Can sub-Saharan Africa feed itself?

Tripling cereal production with minimum emissions

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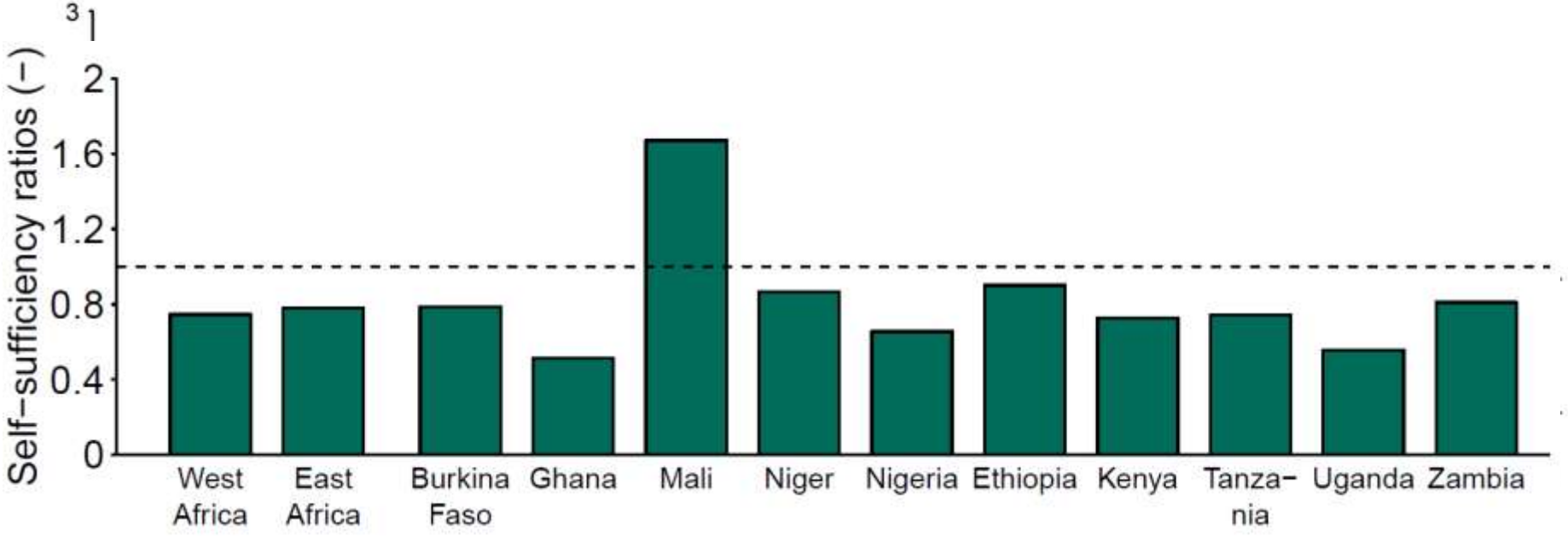
Global Yield Gap Atlas


FAO projection: +60% demand (2007-2050)
Sub-Saharan Africa: cereal demand is projected to increase a factor 2.8 (2015-2050)
(van Ittersum et al., 2016)

Current self-sufficiency ratios cereals



Source: FAOstat and van Ittersum et al., 2016 (PNAS)

Global Yield Gap Atlas

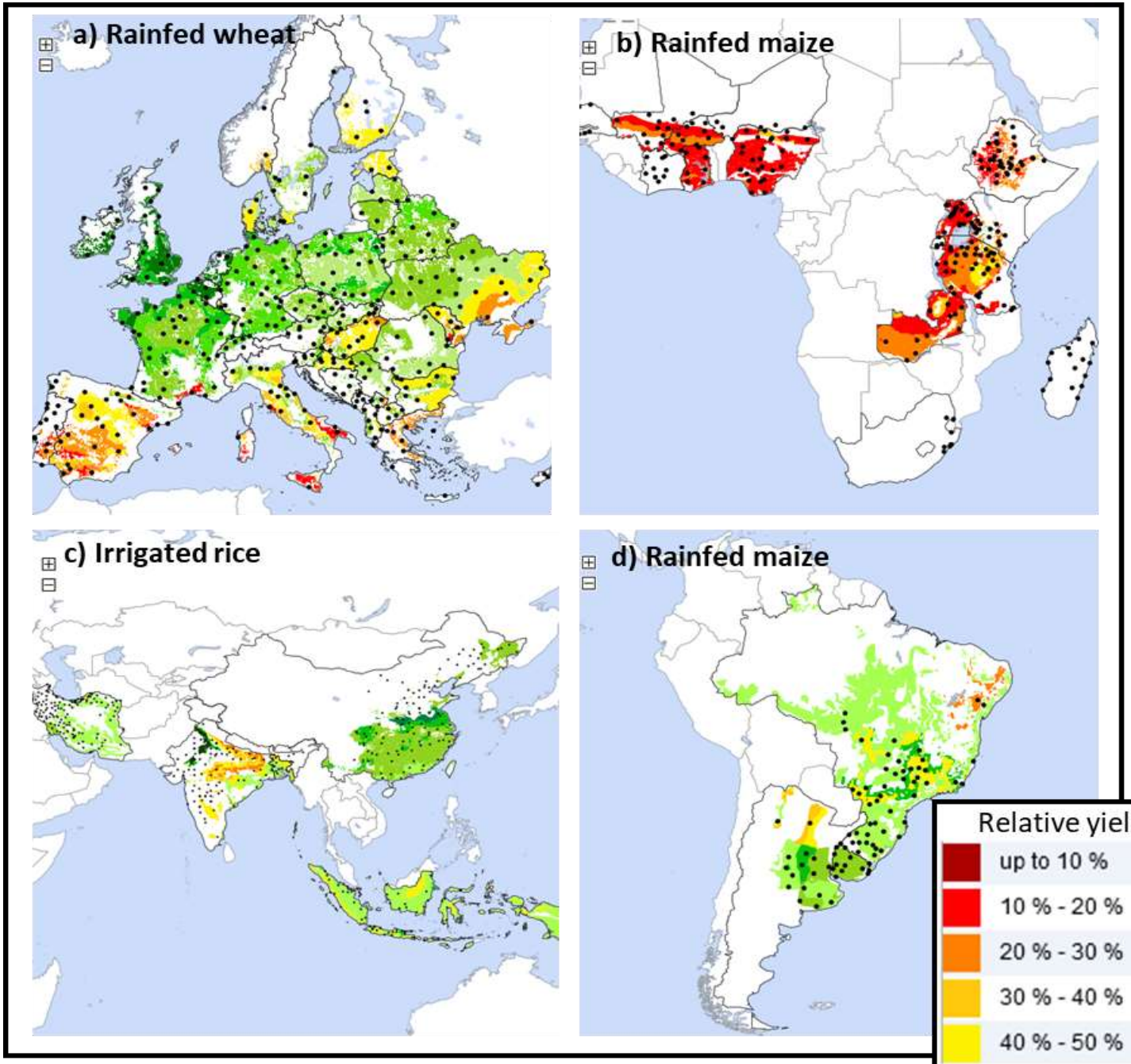
Can sub-Saharan Africa feed itself?

- on current cropland with intensification?
- and with crop area expansion?
- how does this work out for crop nutrient requirements?
- and for GHG emissions?

- Five main cereals: maize, millet, rice, sorghum, wheat (ca. 50% of crop area and 50% of caloric intake in SSA)
- In 10 countries (54% of population and 58% of crop in area in SSA)

- Joint work with country agronomists from each of the ten African countries and industry

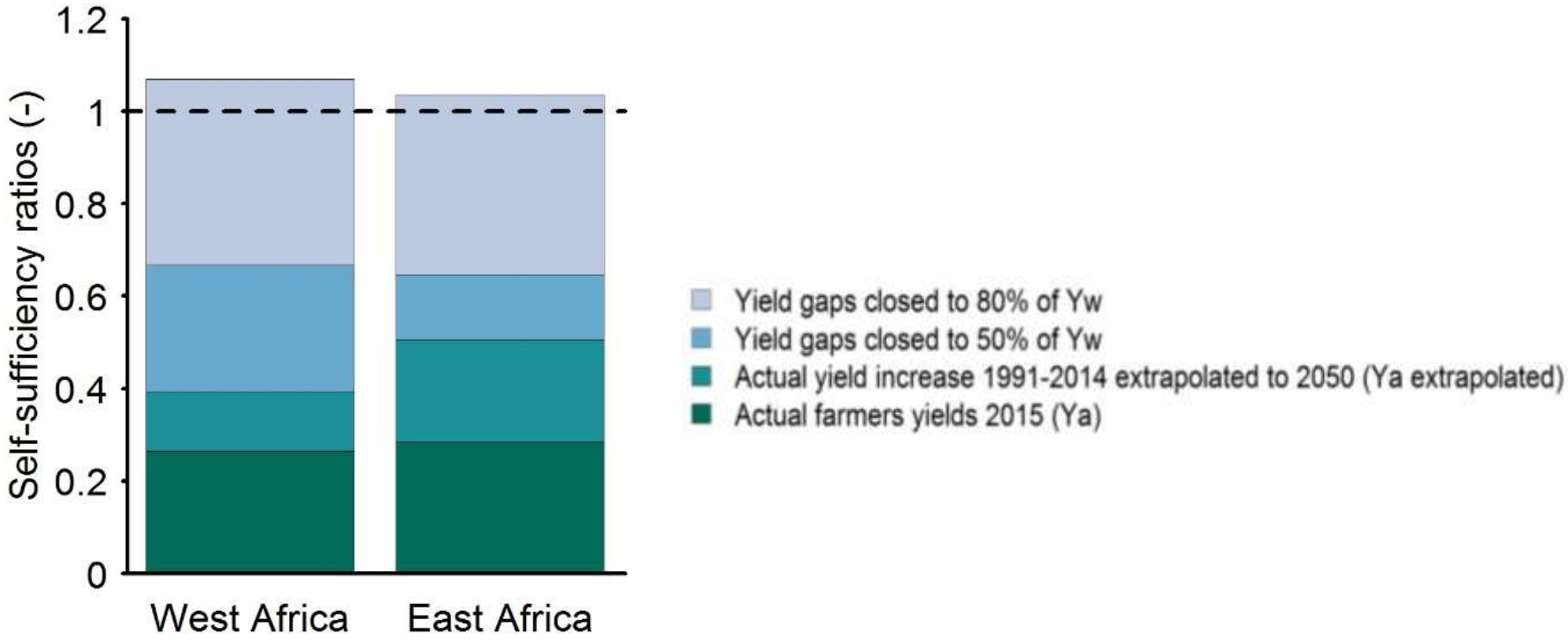
Global Yield Gap Atlas



http://yieldgap.org/

Global Yield Gap Atlas

Intensification: cereal self-sufficiency 2050



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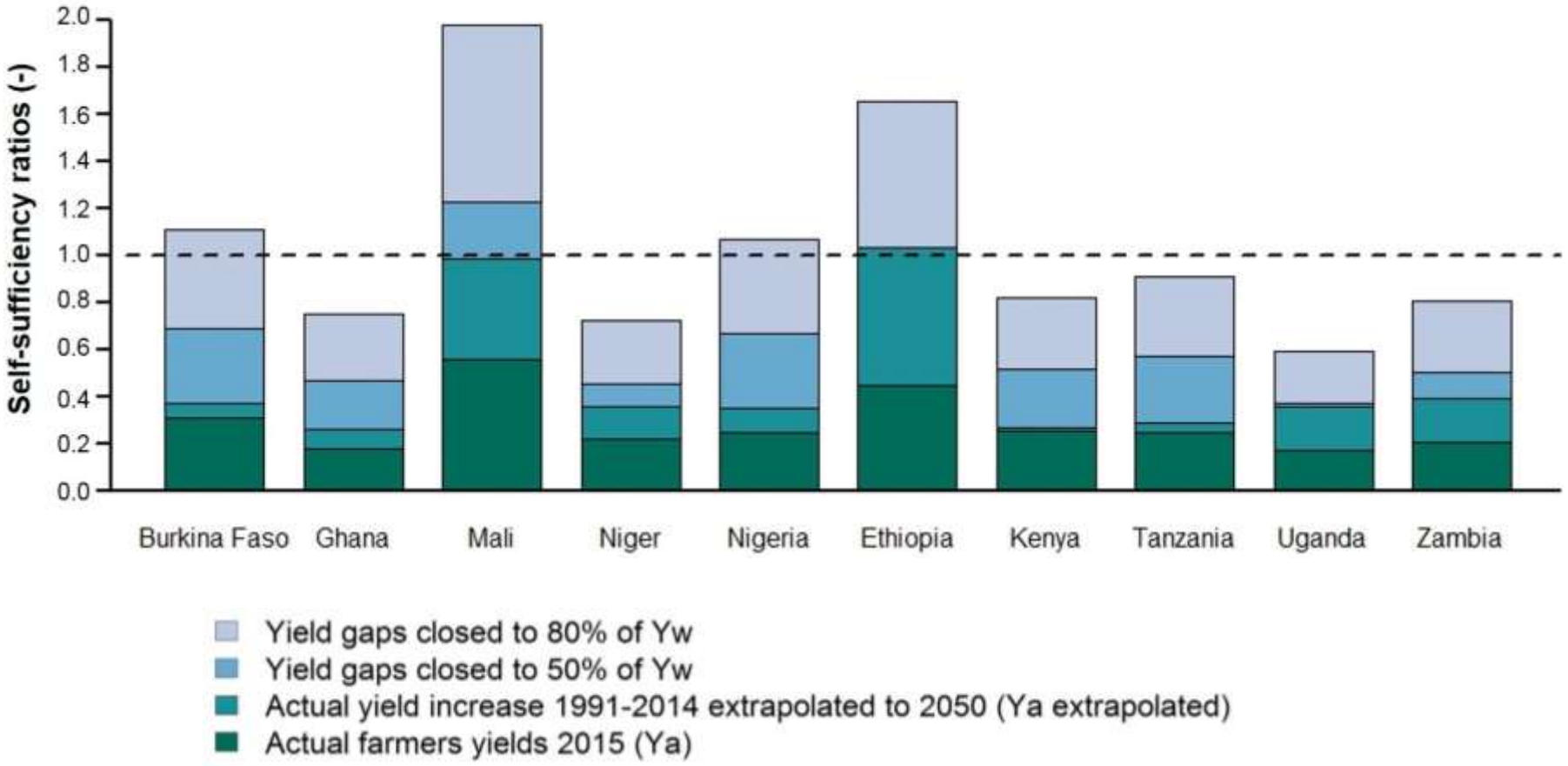
Update of: Van Ittersum et al., 2016 (PNAS)

Cereal self-sufficiency 10 countries - 2050



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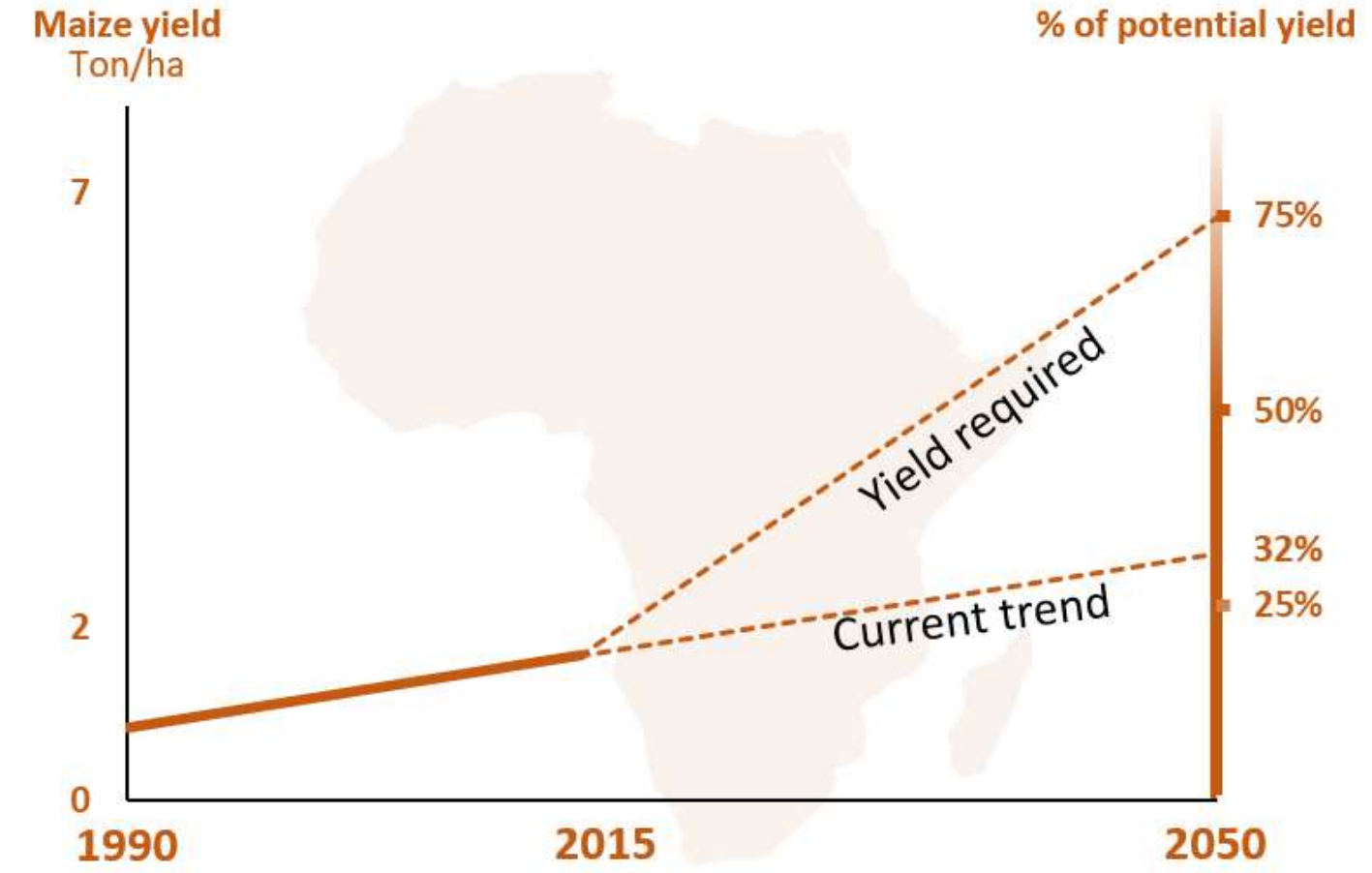
Update of: Van Ittersum et al., 2016 (PNAS)

Necessary trendbreak – maize yields



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Van Ittersum et al., 2016 (PNAS)

If a successful intensification is not achieved...

The consequences in terms of:

- cereal self-sufficiency and/or
- area expansion (GHG, biodiversity!)

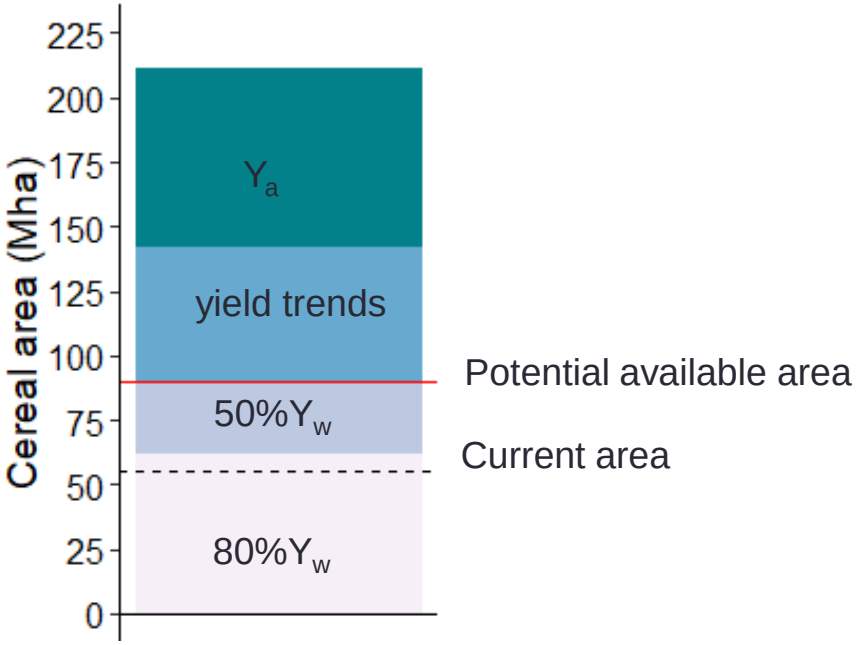
will be huge!

Next questions:

- what is possible in terms of area expansion?
- what are nutrient requirements for intensification?
- what is climate-smart?

Self-sufficiency through area expansion?

- Current area is just enough with 80% Yw for ten SSA countries
- Potentially available area is just sufficient with 50%Yw
- Lower yields requires land that is not there!



Global Yield Gap Atlas

Update of: Van Ittersum et al., 2016 (PNAS)

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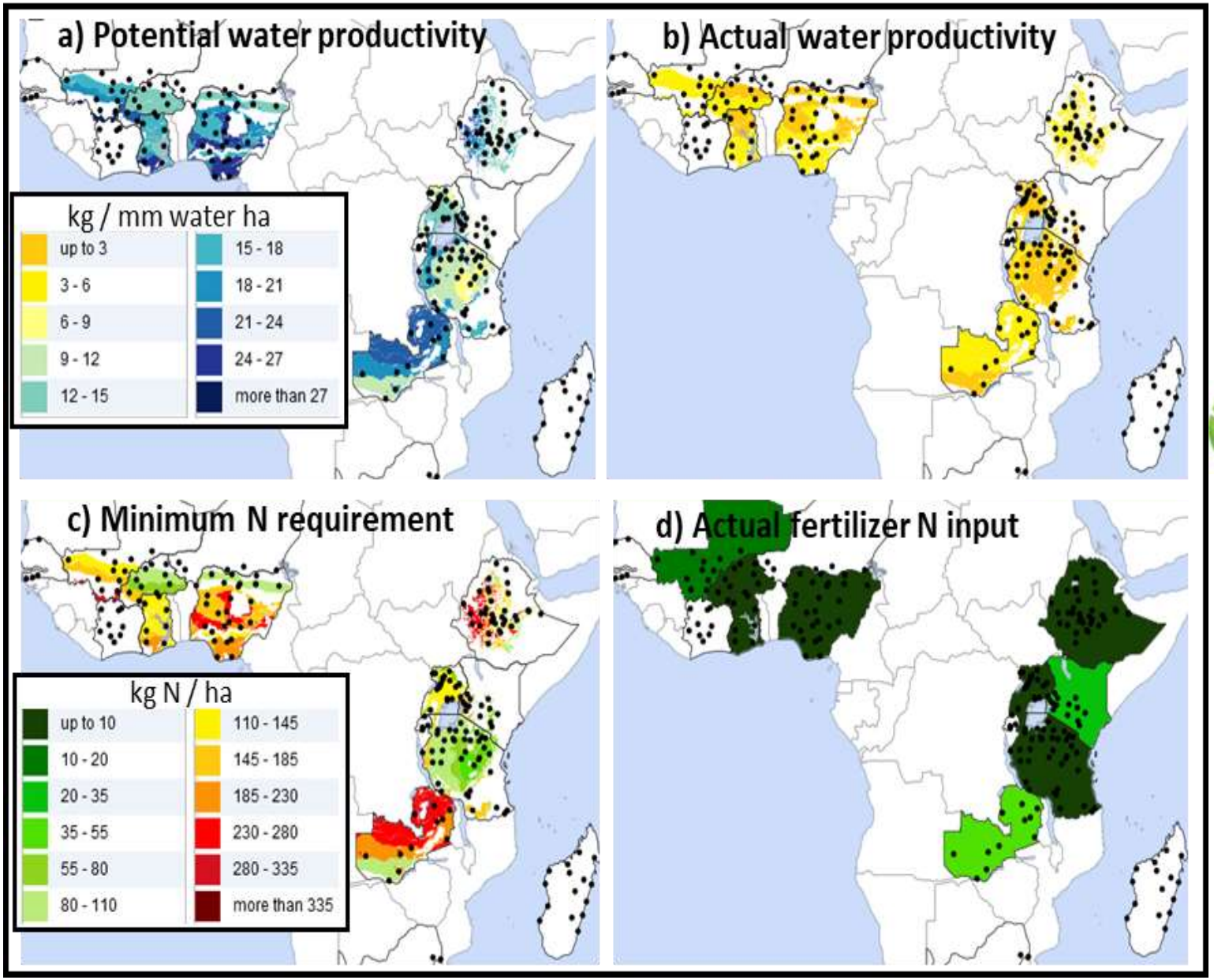
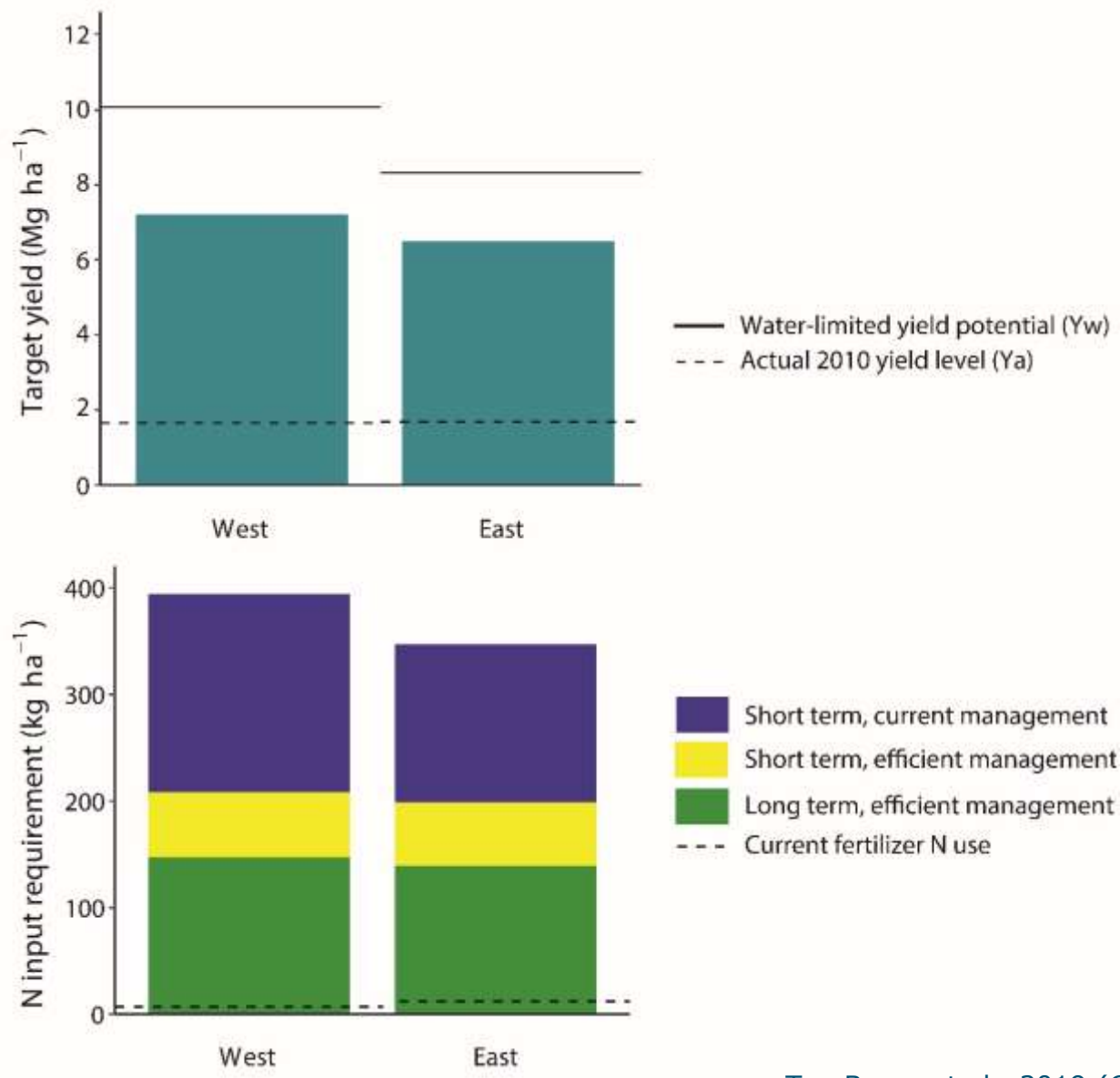


http://yieldgap.org/

Global Yield Gap Atlas

Nitrogen requirements for maize self-sufficiency



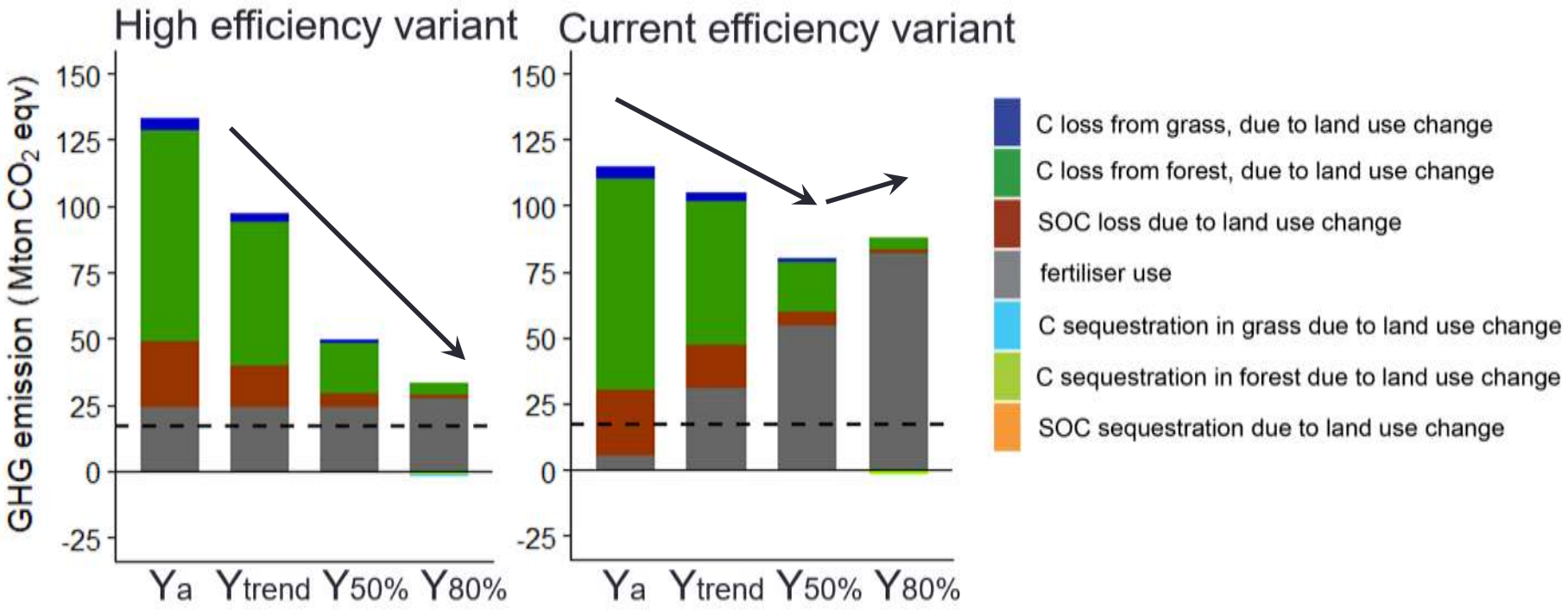
Ten Berge et al., 2019 (Global Food Security)

Four intensification scenarios

- S1: Ya scenario (2015)
- S2: Ya trend extrapolated to 2050
- S3: 50% Yw
- S4: 80% Yw

- All complemented with area expansion to achieve SS=1

Total GHG emission for maize in 2050 for SS=1



All complemented with area expansion to achieve SS=1

High agronomic N use efficiency crucial => good agronomy!

Global Yield Gap Atlas

Van Loon et al., 2019 (Global Change Biology)

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To conclude

Awareness:

- The size of the challenge for SSA is unprecedented!
- Intensification seems the only feasible pathway, requires a lot of crop nutrients *and* can be climate-smart
- Nutrient requirements cannot be met from organic sources
- Good agronomy is essential

And then?

- Public-private efforts
- at macro level: e.g. Abuja 2 summit on ‘Soil fertility and fertilisers’, convened by African Union
- at micro-meso level: e.g. scaling of experimentation, decision support systems, scaling of farms and mechanisation

A Marshall plan for SSA?

Future harvest

Thank you for your attention!

Acknowledgements:

The donors of this work

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