The Age of Food: feeding the world in the era of ‘peak people’

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Food will change more in the next 100 years than in the last 10,000

2100 menu ‘unrecognisable’ to today’s consumer

Change driven by:
- fierce supply/demand pressures
- global scarcities
- changing climates
- health and social impacts
- new technologies
A ‘wicked’ problem...

**DEMAND:**
- 130,000 more people/day
- More babies + longer lives
- Rich eat 35,000 more meals
- Population >11 bn by 2100
- Meat demand soaring in NICs
- Food demand doubles by 2060s

**CONSTRAINTS:**
- ‘Peak water’
- ‘Peak land’
- ‘Peak oil’
- ‘Peak Phosphorus’
- ‘Peak fish’
- ‘R&D drought’
- ‘Capital drought’
- ‘Climate extinction’
“By 2030, demand for water could be 40% greater than supply available” – UN Report, 2015.
Vanishing land
33% of world’s topsoil lost since 1975
80% of minerals lost from heavily cropped soils

“The Earth is losing topsoil at a rate of 75 to 100 GT. per year. If soil loss continues at present rates, it is estimated that there is only another 48 years of topsoil left.”

- Marler & Wallin, Nutrition Security Institute 2006
Killer diet

- 2 people in 3 now die of a diet-related disease (The Lancet, 2012)
- Food kills 6x more people than tobacco
- 75% of healthcare costs linked to chronic diet-related diseases
- 2.1bn overweight/obese
- Diabetes: world’s 7th largest killer by 2030 (WHO)

**Food deaths are preventable deaths**
The 6th Extinction:

- Two thirds of large wild animals lost since 1970
- Half of ocean fish gone since 1970
- 23,000 species facing extinction
- Humans and livestock = 96% of terrestrial vertebrate biomass.
- Food is the main driver of extinction.

“We are tearing down the biosphere. I don’t think the world can sustain this.”

- E.O. Wilson, author of ‘Half Earth’
Megacities: mega-risks

By 2050s.
7 billion will inhabit cities
Total urban area = Australia
Urban water use 2800 cu kms
Cities cannot feed themselves

By 2030...

<table>
<thead>
<tr>
<th>City</th>
<th>Population (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jakarta</td>
<td>37</td>
</tr>
<tr>
<td>Tokyo-Yokohama</td>
<td>36</td>
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<tr>
<td>Manila</td>
<td>36</td>
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<tr>
<td>Mumbai</td>
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<td>Delhi</td>
<td>30</td>
</tr>
<tr>
<td>New York</td>
<td>20</td>
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</tbody>
</table>
Why we must recycle nutrients

< 30-50% of world’s food is currently wasted or lost post-harvest

Sources of artificial fertilisers will be scarce and costly by 2050 >
Peak fish

“The maximum wild capture fishery potential from the world’s oceans has probably been reached.” - FAO

- 90% of fisheries ‘fully-fished or overfished’
- Most fish now contain toxic plastic
- 400+ Ocean Dead Zones
Knowledge drought

World food R&D spend

Stagnant crop yields
Devouring a Planet

Every meal costs the Planet:

- 10 kilos of topsoil
- 1.3 litres of diesel
- 800 litres of fresh water
- 0.3g of pesticide
- 3.5 kg of CO₂
Holocene climate is extinct
+2 degrees ‘inevitable’
5° of warming: 50% less food?
Arable farming ‘highly vulnerable’ above 2°
Risk of regional famines, wars
The challenge

Double global food availability with:
- half the present fresh water
- half the land
- unreliable climate
- no fossil fuels
- scarce R&D and investment
- collapsing fisheries

Massive opportunities for novel food systems

World's first vertical forest city, Liuzhou, China
The Solutions

- Recycle water, nutrients, carbon; halve land area
- Eliminate toxins, cruelty to animals and people
- Shift the diet – less ‘European’, more ‘Asian’ = healthier, safer food
- Cultured meat, novel vegetables, biocultures, food printers
- Move half of global food production into cities
‘Sky farms’
800m ‘urban farmers: FAO

Swedish Tax Dept.

Singapore

New York

Linkoping

Milan & Shanghai
‘Agritecture’
Food without soil

Blue Farms, Sydney

- Recycled nutrients
- Recycled water
- No pesticides
- No soil
- Biological control
- Automated
- Specialty crops
Aquaponics and aeroponics
Floating farms
Desert farms

Sundrop Farms, SA
Microfarms

Ikea farm
Entomoculture & entomophagy...
Cowless meat, milk etc.

2011: first cultured sausage
2013: first cultured burger
2016: first cowless milk
2018: chickenless eggs
2020: health profiled 'meat'
Biocultures & food printers
Of 29,500 edible plants we eat just 200

http://foodplantsinternational.com / new scientist
Green cities: climate-proof food
Aquaculture boom
‘Algaepreneurs’

By 2060 water plants (algae) will be the world’s top crop: **health food, stockfeed, transport fuel, plastic, textiles, chemicals, paper, clean-up, biomining** etc
Robot eco-farms
Re-wilding half the planet
A new **respect** for food...

- **Food Year** in every junior school on Earth
- Teach respect for food: how to eat for **health** & to **sustain our food supply**
Tasmania in the ‘Age of Food’

• Vast new range and choice of foods
• Climate-proof food systems
• Secure food for megacities
• Diets that prevent disease
• Major driver of ‘ideas economy’
• A practical way to restore the Earth and avoid Extinction.
Forthcoming book:
Food or War?  By Julian Cribb

- Explores the links between food and conflict, past, present and future
- Explains why today's food system cannot be sustained
- Describes new food systems that will:
  - Protect the planet
  - Create healthier humans
  - Save our wildlife, soils and water
  - Create new jobs and investment
  - Prevent war.