



Sustainable Nutrition: Sustainable Paths and Challenges for the Food Industry

Paul Nestel Lecture
Food Industry Forum for Nutrition Research

Adelaide, 2011

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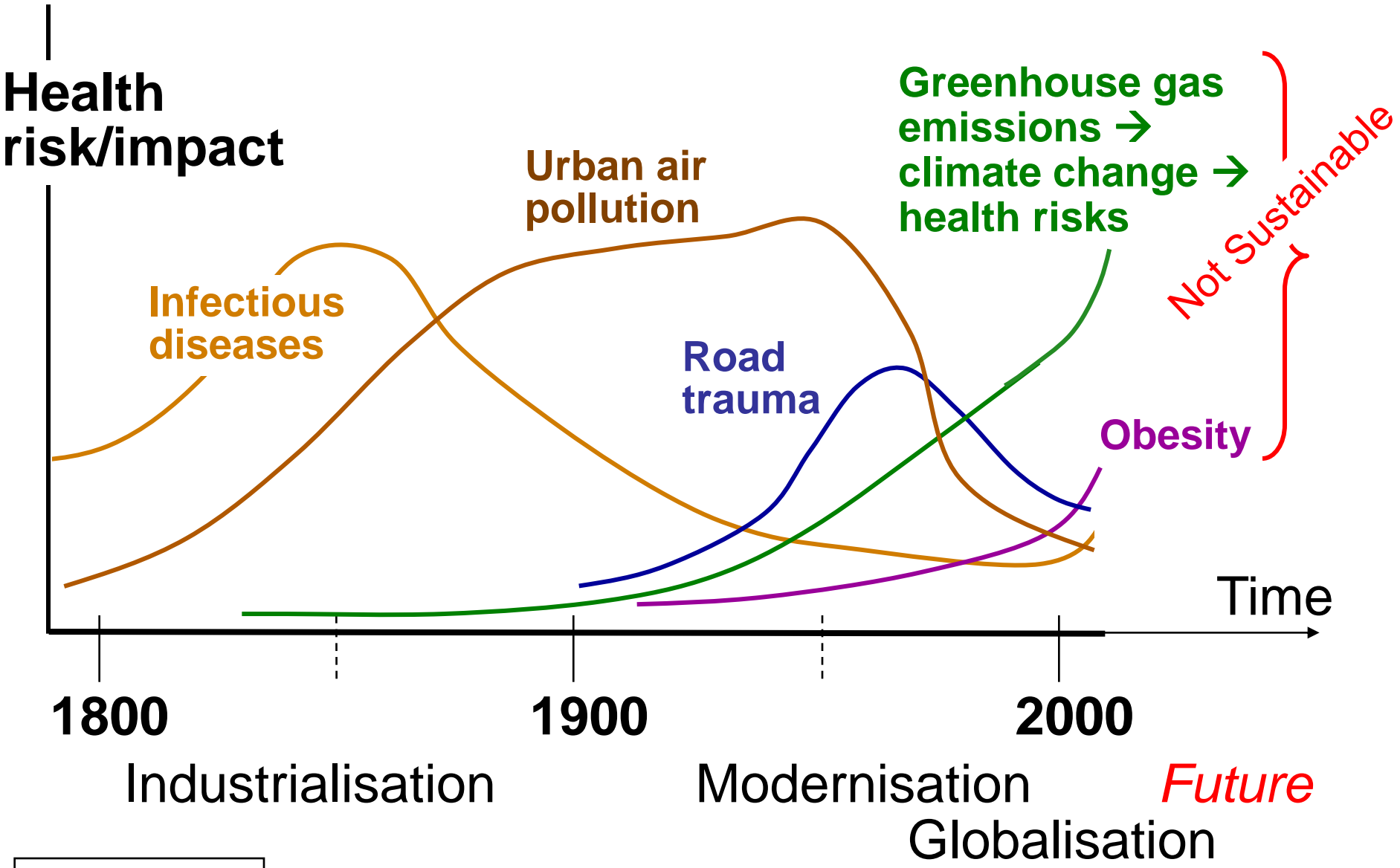
Food Industry in Australia

Four things to sustain

- 1. Environmental resource base**, from where all food originates
- 2. Health gains in western societies over past two centuries** – substantially due to gains in food yields, quality and safety
- 3. Reputation as responsible environmental and social citizen**, attuned to needs of the future
- 4. Viability and profitability**

Rise-and-Fall of 'Urban Health Penalties'

(Developed Country Experience)



The World Feeding Challenge

- World Food Production will need to double by 2050 to feed a population:
 - 30% bigger (9.2 bn) than now (6.9 bn)
 - Wealthier [depending ...?]
 - More urbanised
 - Aspiring to eat more red meat

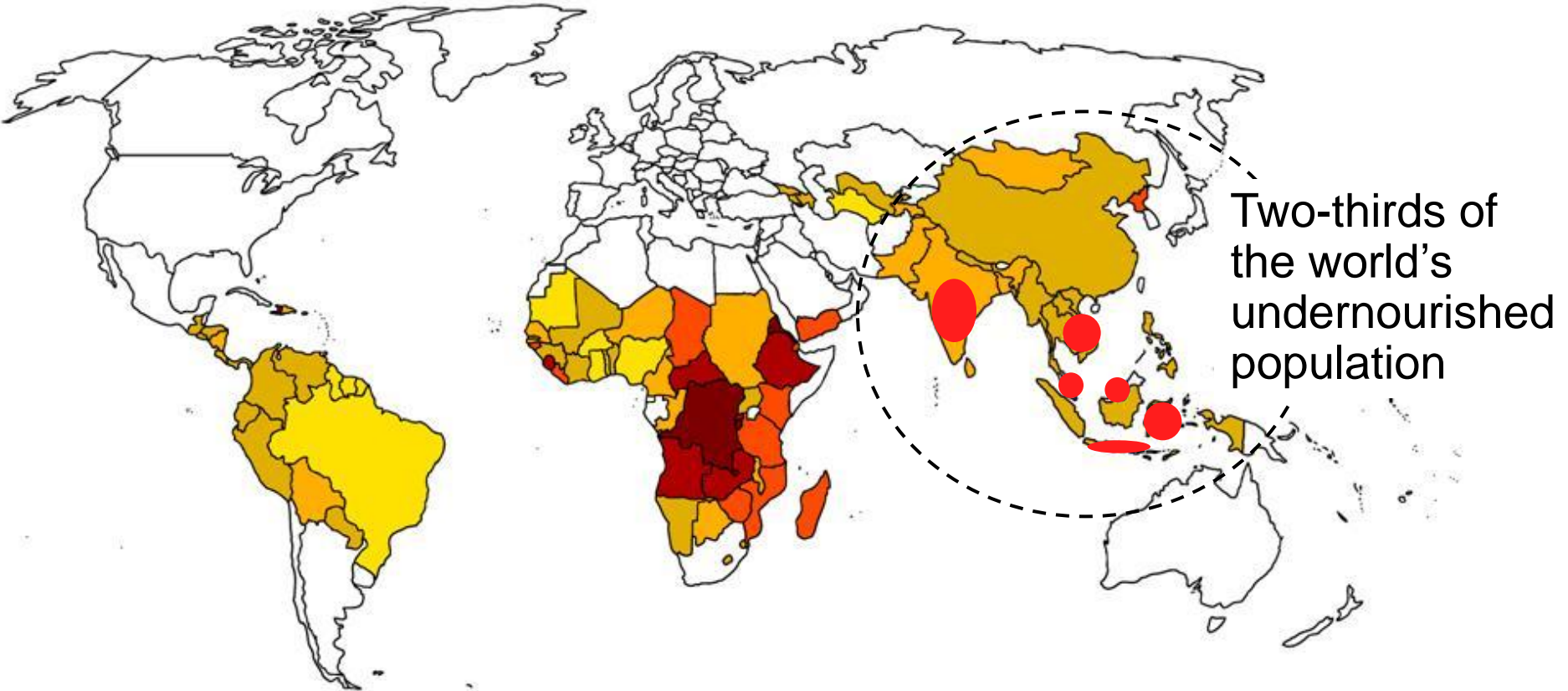
Half a Decade of Rising (Global) Food Prices

Population pressure, fuel and fertiliser costs, soil degradation, water shortages, speculation and hoarding, biofuels, regional climate change

FAO Food Price Index (Years 2002-2004 = 100)

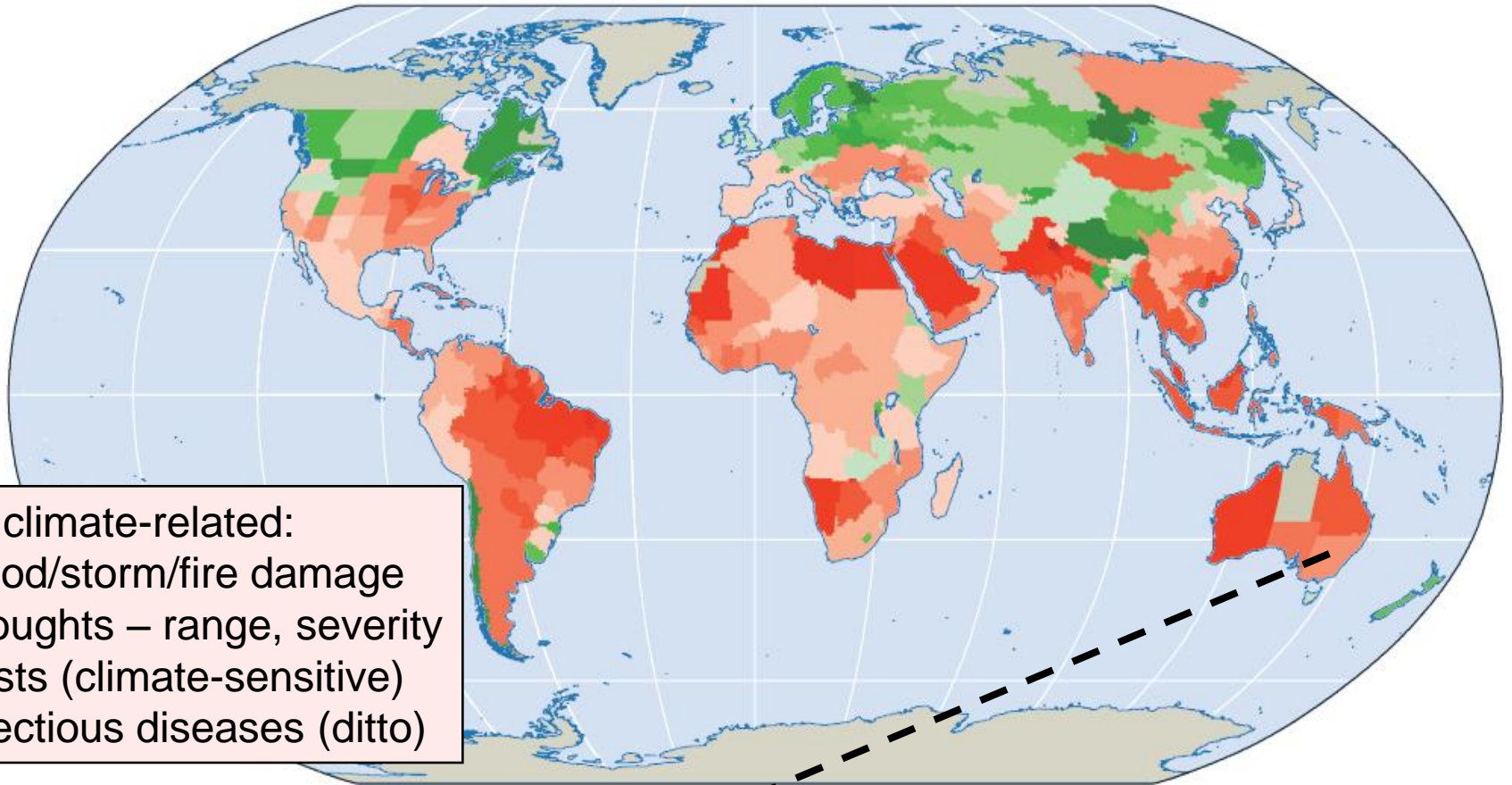


Prevalence of Malnourishment, 2009



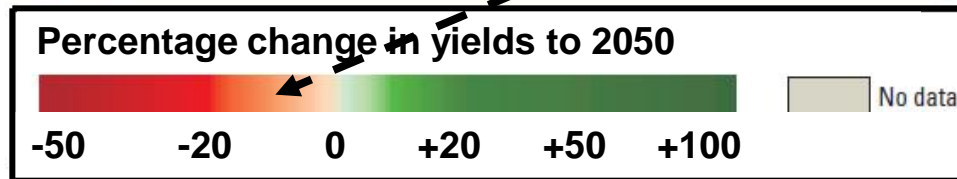
● Reduced rainfall, 2050 [under SRES A2]

CLIMATE CHANGE & MODELLED IMPACTS ON CEREAL GRAIN YIELDS, TO 2050: Poor Countries (mostly) Fare Worst



Plus climate-related:

- Flood/storm/fire damage
- Droughts – range, severity
- Pests (climate-sensitive)
- Infectious diseases (ditto)



UN Devt Program, 2009
World Bank, 2010

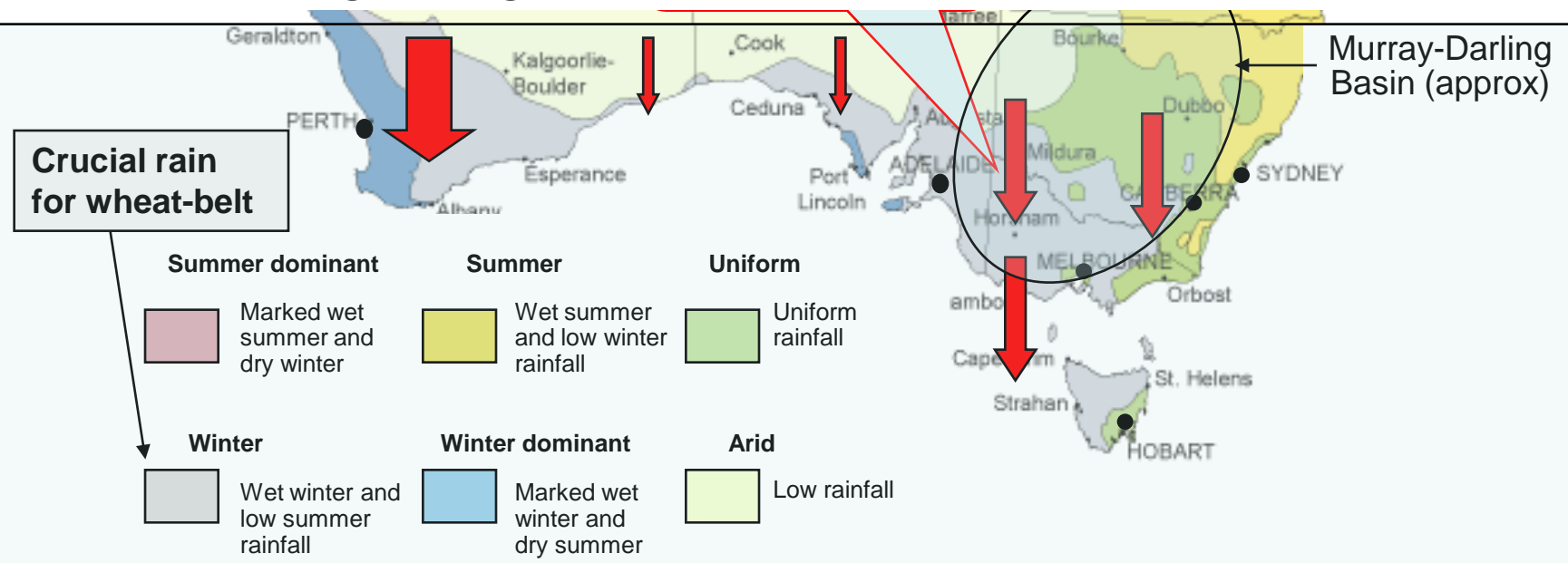
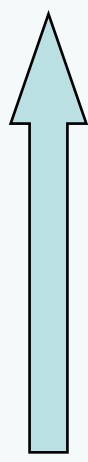
Australia's seasonal rainfall zones

climate change → farm yields → health impacts

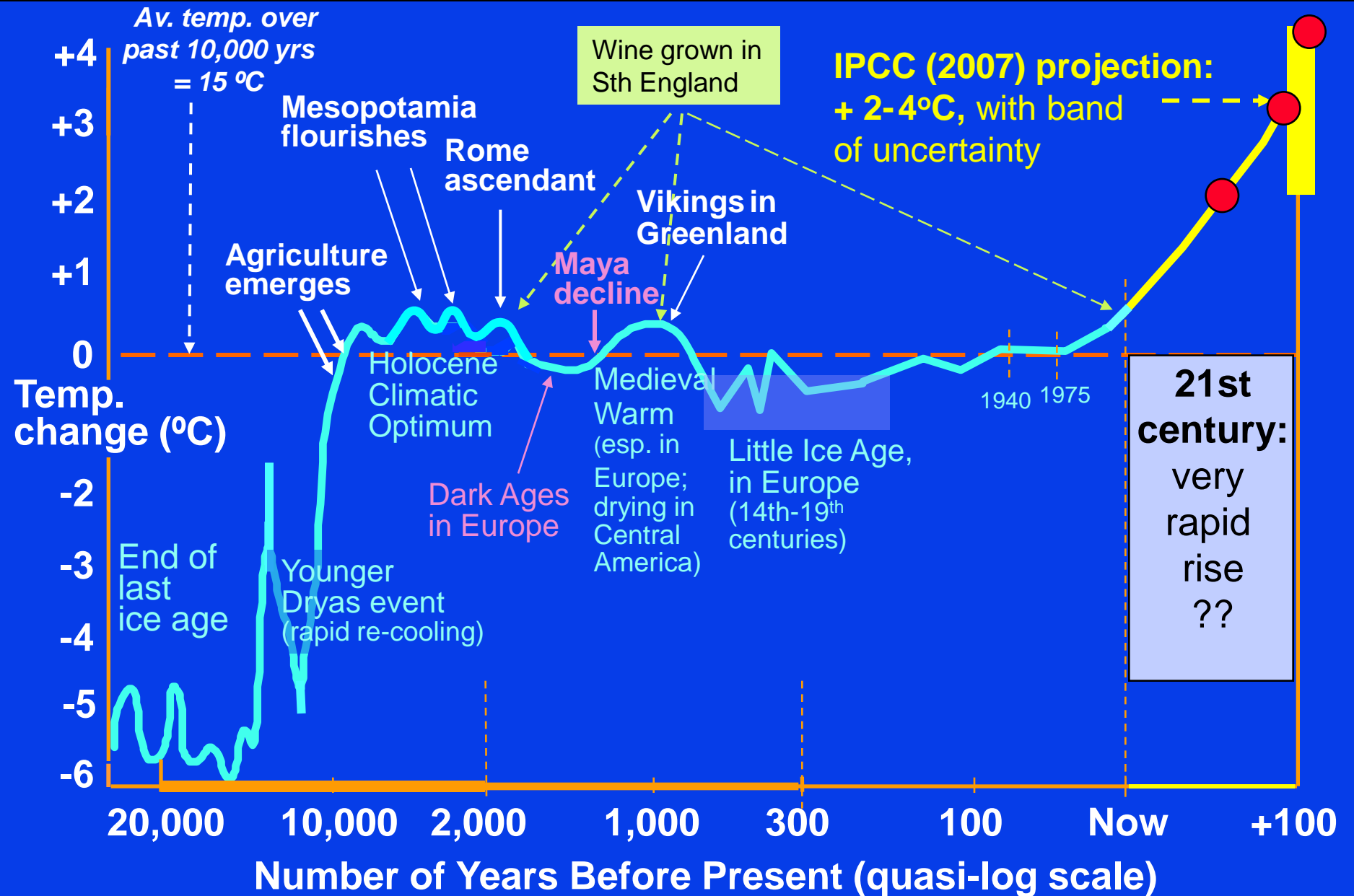
Increasingly rain-depleted upper troposphere



Sub-tropical ridge: high pressure, low rain [centred on ~30° Sth]



Global Temperature: Past 20,000 Years; Next 100 Years



“Sustainability” means avoiding:

- **Permanent** loss of natural environmental assets that our biological wellbeing depends on:
 - e.g. key species/ecosystems, ‘fossil’ aquifers, Holocene climate, stratospheric ozone
- **Temporary or semi-permanent** loss of social, demographic, cultural & economic assets that supports our overall wellbeing:
 - e.g. social cohesion, built ‘capital’, political stability, health and longevity

Palm Oil: from Southeast Asia

Saturated fat, rich source: now widely used in processed foods*

Deforestation → Orangutan extinction
(Indonesian 'Borneo': Kalimantan)

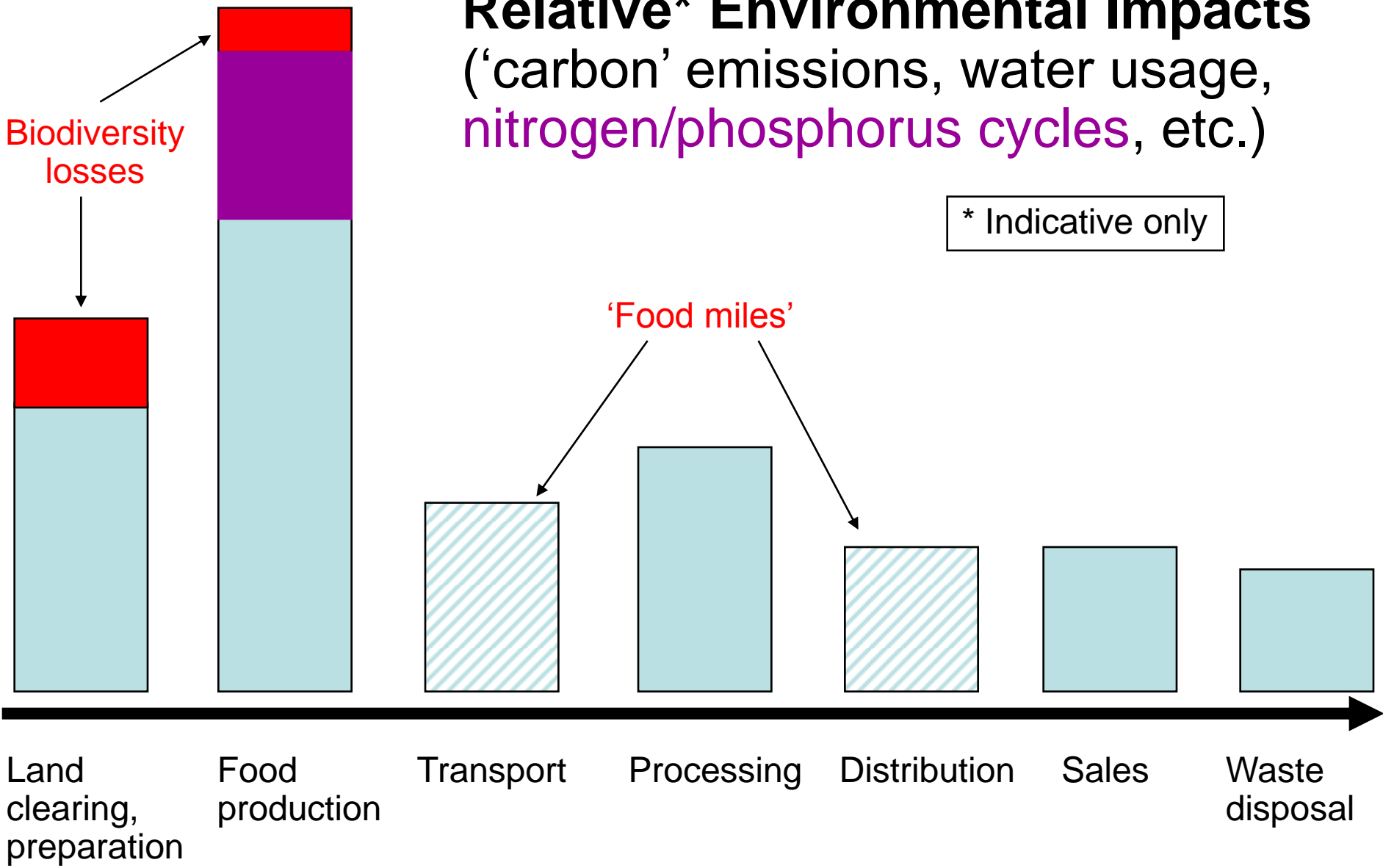
Deforestation → Greenhouse gas emissions

* Note: Recent new federal legislation to include labelling of palm oil on food products

Relative* Environmental Impacts

(‘carbon’ emissions, water usage, nitrogen/phosphorus cycles, etc.)

* Indicative only



'Global Environmental Change'

Planetary Overload Syndrome

Human aggregate pressure is disrupting/depleting many of Earth's environmental systems:

- greenhouse gas build-up and climate change
- stratospheric ozone depletion (halons, N₂O, etc)
- ocean acidification (CO₂ uptake)
- nitrification of soils & waterways (N bioactivation)
- loss of biodiversity (ecosystem disruption)
- depletion of freshwater
- degradation of fertile land
- exhaustion of fisheries

See also: Rockstrom et al. *Nature* 461, 2009

Long-term environmental sustainability

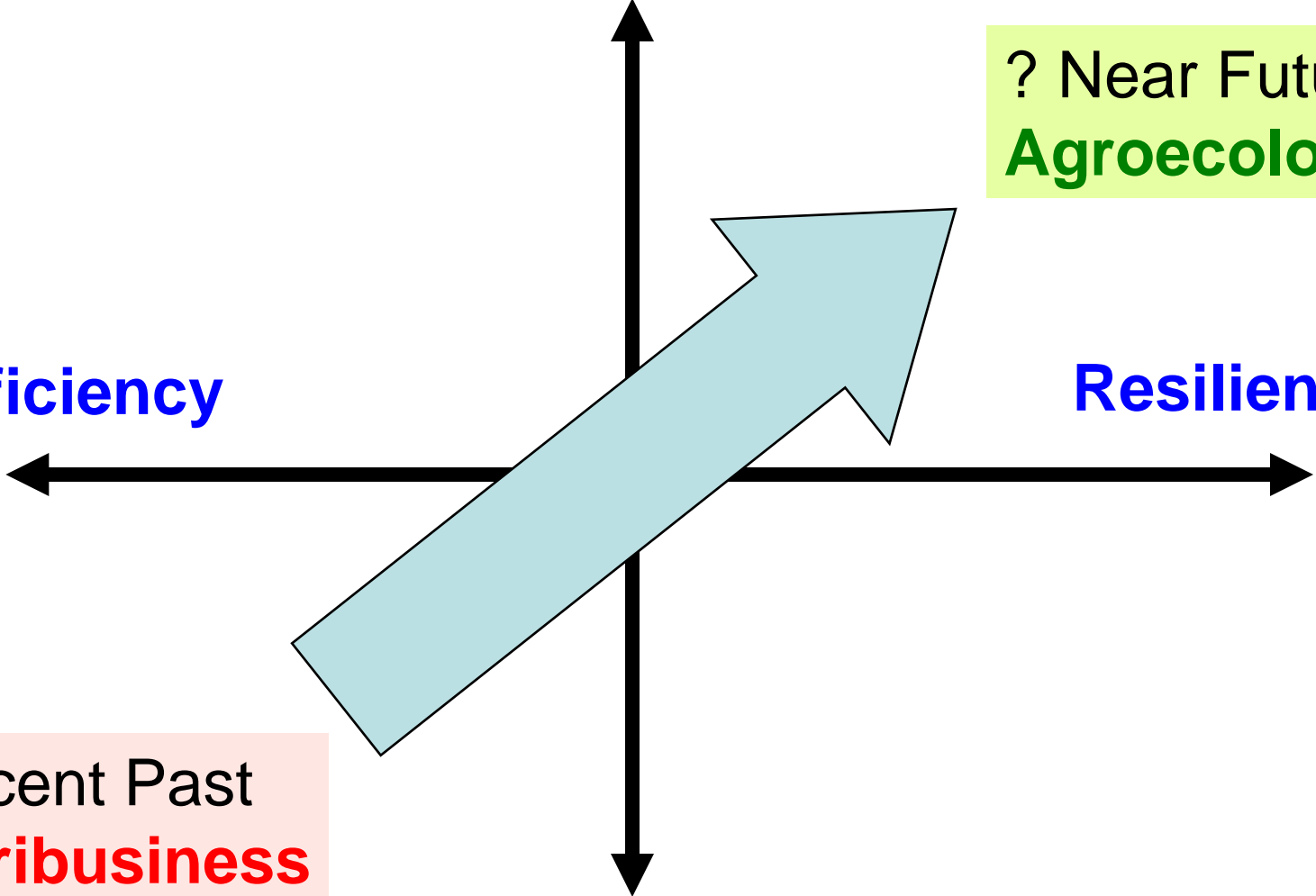
? Near Future
Agroecology

Efficiency

Resilience

Recent Past
Agribusiness

Near-term profitability



GLOBAL LOSS OF FOOD-CROP DIVERSITY

**Commercial species losses
1903-1983:**

	RESILIENCE	EFFICIENCY
Beet	288	17
Cabbage	544	28
Sweet Corn	307	12
Lettuce	497	36
Melons	338	27
Pea	408	25
Radish	463	27
Squash	341	40
Tomato	408	79
Cucumber	285	16
<hr/> TOTALS <hr/>	<hr/> 3,879 <hr/>	<hr/> 307 <hr/>

LOSS: ~ 93% in just 80 years

Use of Antibiotics in Animals

- Therapeutic

- sick animals

- Prophylaxis

- prevent infection

- Growth promotion

- weight gain
- feed efficiency



Antimicrobial resistance



Food Industry's Role in Sustaining the Nutritional Quality of Australia's Diet

Should, of course, look way beyond reliance on:

1. **Gene-tweaking**
2. **'Functional foods'**
3. **... and *Caveat Emptor***

What have we learnt from the ongoing rise in obesity and diet-related chronic diseases?

ULTIMATE HORROR MOVIE

INC



I SEE IT... A STORY OF OUR TIMES...
OBESITY MEETS GLOBAL WARMING!



moni



Prof Rob Moodie: Chair, National Preventive Health Taskforce, 2008-09:

“Obesity is a commercial success”



McDonald's first fast-food restaurant in New Delhi, India

Photo: Agence France Presse/Getty Images

Spurious Alternatives

Climate change: Natural variation, or human-induced?

Obesity: Excess energy input, or deficient energy output?

In each case, what matters is the *net change*: i.e, the balance between the two.

Some Current Views of the Food Industry

Voluntary (advertising) code – largely cosmetic

Energy-dense nutrient-poor processed foods are the cheapest – easy to sell

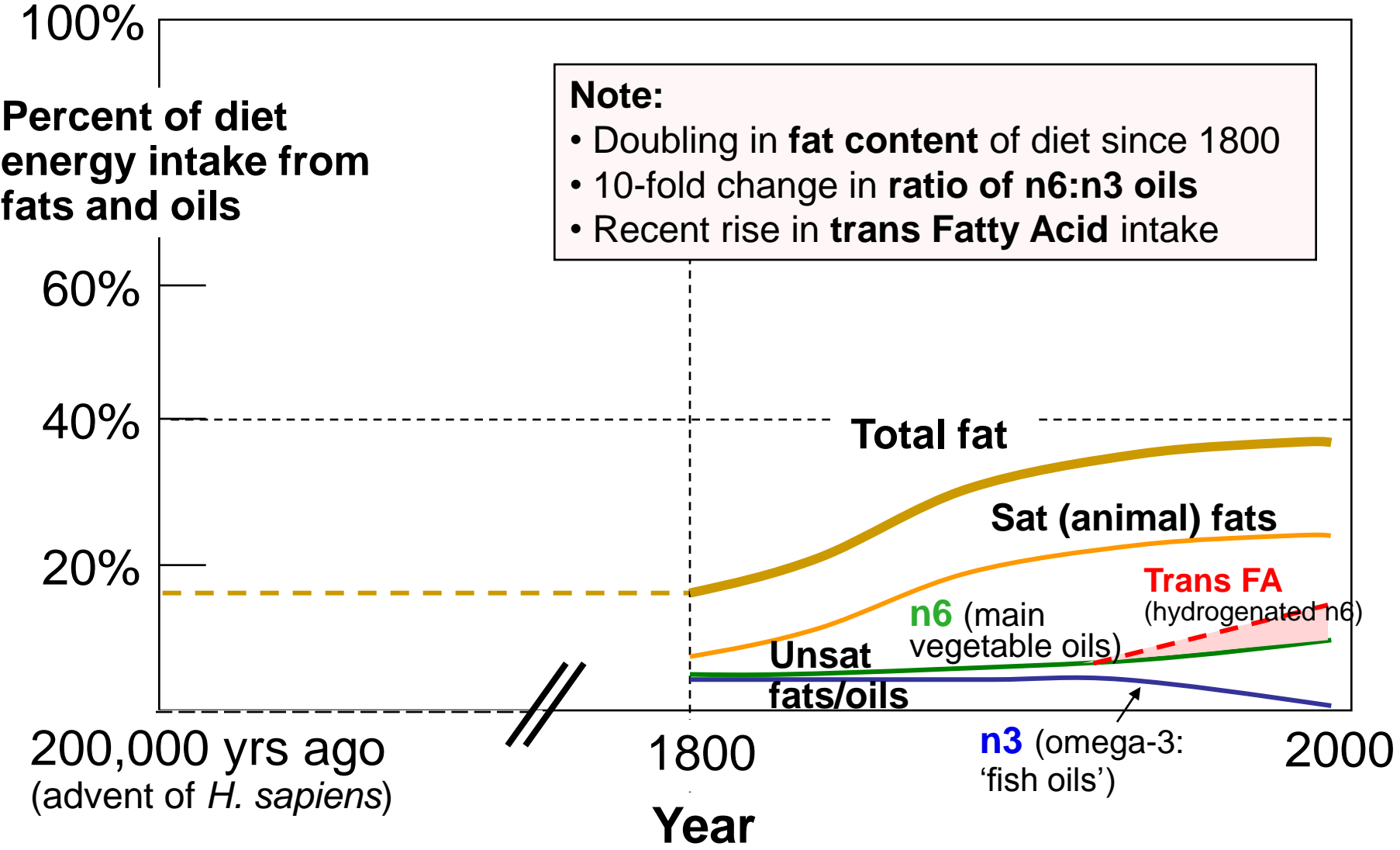
Resistance to proper-disclosure food labelling

Resistance to environmental considerations in national food /dietary guidelines

Food Standards ANZ is less overtly committed to protecting public health than, eg, Food Standards UK

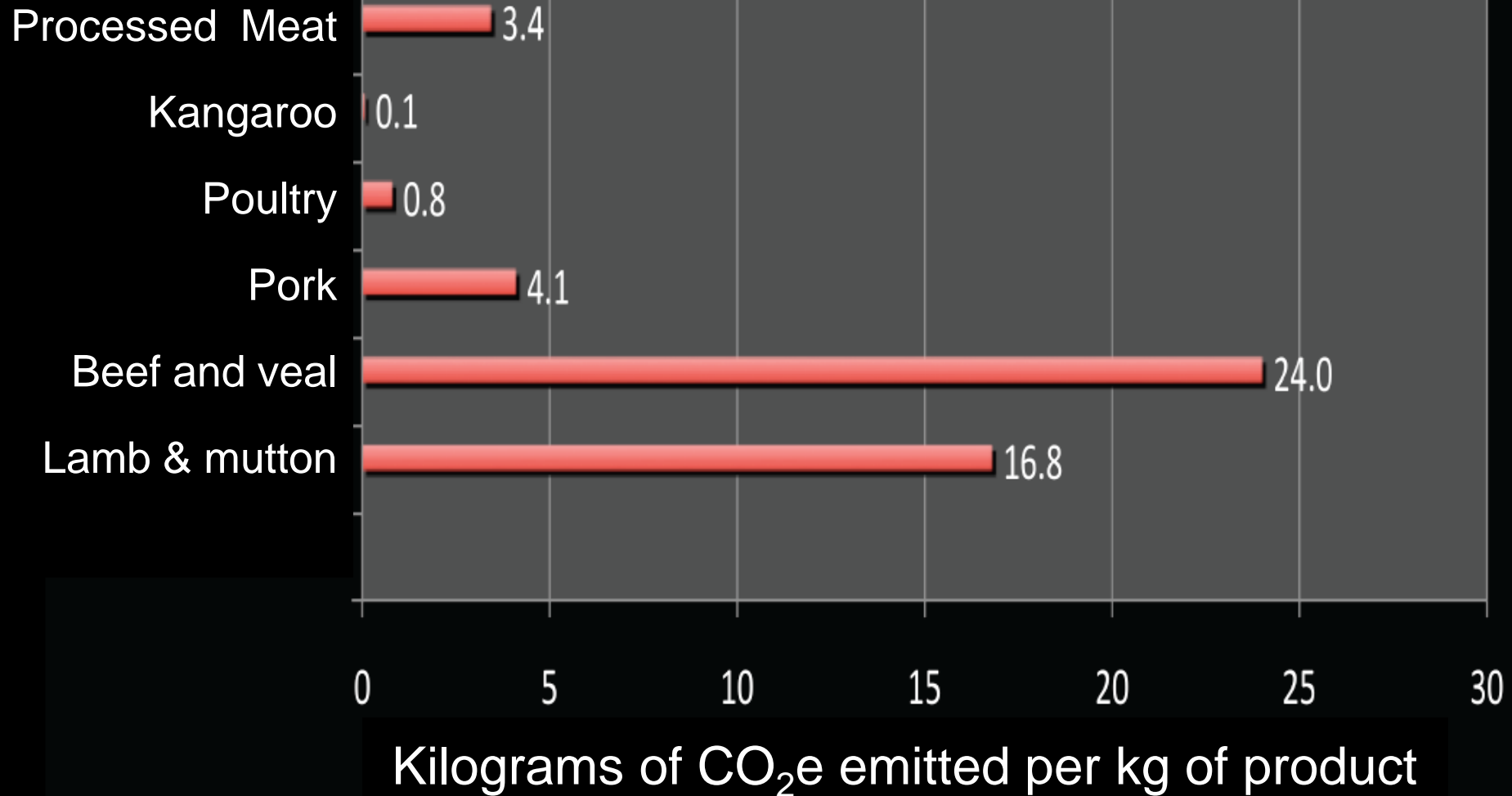
Cosy links with some research groups

Changes in Dietary Fat Content and Type since Industrialisation



Carbon 'Cost' of Meat Products

(carbon dioxide-equivalent emissions per kg)

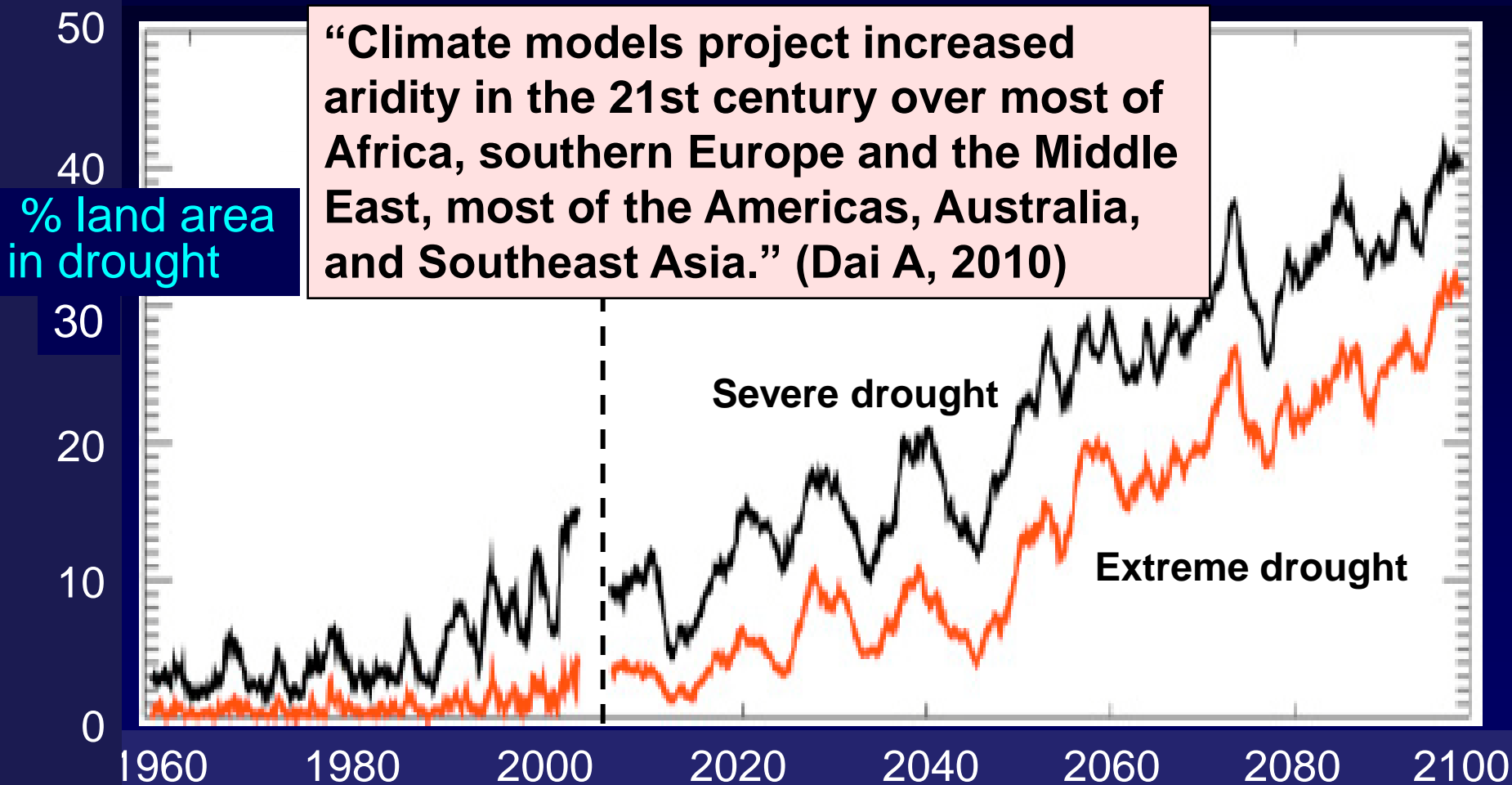


Adapted from Garnaut (2008) and Wilson and Edwards (2008)

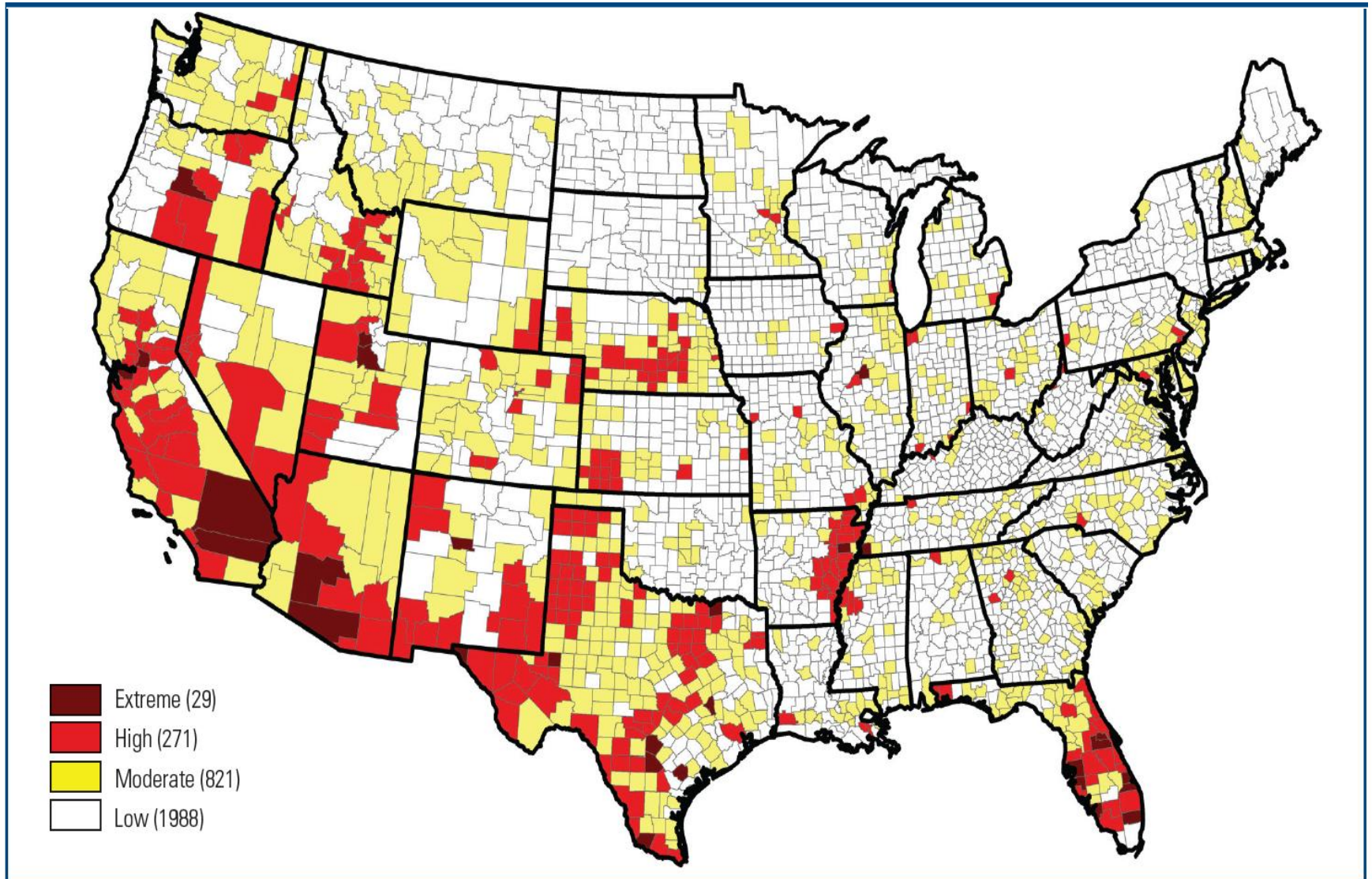
Courtesy of: M Abouzeid, 2010

Drought: Recent and likely future expansion under climate change

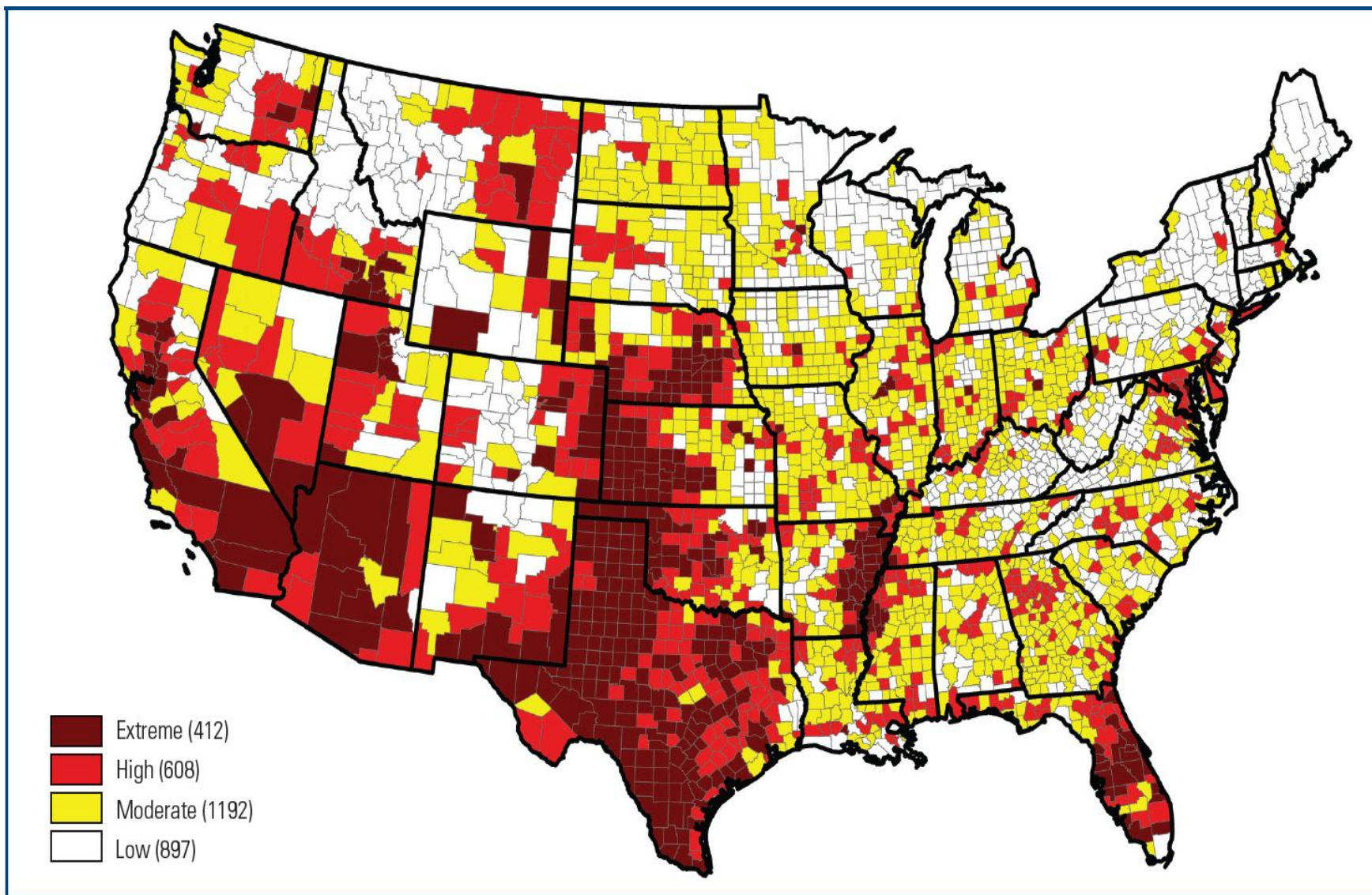
Percentage of world's land area in drought



Water Sustainability Index and Drought Risk **without** **Climate Change: USA 2050**



PLUS Climate Change: Water Sustainability Index and Drought Risk: USA 2050



US National Resources Defense Council, 2010

The Mayan Collapse, 760-910 CE:

Population growth, soil exhaustion, then drought
Can we Learn from History?



Uxmal, northern Yucatan (Mexico)

Long-term environmental sustainability

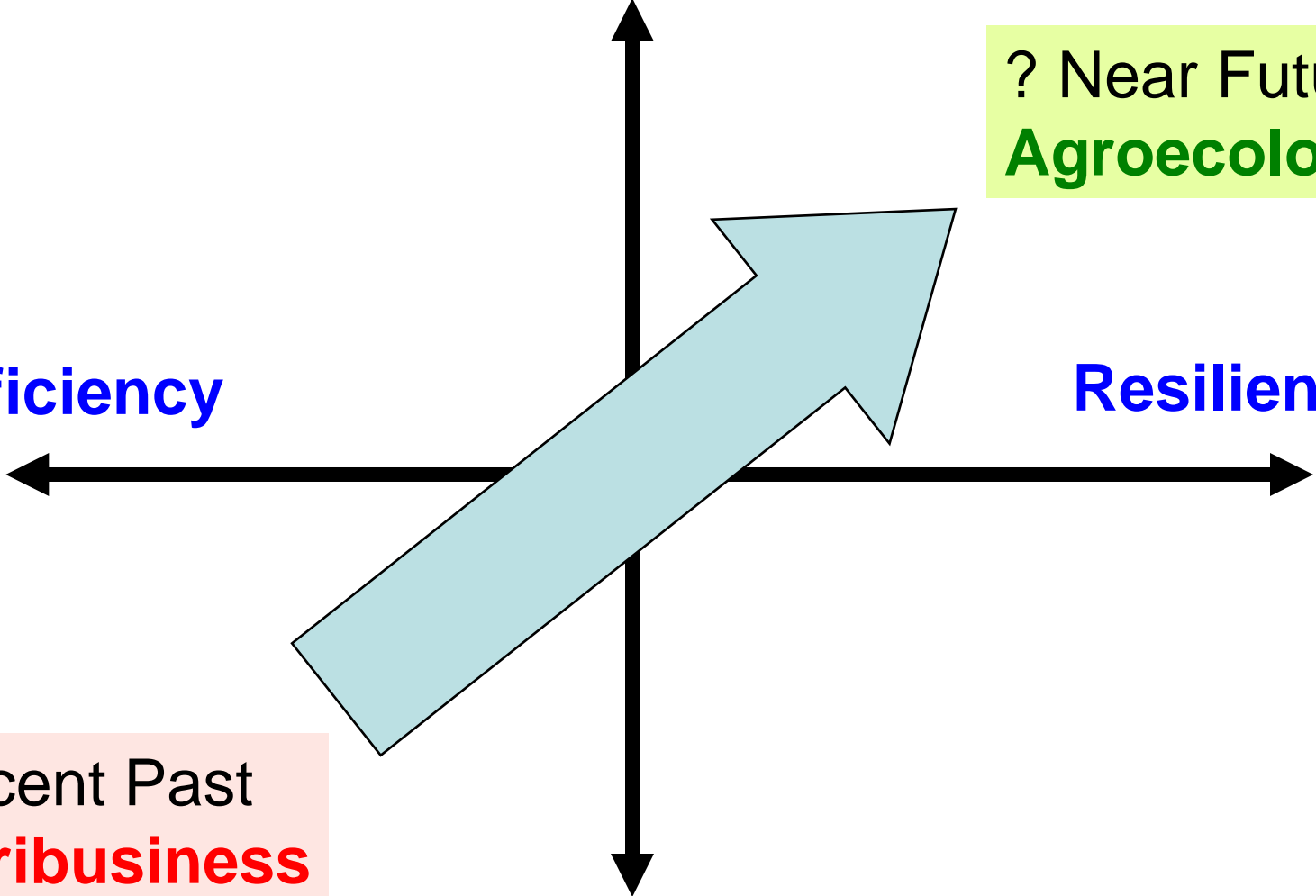
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**We have just
one planet**

Good planets are
hard to find



**And
that's All**

