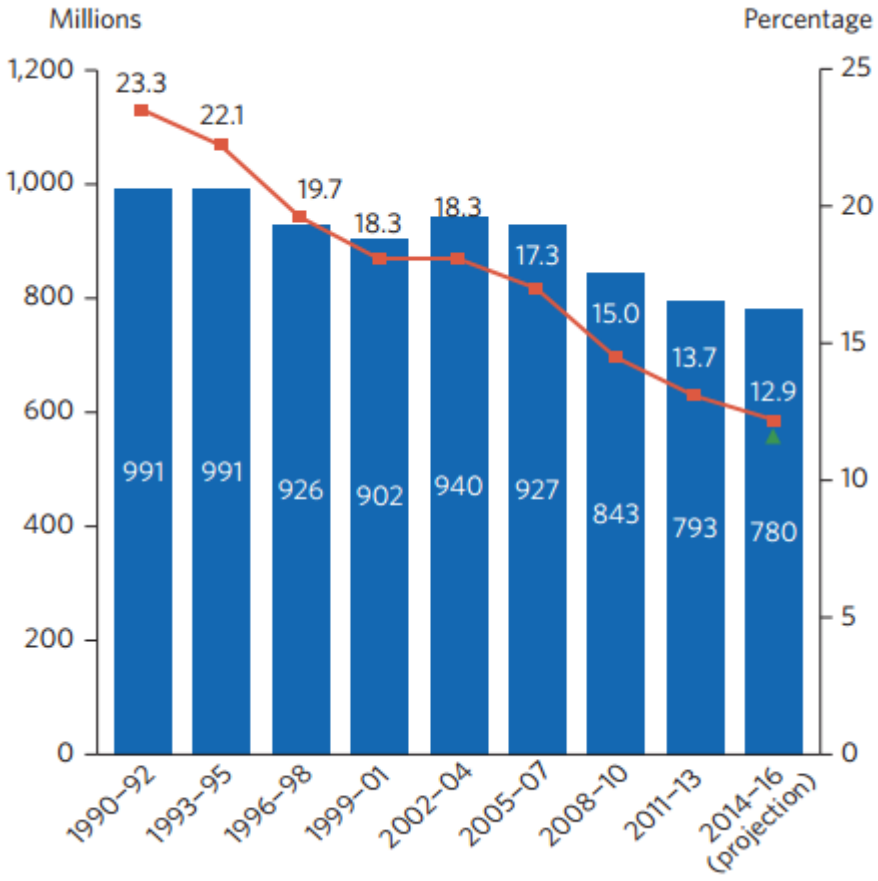
Data and indicator selection are critical to creating effective policy



We have made considerable progress in achieving the MDGs



Number and proportion of undernourished people in the developing regions, from 1990–1992 to 2014–2016

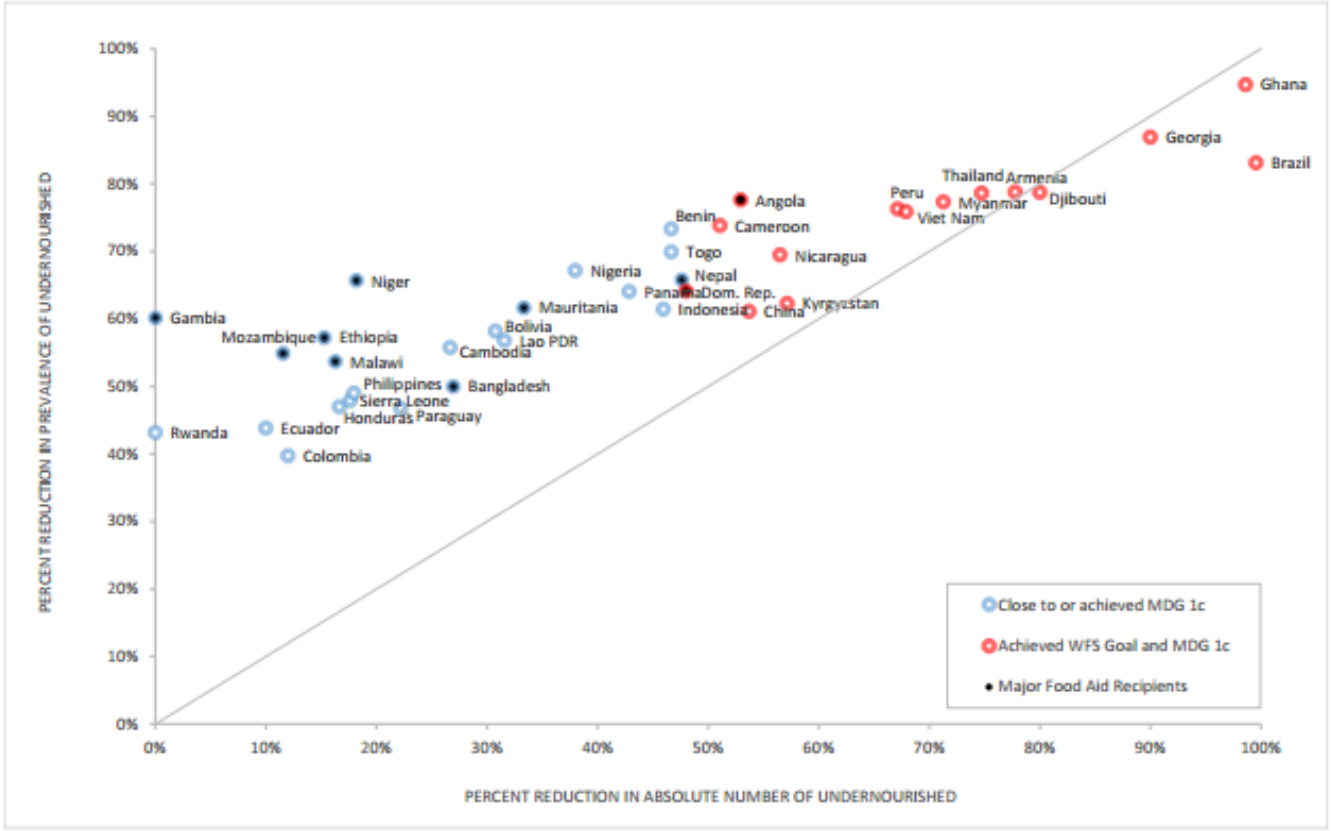
Left axis: number of undernourished people

Right axis: proportion of undernourished people

Right axis: 2015 target

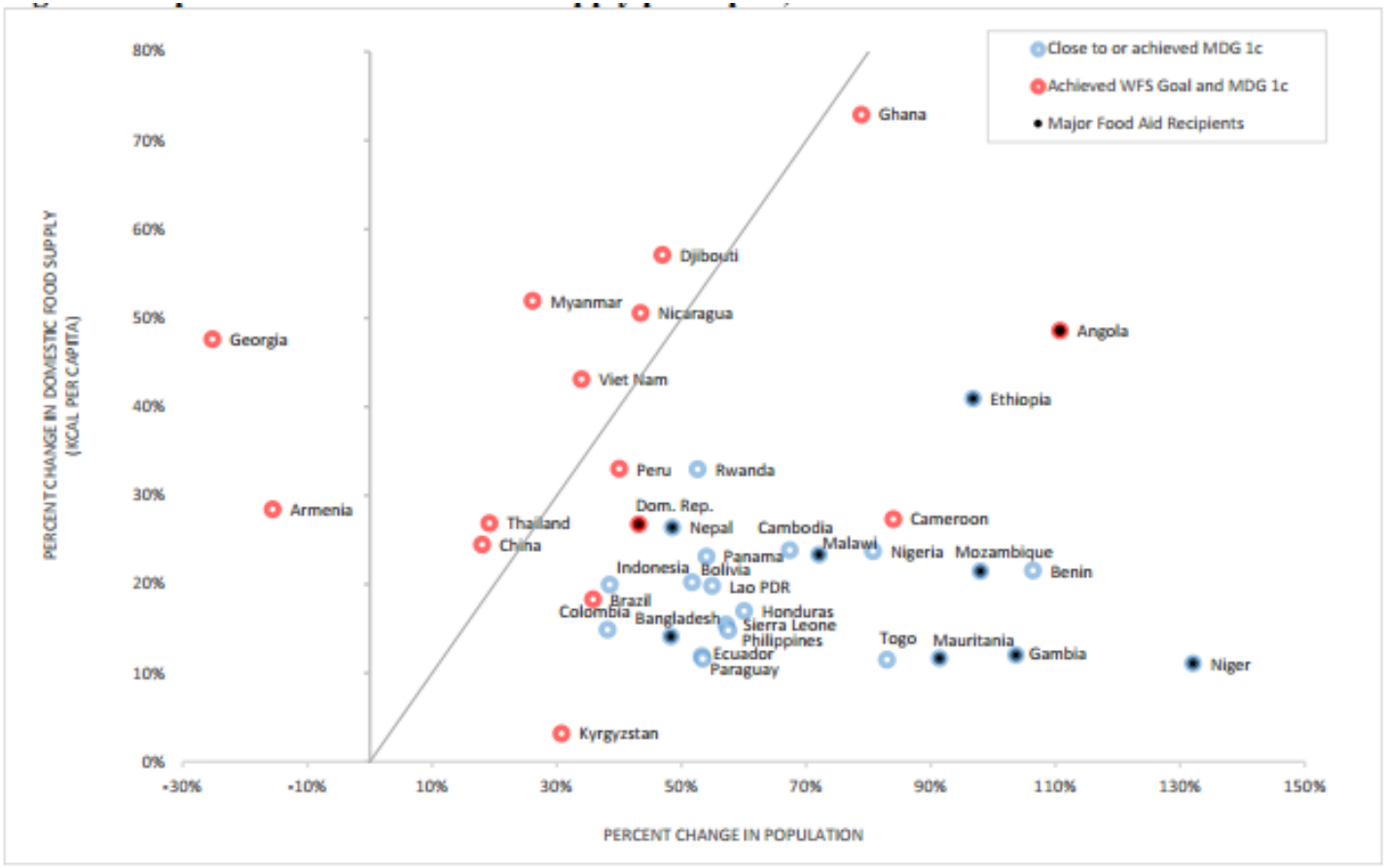
Source: UN MDG Report 2015

Indicator selection makes a big difference in determining how well countries have performed in reducing hunger



Source: FAO and WFP

Countries which were able to keep food supply growing as rapidly as population were the most successful



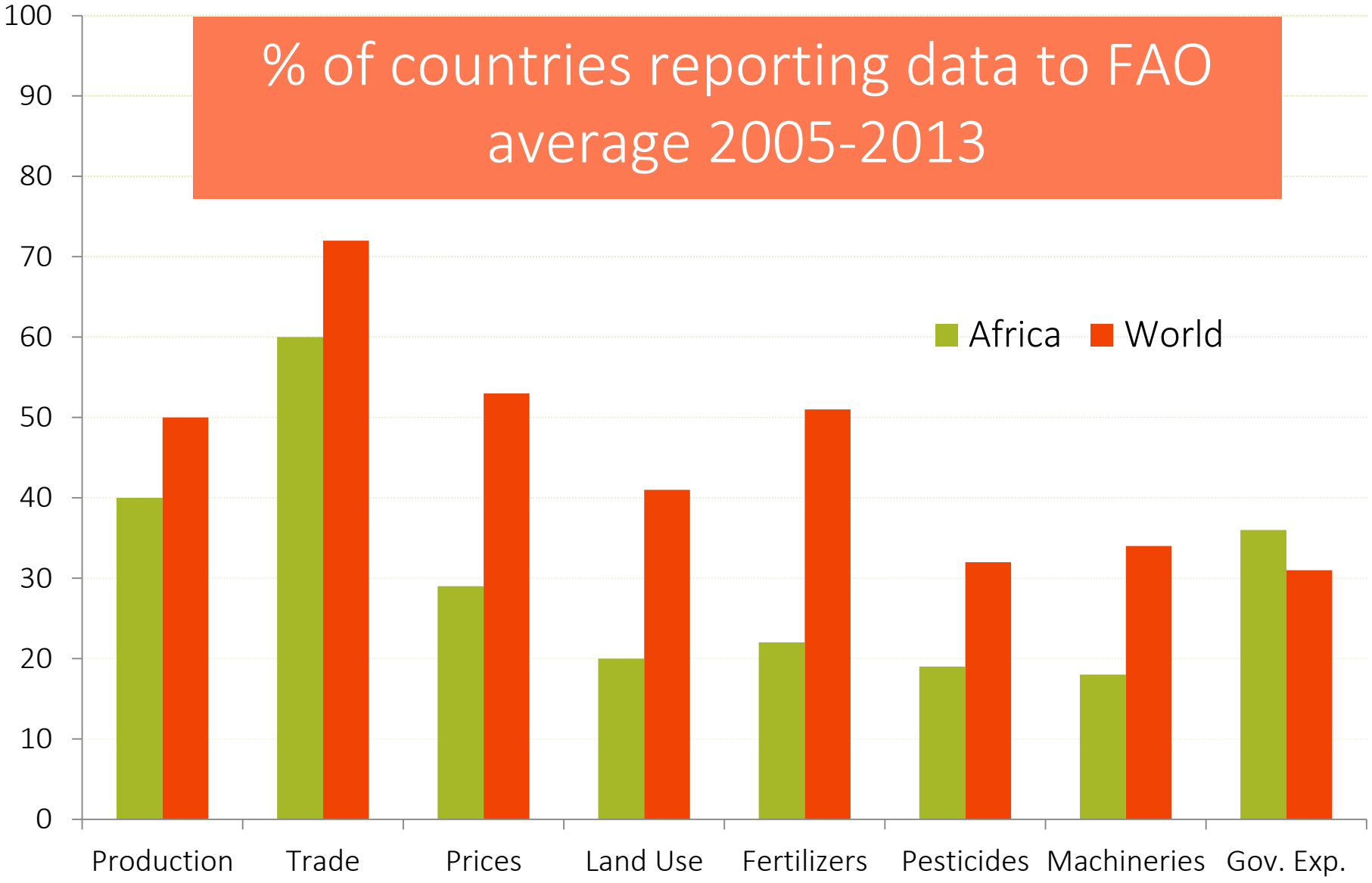
Source: FAO, World Bank and WFP

Even the most carefully selected indicator is only as good as the data used to generate it.

"**It is believed that the food balance sheets as currently prepared, while often being far from satisfactory in statistical terms, provide an approximate picture** of the overall food situation of individual countries which may be used for economic and nutritional studies, the preparation of development plans and the formulation of related projects, as in fact are carried out in FAO. "

Source: http://faostat3.fao.org/download/FB/*/E (accessed 1/7/2016)

% of countries reporting data to FAO average 2005-2013

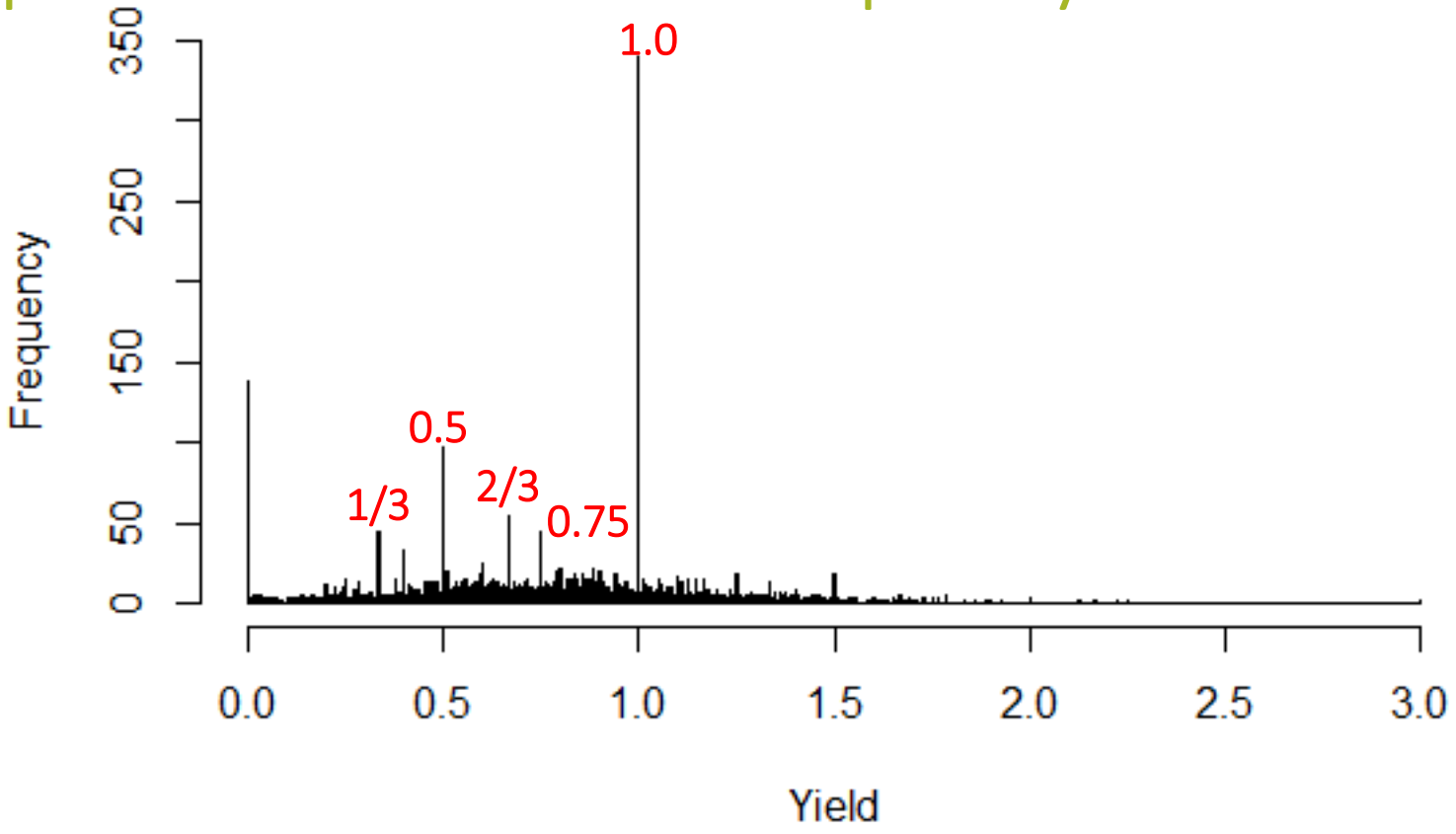


Source: FAO

As the global community tries to achieve the Sustainable Development Goals

It is not clear that all the data we need are available

Even when data are available, there are questions about their quality

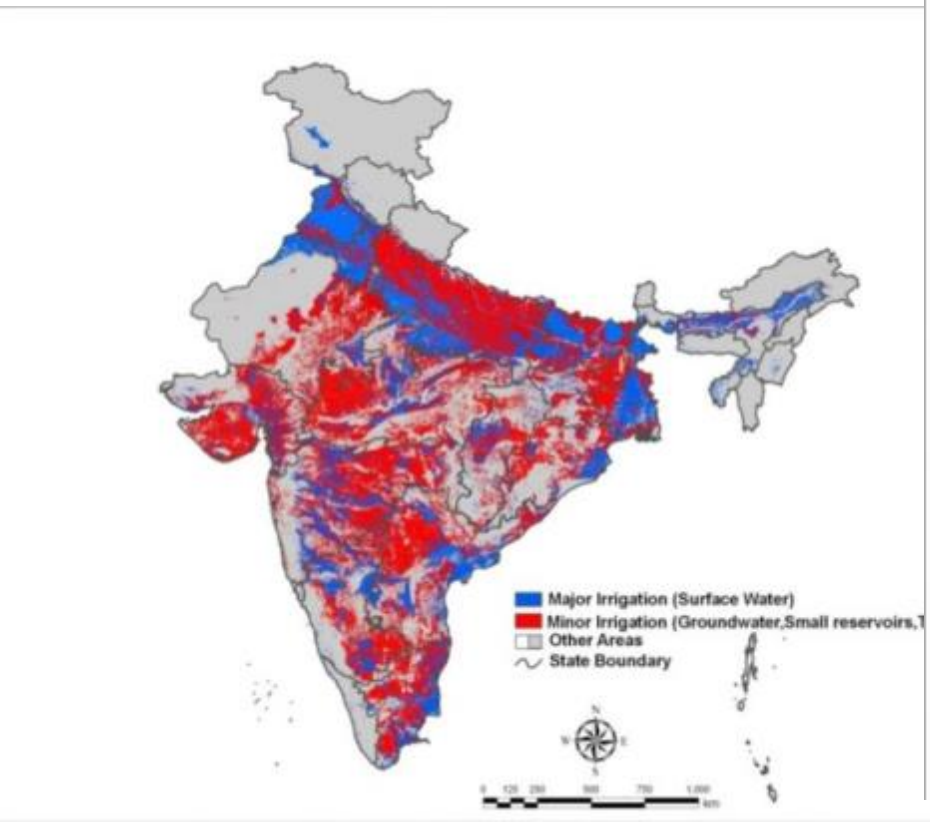


Frequency distribution of sorghum yields in India for 213 districts over 1980-2009 (n=5186)

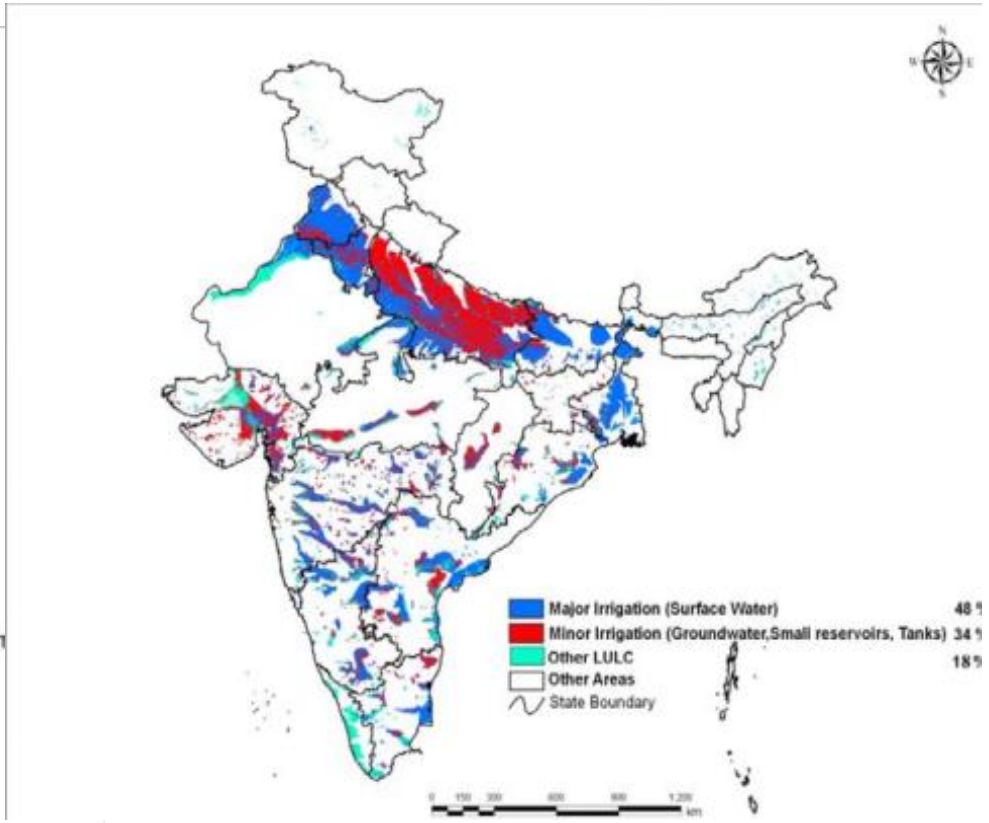
It can be difficult to capture what is happening at smaller scales

How much irrigated area in India?

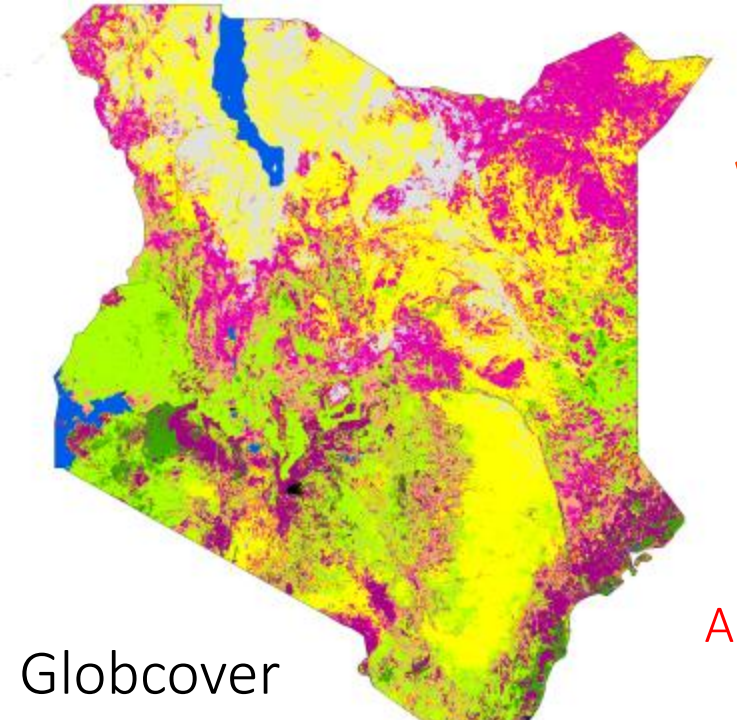
Intl. Water Management Inst.
113 M ha (net)



Government of India
57-62 M ha



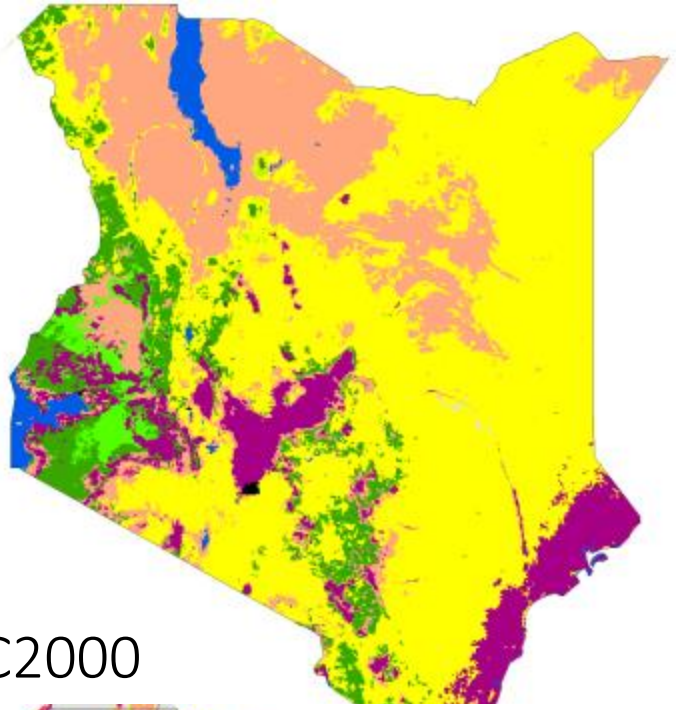
Source: Thenkabail 2009



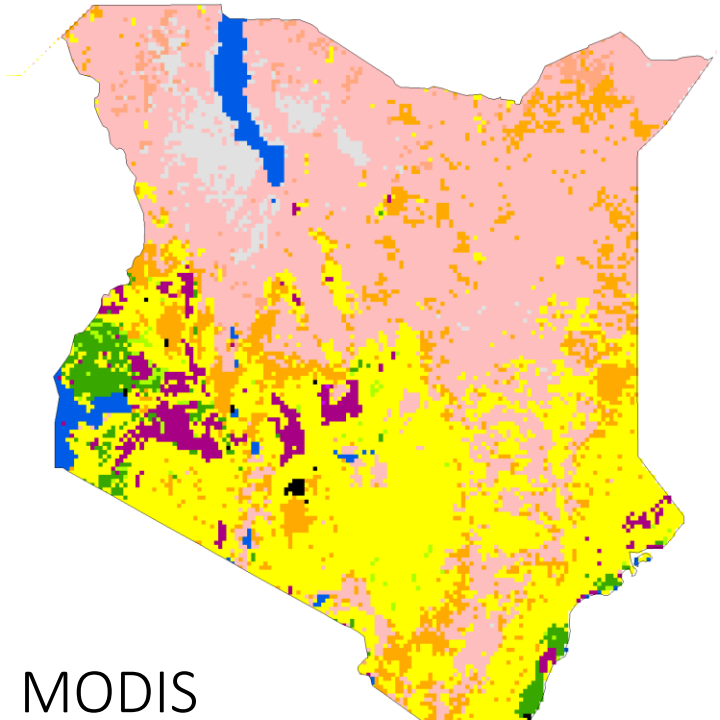
Globcover

What is the land cover in Kenya?

All maps use the same legend!

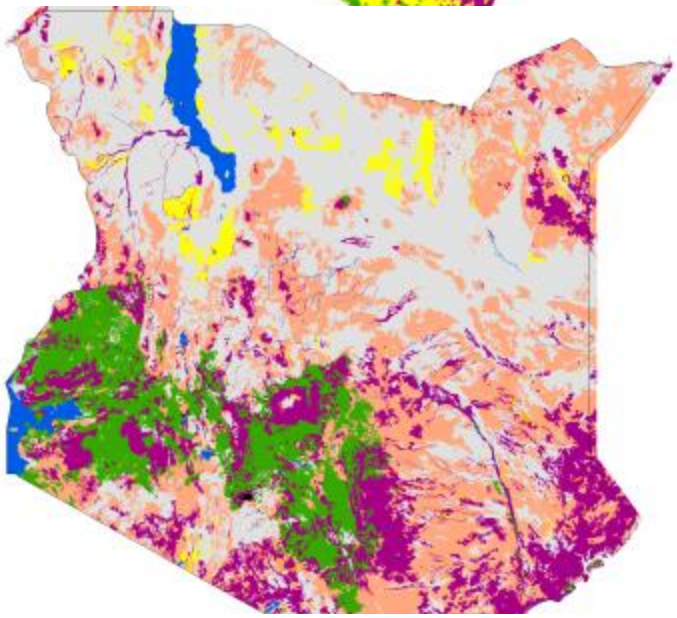


GLC2000



MODIS

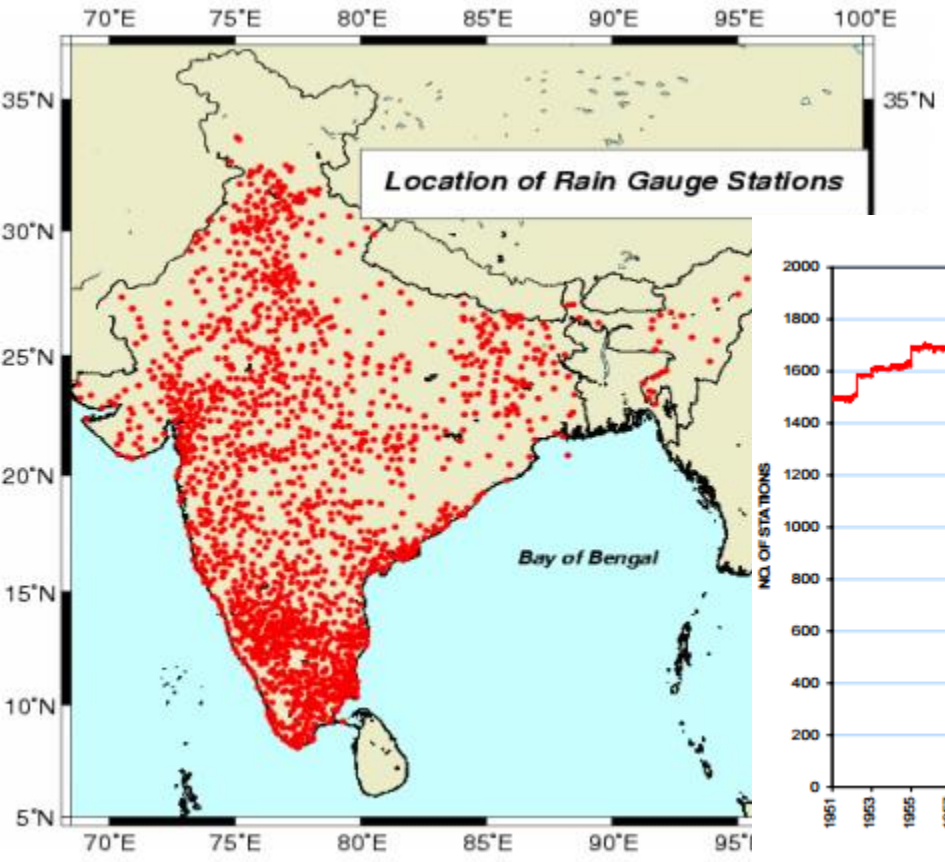
Crop
mixed crop
shrubs
savannah
grassland
forest
unvegetated/error
urban
Water



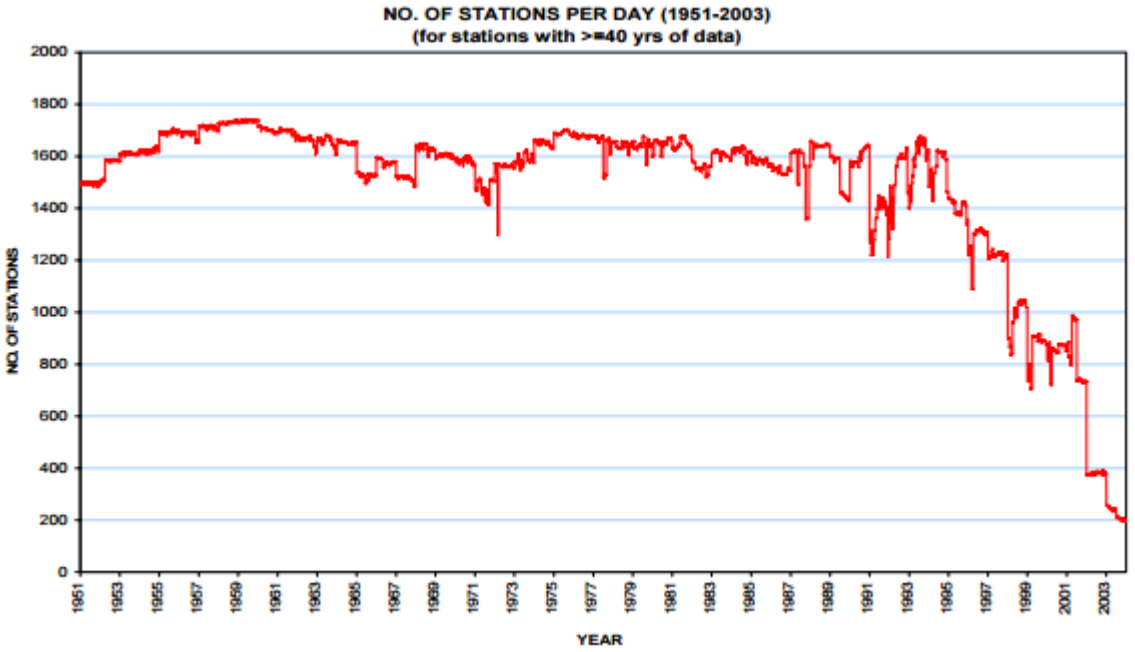
Africover

Zhe Guo, HarvestChoice 2011 (unpublished)."

Climate data can be as bad or worse



Distribution of rain gauges with long-term data operated by the India Meteorological Department



Source: Rajeevan 2006

Data limitations ultimately lead to uncertainties about historical and future impacts

IPCC projections for agriculture in South Asia and India

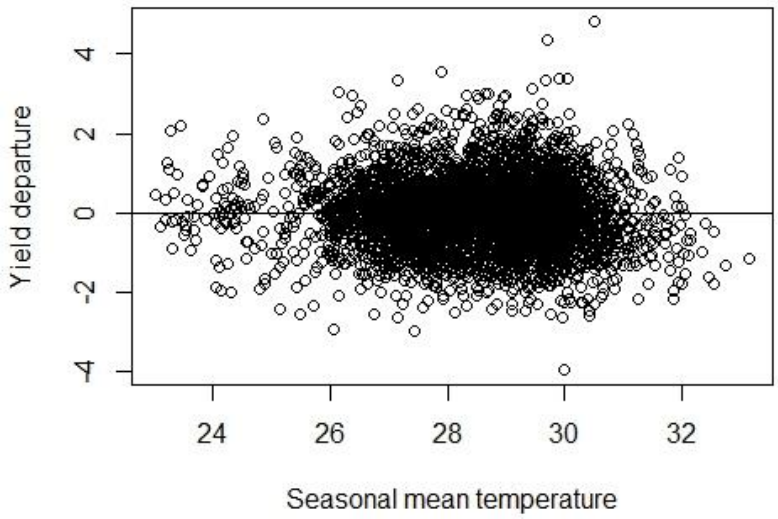
South Asia	South Asia	• Maize: –16 • Sorghum: –11	2050	Knox et al. (2012)
	South Asia	Net cereal production –4 to –10	+3°C	Lal (2011)
	India	Winter sorghum: up to –7, –11, –32	A2 2020, 2050, 2080	Srivastava et al. (2010)
		• (I) Rice: –4, –7, –10 • (R) Rice: –6, –2.5, –2.5	A1B; A2; B1; B2 2020, 2050, 2080 +CO_2 MIROC; PRECIS/HadCM3	Kumar et al. (2013)
		• Monsoon maize: –21 to 0, –35 to 0, –35 to 0 • Winter maize: –13 to +5, –50 to +5, –60 to –21	A2 2020, 2050, 2080 HadCM3	Byjesh et al. (2010)
	Northeast India	• (I) Rice: –10 to +5 • (R) Rice: –35 to +5 • Maize: up to –40 • Wheat: up to –20	A1B 2030 +CO_2 PRECIS/HadCM3	Kumar et al. (2011)
	Coastal India	• (I) Rice: –10 to +5 • (R) Rice: –20 to +15 • (I) Maize: –50 to –15 • (R) Maize: –35 to +10		
	Western Ghats, India	• (I) Rice: –11 to +5 • (R) Rice: –35 to +35 • Maize: up to –50 • Sorghum: up to –50		

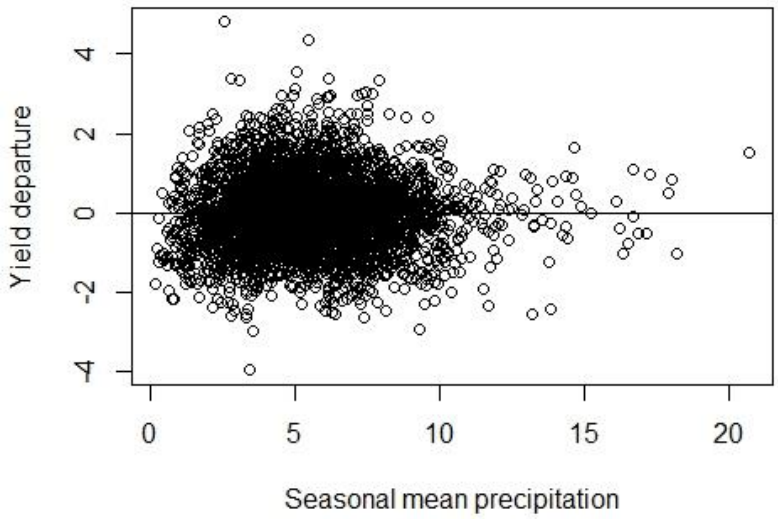
Large regions: not clear where to focus

Few crops: not very informative for nutrition

Source: IPCC Working Group 2

Even the best available data do not show clear relationships





Sorghum yields in India for 213 districts over 1980-2009 (n=5186) plotted against temperature and precipitation

New approaches

Remote sensing

Source: Ken Banks/ Wikimedia Commons

Crowdsourcing/ citizen science

Low-cost sensors

Conclusions

- Data remains a critical limitation to policy analysis across scales
- New technologies can help overcome some of the resource limitations involved in traditional data gathering
- However great improvements need to be made in:
- Data access
- Data formats and interoperability
- Metadata (methodology as well as other details such as location)

Thank you