

Famine: the Geography of Scarcity

Agricultural revolutions



We're half way through...

- 20th century agricultural revolutions
 - Soviet collectivisation and modernisation
 - The Green Revolution
 - Biotechnology and a New Green Revolution
 - Alternatives
- Feedback

What's in a name?

- Clarification on “hunter-gatherers” vs “farmers”



Firestick farming



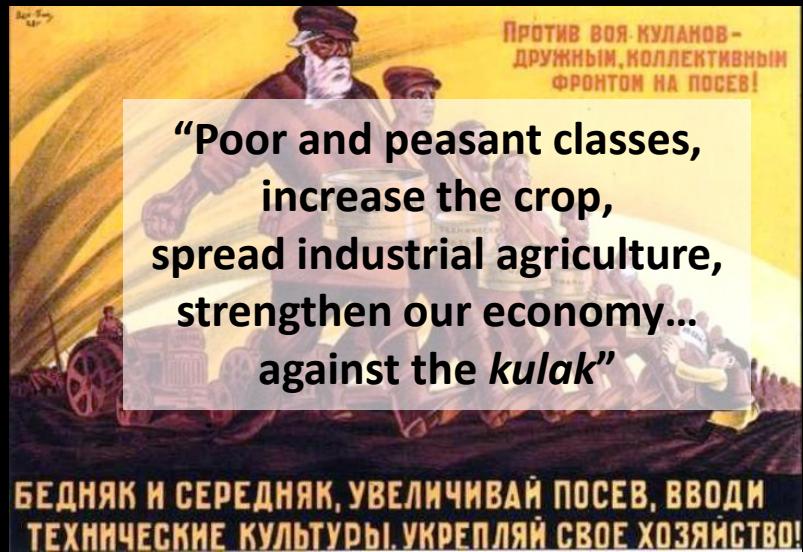
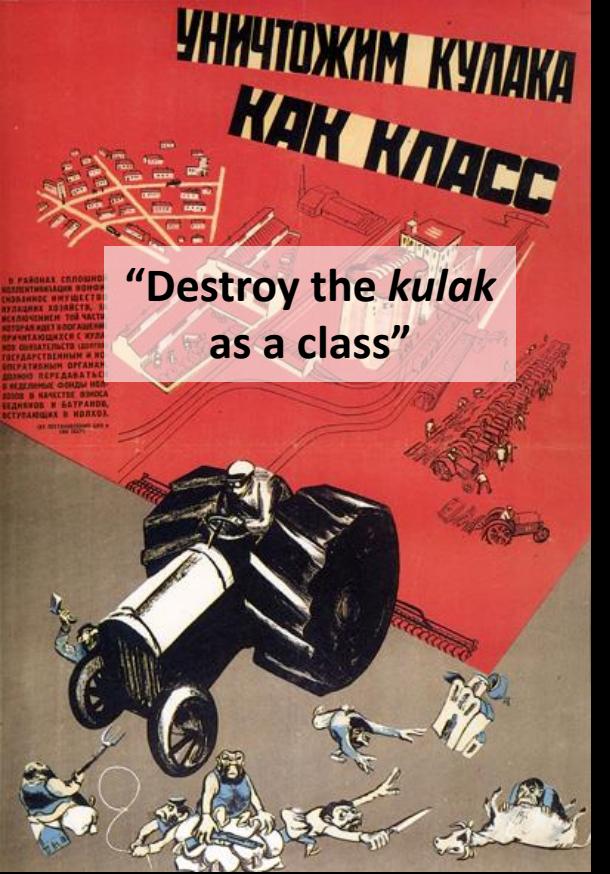
Harvesting yam daisies, Indented Head, 1835 AD



Village at Lake Condah, 1840 AD



Harvesting fish traps, Brewaranna River, NSW



Who were these Kulaks?

- Originally peasants who had acquired land from Tsarist-era estates on a repayment system
- “Kulak” became a more general term for anyone who resisted collectivisation
- Came to be seen as enemies of progress



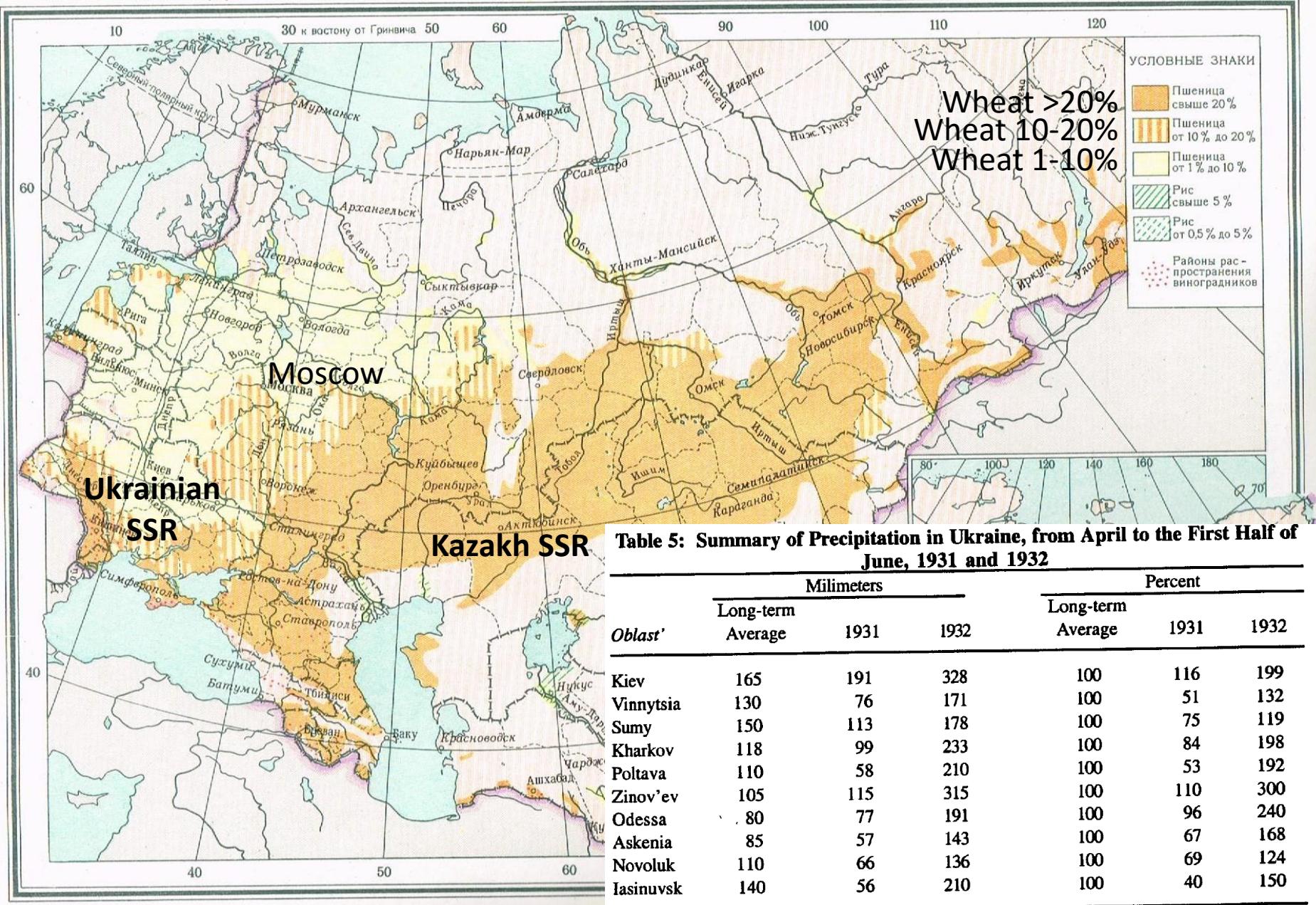
Stalin's response



- Policy of “dekulakisation” in 1930
- Authorised deportation; confiscation of grain and livestock; executions for hiding food (state property)
- Cause of the ‘Holodomor’ famine of 1932-33
- Other factors:
 - Soviet strategy of “divide and conquer” increased Ukrainian sense of identity, leading to cultural resistance
 - Collectivisation and mechanisation allowed food distribution to be centralised – policy pressure
 - Continued exports; refusal of foreign aid
 - Below average rainfall in 1931; wheat rust in 1932

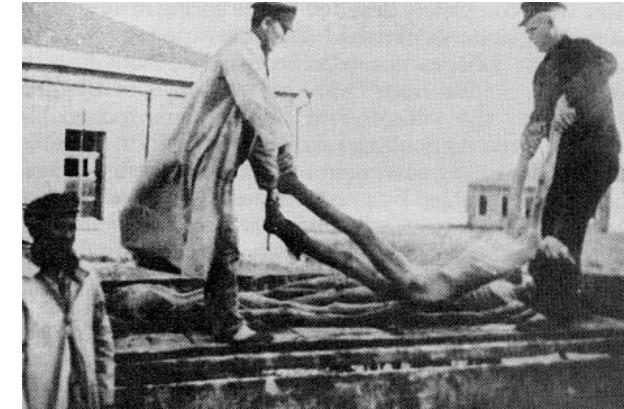
USSR: wheat, rice and grapevines (1959 map)

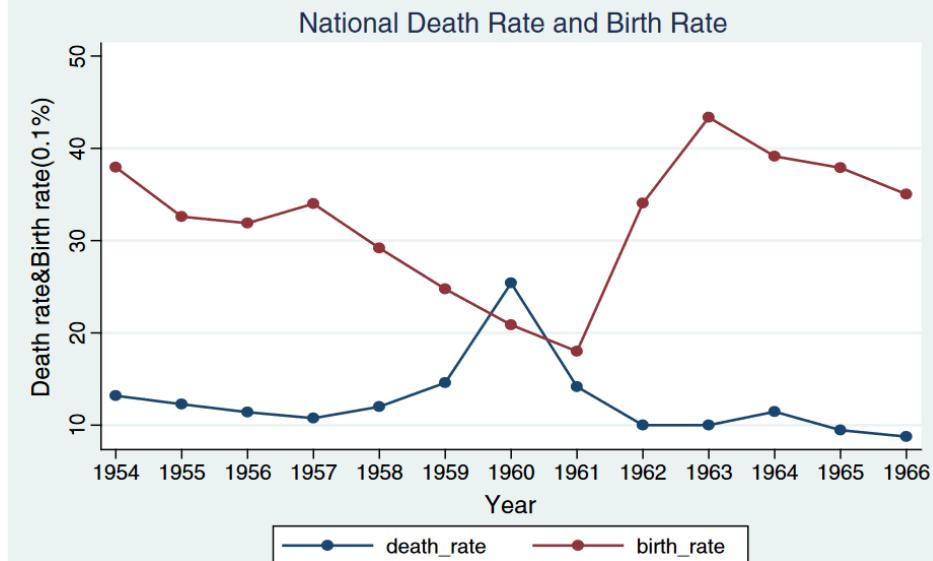
114 СССР. ПШЕНИЦА, РИС И ВИНОГРАД



Holodomor 1932-33

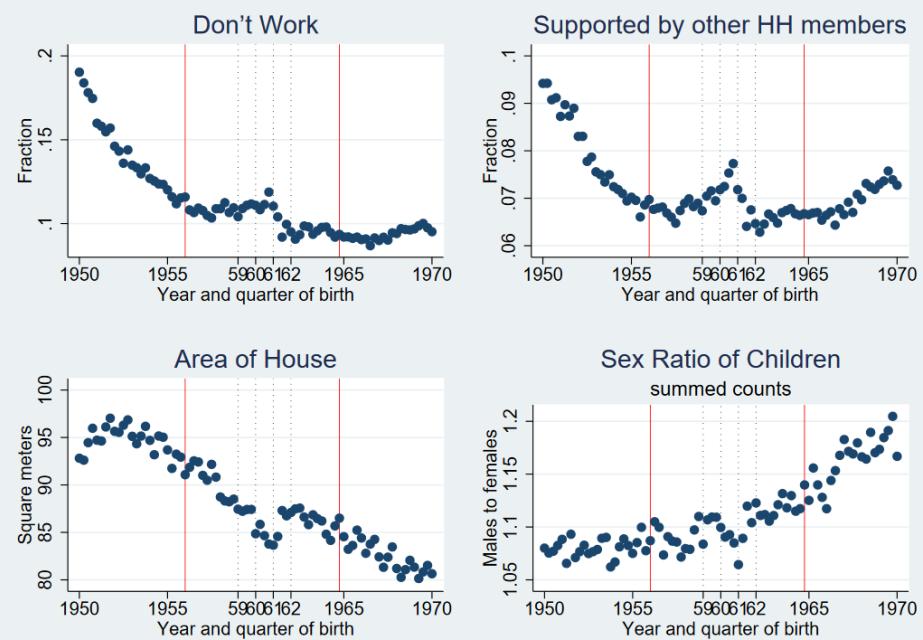
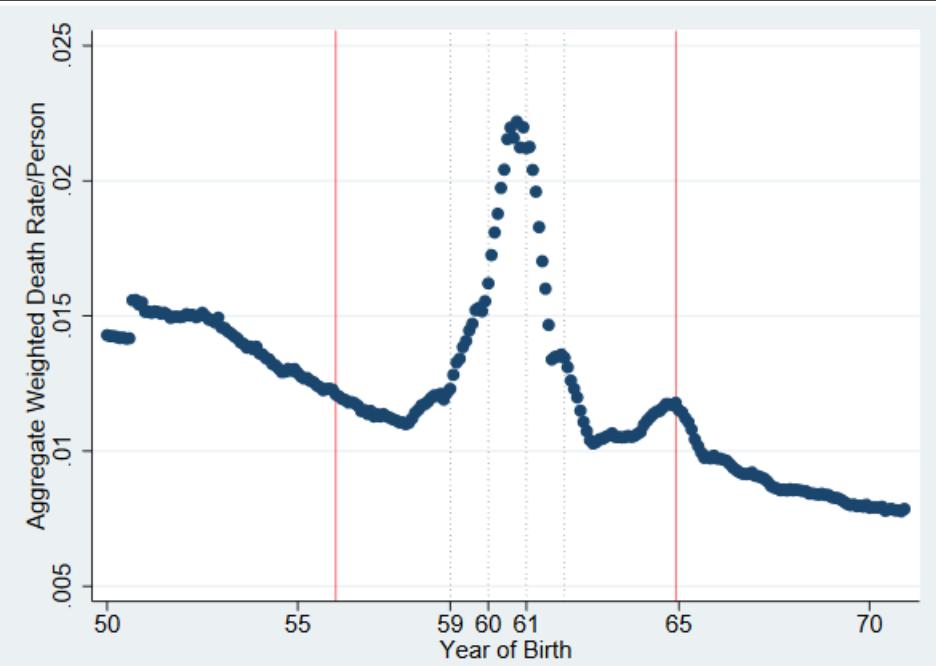
- Millions starved, executed, deported, cannibalised
- “Famine conditions were deliberately constructed by the state” (Devereux 2012: 4)
- Holodomor famine in Ukraine was part of a wider Soviet food shortage – food prices escalated
- Grain-producing areas and non-Russians most affected – centralisation to feed industrial cities





Source: China National Bureau of Statistics

Shi (2011) *China Economic Review*



CAN TECHNOLOGY REPLACE SOCIAL ENGINEERING?

ALVIN M. WEINBERG (1967)

Social problem

- Electricity shortage
 - World peace
 - Poverty
 - Overpopulation
 - Water shortage
 - Global hunger
 - Pollution

“Quick Technological Fixes”

- Nuclear power
 - H-Bomb
 - Mass production
 - Intra-uterine devices
 - Nuclear desalination
 - Nitrogen fertiliser
 - “really cheap energy”



Acme

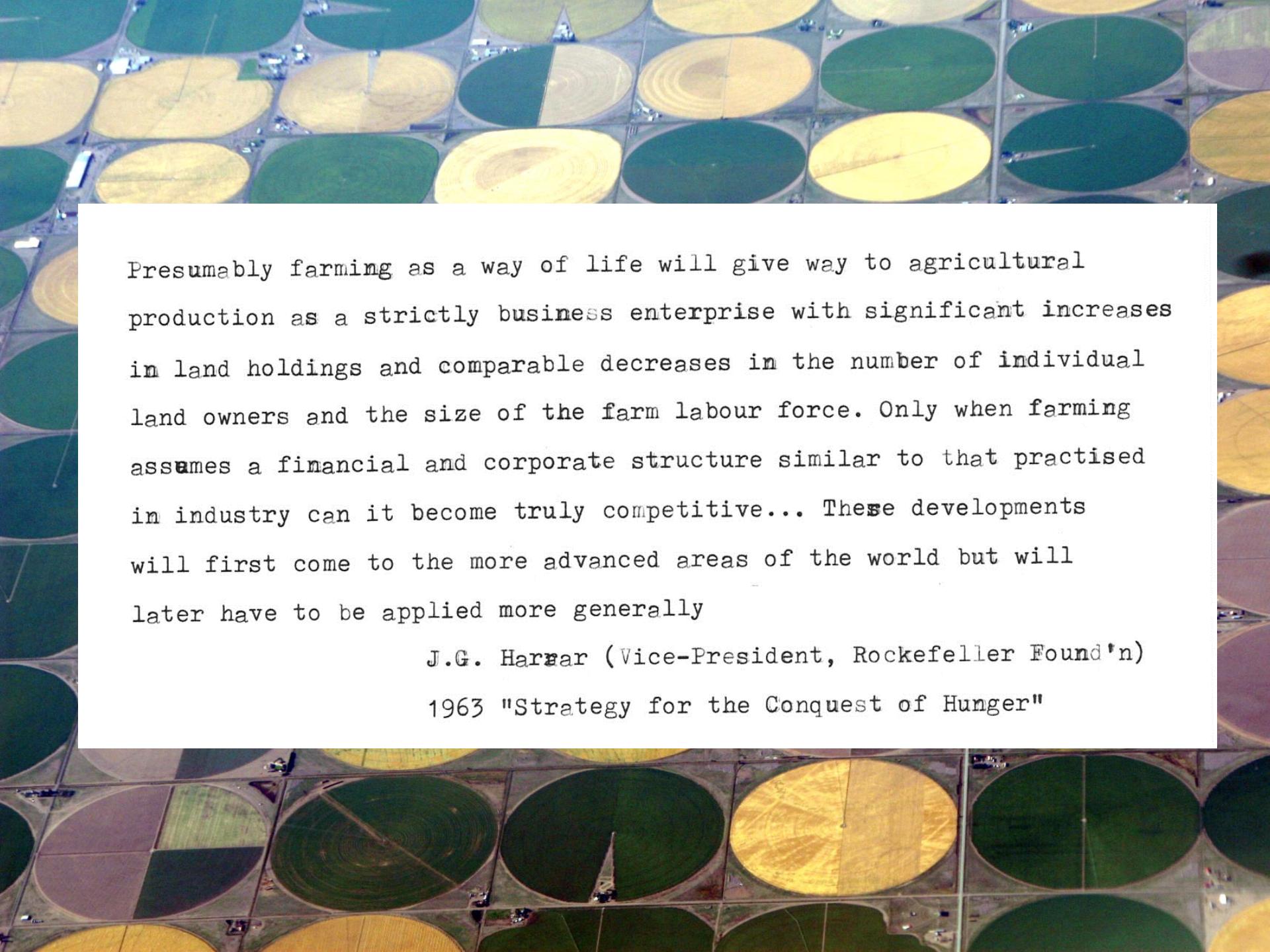
Flying and Biting Bugs on Jones Beach Die in a Cloud of DDT, New Insecticide

A truck-mounted fog generator squirts the poison, mixed with oil droplets, over a four-mile area of the New York City playground. Spread by Army and Navy planes and by hand sprays, DDT routed dangerous disease-bearing flies and mosquitoes on Pacific islands. Dusted on almost the entire population of Naples, it killed lice and halted a typhus epidemic. DDT has a drawback—it kills many beneficial and harmless insects, but does not kill all insect pests. Birds and fish which eat large numbers of DDT-poisoned insects may be casualties, too (page 408).



The Green Revolution

- Antidote to the **Red Revolutions** of Communism
- Economic origins in the cash crops of colonialism
- Centrally controlled – production oriented
- Technological/institutional focus (not social reform)
- Designed to keep food prices down to prevent industrial wage inflation and unrest due to hunger
- “Green Revolution has remained largely unchanged right into the present” (Harwood 2012: 115)



Presumably farming as a way of life will give way to agricultural production as a strictly business enterprise with significant increases in land holdings and comparable decreases in the number of individual land owners and the size of the farm labour force. Only when farming assumes a financial and corporate structure similar to that practised in industry can it become truly competitive... These developments will first come to the more advanced areas of the world but will later have to be applied more generally

J.G. Harrar (Vice-President, Rockefeller Found'n)
1963 "Strategy for the Conquest of Hunger"

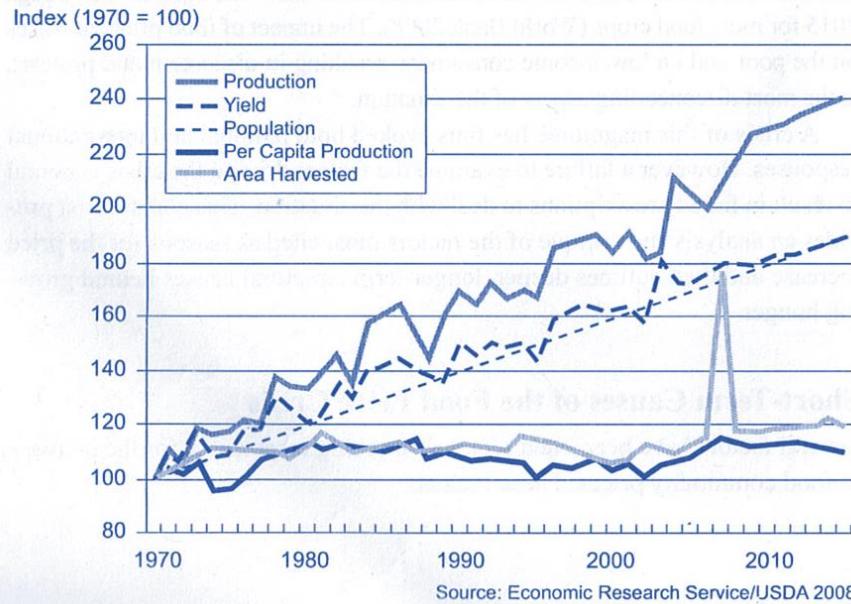
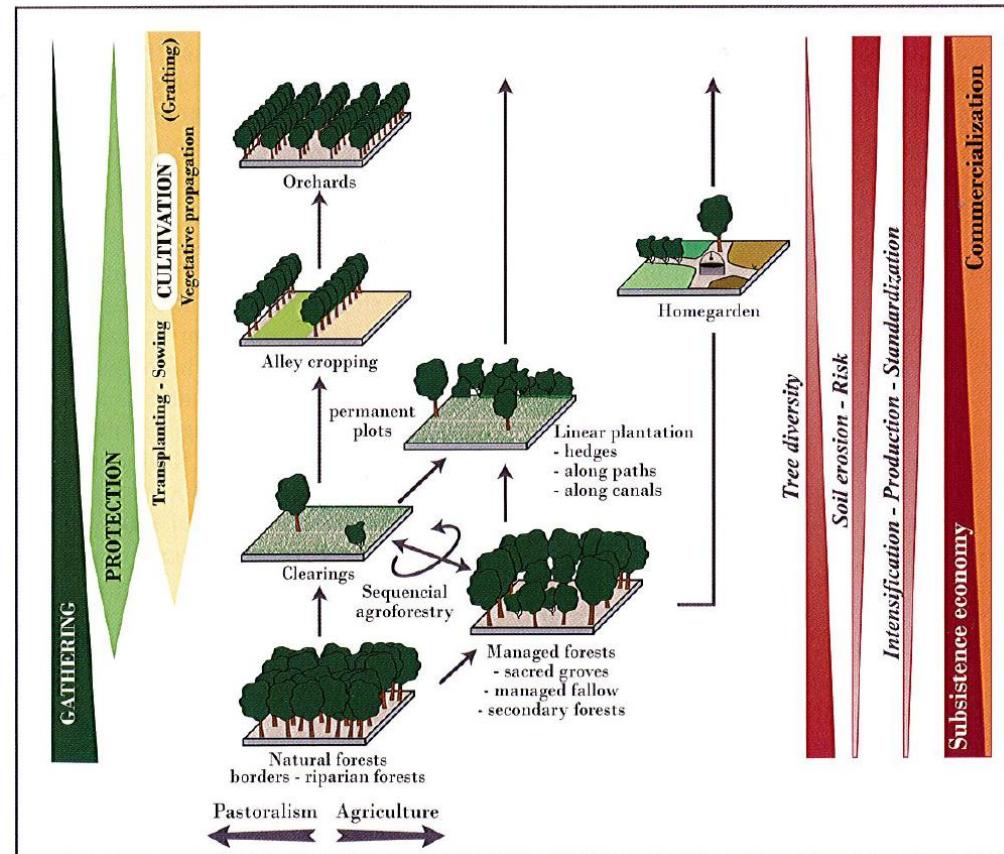
The Green Revolution

Benefits

- Doubled or tripled cereal production & yields
- India became self-sufficient in cereals; SE Asian countries in rice
- Lower food prices
- Increased rural labour
- Overall reductions in poverty and chronic *hunger*

Criticisms

- Environmental damage: salinity, pollution etc.
- Groundwater extraction
- Reliance on fossil fuels
- Monoculture = pesticide
- *Malnutrition* and poverty persisted/grew regionally
- Widened rich–poor gap
- Loss of diversity

Figure 2.1**Total World Grain and Oilseeds**Clapp & Cohen 2009 *The Global Food Crisis*Bouby & Ruas 2014 *Plants and People*

Properties of GR crops

- Need for additional fertilizer
 - Favoured farmers who could afford it
- Need for large amounts of water (irrigation)
 - Favoured farms with ready access to wells, rivers etc.
- Hybrids rapidly lost vigour if seeds saved
 - Favoured farmers who could afford to buy fresh seed
- GR crops more ‘particular’ and disease-susceptible
 - Favoured farms that could employ large labour force
 - Subsequently favoured large-scale mechanisation
 - Favoured farmers who could afford pesticides
 - Favoured some geographic/climate zones over others

Contrasting views on the GR

- Vandana Shiva – Indian feminist, activist, scholar and former nuclear physicist; founder of Navdanya seed saving network



- Melinda and Bill Gates – American business magnates and philanthropists; trustees of the multibillion dollar Bill and Melinda Gates Foundation



One of the longest running, loudest and most bitter debates about food in modern times centres on the relative virtues of genetically modified and organic crops. Advocates of each decry the other, while simultaneously boosting their choice as the only sensible solution for meeting the world's future food needs.

A report published earlier this month, however, might be the catalyst to end the division and, just perhaps, bring the two camps together to focus on a common goal. The study, conducted by US plant geneticists Johannes Kromdijk and Stephen Long of the University of Illinois, strongly suggests that all types of crop breeding – including genetic engineering and organic – need to be pressed urgently into service if we are to escape famine caused by a rising population and climate change.

Published in the Royal Society's journal *Proceedings B*, the authors estimate that the world has perhaps until the mid-2040s to dramatically improve cereal crop yields in order to offset severe shortages.

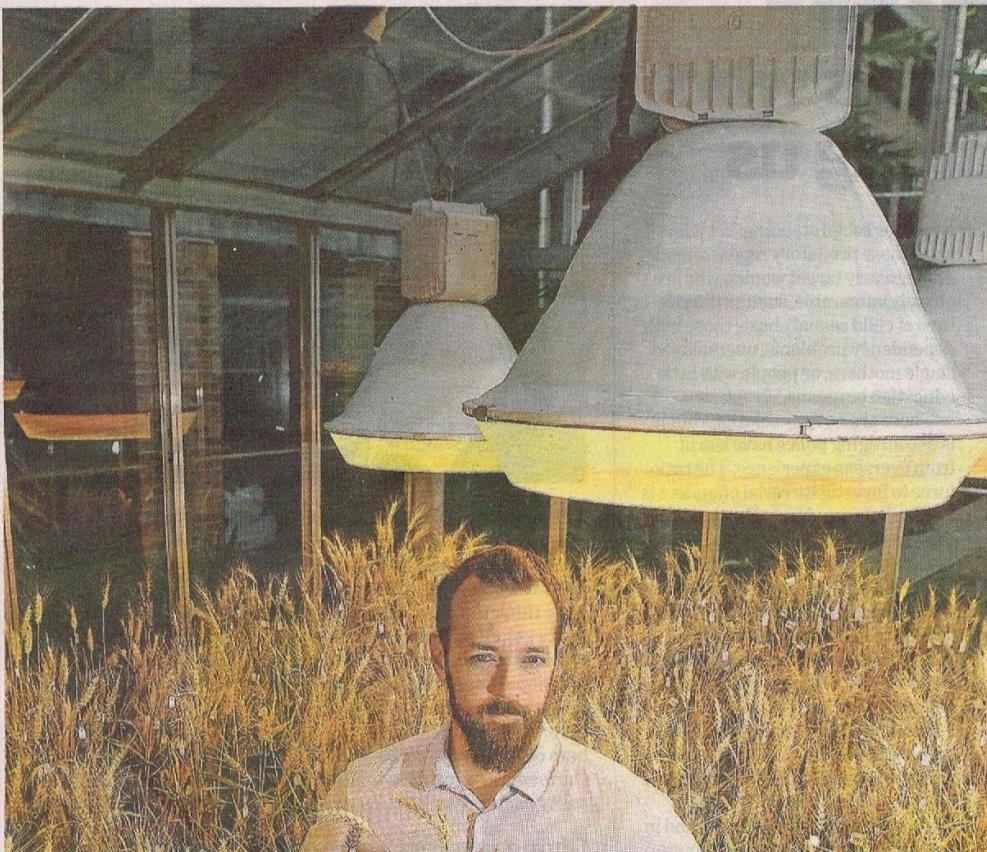
"With the short time-scale at which food demand is expected to outpace supplies, all available technologies to improve crop varieties, from classical crop breeding to crop genetic engineering, should be employed," they wrote. They called for "vastly increased" private and public investment in the process.

The main game, the researchers suggest, lies in employing every available horticultural strategy to breed better cereal crops. The goal is not to plant more wheat, for

Growing pains

The divide between the organic and the genetically modified food camps could soon be bridged as the world faces climate-change induced food shortages.

Andrew Masterson reports.



these days mutagenesis is rather less popular as a method of genetic modification than it used to be. And for good reason.

"There are two main ways that plant breeders can use this tool to create variation," explained Hickey. "One is through gamma radiation and the other is through a chemical called ethyl methanesulfonate or EMS. Basically both of these things induce a higher rate of mutation in the genome. And both, when we are exposed to them, cause us to get cancer."

The technique is still in use, particularly in rice development, but its decline in popularity among plant geneticists is only partly because of the health risks to lab workers associated with improper use. Mostly it's because it's just not that efficient.

Plants are blasted with radiation as a means of accelerating the genome's natural mutation rate. Scientists then have to trawl through the resulting changes to DNA in individual plant sex cells – or check which plants grow better from irradiated seeds – and then single them out for further breeding.

"Basically, you have no control whatsoever, unlike a technology like genetic engineering, where you are specifically targeting a known gene," Hickey said.

While DNA changes in fruit, vegetables and cereals resulting from gene-editing have come under ferocious and sustained attack by organisations that represent organic farmers, those arising from mutagenesis have largely avoided scrutiny.

"The organic industry has no formal position on mutant varieties," said Jan Denham.

Are GMOs the answer?

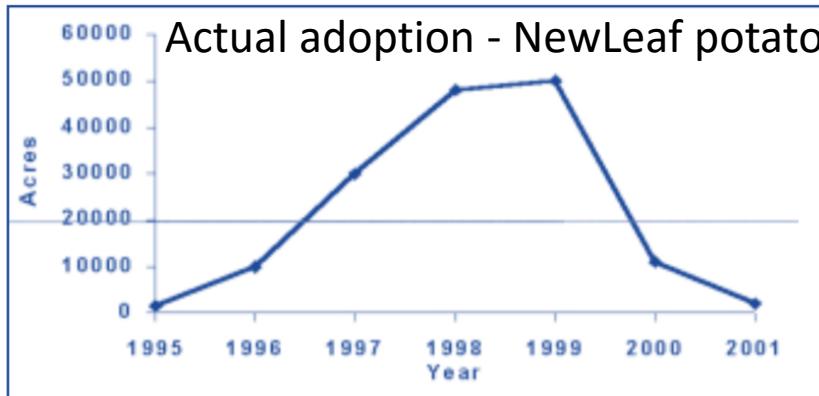
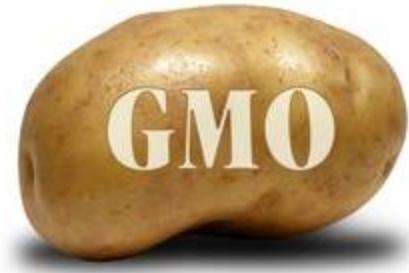


Figure 5. Acreage of NewLeaf™ potatoes in the United States and Canada, 1995 through 2001 (NatureMark, internal data).

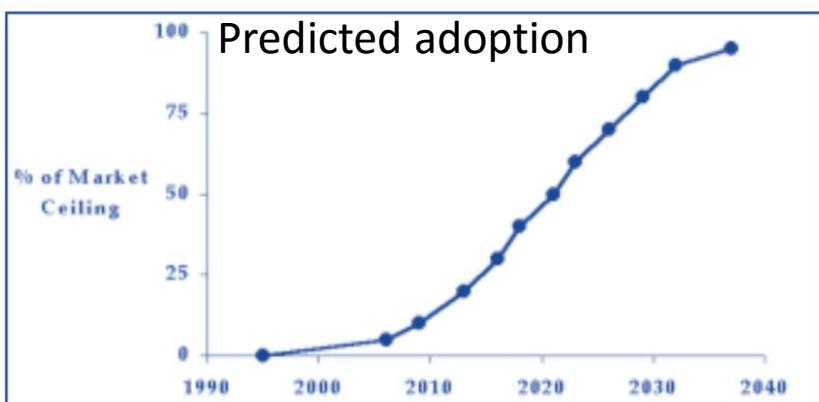


Figure 6. Predicted adoption rate of genetically modified potatoes based on a model of similar technologies (adapted from Guenther, 2002).

- Higher yields?
- Less pollution?
- Less labour-intensive?
- Superbugs & superweeds?
- Public acceptance?
- Intellectual property?
- Biodiversity conservation?
- Poverty alleviation or new product line?

“in its basic features the Green Revolution has remained largely unchanged right into the present”

Harwood (2012: 115)

Europe’s Green Revolution and Others Since



FOOD AND AGRICULTURE MATTERS

FIVE STRATEGIC OBJECTIVES

Help eliminate hunger, food insecurity and malnutrition

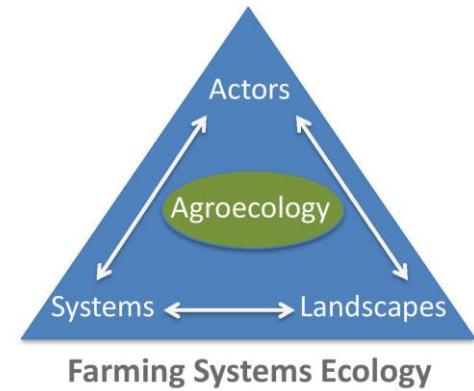
Make agriculture, forestry and fisheries more productive and sustainable

Reduce rural poverty

Enable inclusive and efficient agricultural and food systems

Increase the resilience of livelihoods to threats and crises





Alternatives

- Farming Systems Research
 - Using social and natural science approaches to understand and improve small-scale farming practice
- Participatory Plant Breeding
 - Involving local farmers in crop breeding experiments to select locally suitable varieties with valuable traits
- Agroecology/Agroforestry
 - Combining food production with other ecosystem services and biodiversity conservation

AGROFORESTRY

A Different Approach to a Wicked Problem

Wicked Problems



- Food insecurity, famine, poverty, sustainability
- No templates to follow
- No such thing as complete success
- No true or false
- Different in every context and on every occasion.

MOZAMBIQUE
 0 km 65 130 195 km

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- National Capital (2,867,000 in 1999)
 - over 200,000
 - over 100,000
 - over 25,000
 - other main city
 - other city
 - Chief town of province



Mozambique





Photo: Mezimbite Forest Centre

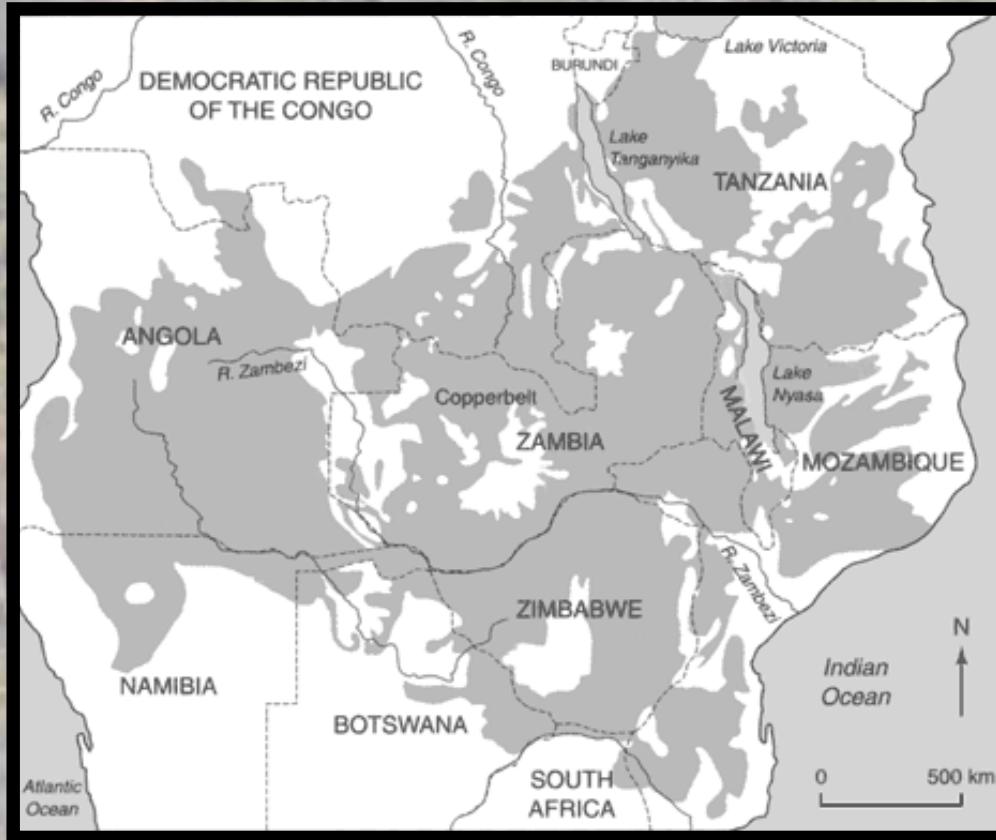
Agroforestry

- Holistic approach to tackling food insecurity and deforestation?
- An economically viable method to increase farming outputs?
- A way to mitigate climate vulnerability of rural people?

Miombo Biome

Dryland Forest,
Savannah

- Spans 11 countries
- 75 million people
- 40 million livelihoods
- Delivers a full range of ecosystem services
- Msasa/Myombo
(*Brachystegia Spiciformis*)



The Deforestation

- The logging and export of high value hardwoods



- The conversion of other species to charcoal



- Burning off for the purpose of Agriculture

Impacts

- **Soil nutrients that were previously cycled fly away as ash or wash away**
- **Ecosystems which supported livelihoods are lost**
- **Agricultural systems become unsustainable**
(swidden agriculture not inherently bad)
- **Communities become more food insecure**
- **The economic and environmental vulnerability of families increases**

Agroforestry goals

- Restore Nutrition to soil
- Rebuild nutrition cycling and increase biomass



- Reduce dependence on expensive inputs
- Address food security holistically

Agroforestry Systems

Restoration Agroforestry

- A direct intervention to deforestation



- Based on Indigenous species

Agroforestry Systems

Alley Cropping

- Directly Addressing food insecurity
- Need for fuel (cooking)
- Holistic Design for year round income/food
- Reduce Vulnerability to climate impacts



Questions?

- Holistic approach to tackling food insecurity and deforestation?
- An economically viable method to increase farming outputs?
- A way to mitigate climate vulnerability of rural people?



Announcements

- Tutorial reading: How trade policies and crop choices influence food security in Africa
- Remember... no lectures or tutes on Monday 25th
- Next lecture – Friday 29th April
- Short essay due same day