



# “Sustainable agriculture”: what is it?

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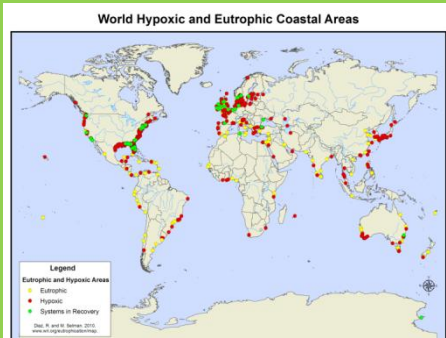
# The concept of “Sustainable agriculture” is often misconstrued, because... (1)



- Management of a piece of land impacts on multiple “currencies”
  - Carbon
  - Land use
  - Water use and impacts
  - Biodiversity
  - (social....economic....)
- And they may well trade-off against each other



# The concept of “Sustainable agriculture” is often misconstrued, because... (2)



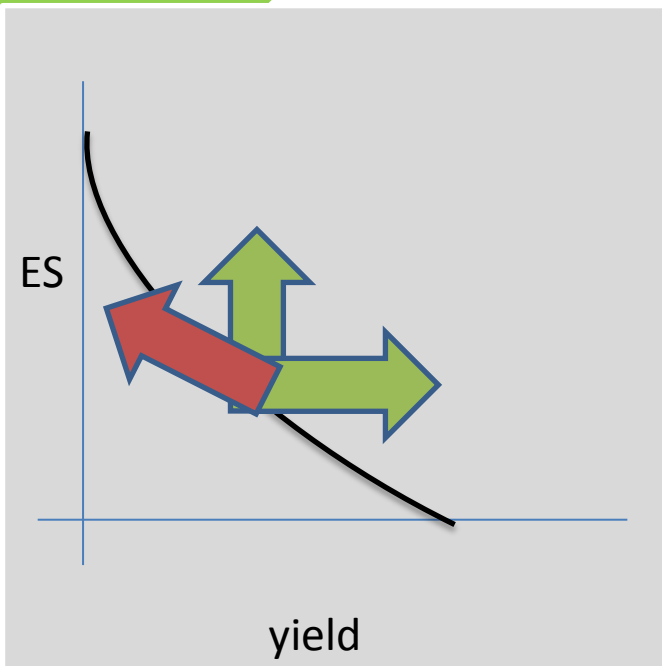
- management of a piece of land can have distant effects:
  - downstream pollution, water extraction, reduction in habitat, greenhouse gas emissions
  - Thresholds in ecological function where the same action can have different outcomes e.g. population viability
  - Market driven effects (point or diffuse) e.g. EU and organic production
- Need to assess system wide impacts: “sustainable food systems”



# A farming system is *more* sustainable...



- If yields stay the same AND environmental benefits *increase*
- Or, if yields grow and environmental benefits stay the same
- If yields drop whilst environmental outcomes increase it may be *less* sustainable due to the need for “extra land”





# “Sustainable Agriculture” needs both...



- Management of impacts within plots/fields
  - Resource use efficiency, good soil management, precision ag etc
- management of land to maintain other services
  - Water, carbon storage, cultural value, pollination, natural enemy services, biodiversity, recreation, wild food etc
  - Network of non-cropped land at landscape scale





# Sustainable agriculture requires landscape view:



If an area (“landscape”) has to produce both food and “ecological goods”, do you get more of both if (a) you farm extensively throughout or (b) you separate some land to specialise in food and some to specialise in ecological goods?



*Is specialising the key to sustainable production?*

**often: yes**

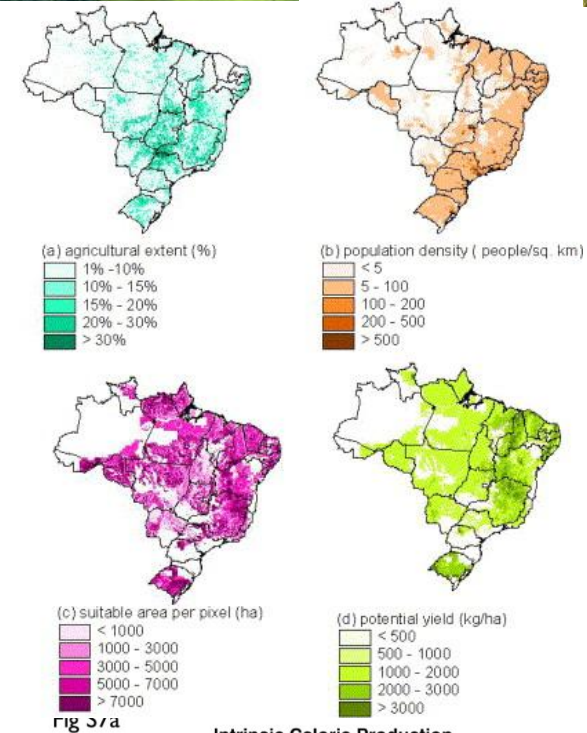
(Hodgson et al 2010, Benton et al 2011, Phelan et al 2011)



# Multiple spatial scales



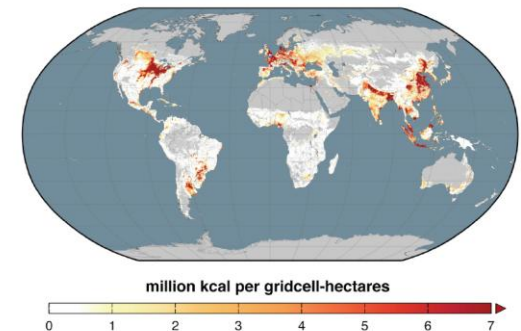
- Within an area
- Between areas within a country
- Between countries



Cost/benefit analyses at each scale: some places are better at producing food, others other services. What is optimal depends on what each place is “good” at and how much it would cost to convert to a different “function”

(Benton et al 2011, World Agriculture)

Intrinsic Calorie Production





# Conclusions



- Systems approaches needed
  - Grow more, with less resource and with less impact
  - Sustainable Agriculture requires planning or managing at the landscape scale
  - Recognise and manage indirect, distant and trans-national impacts
  - Recognition of the problem and that it is impossible to have a perfect solution from any one angle due to trade-offs and indirect effects
- Difficult challenges
  - More research needed
  - Difficult governance/policy areas





Thank you!

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