Meeting the C21st Food Challenge

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Facing the Global Food Crisis
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A ‘wicked’ problem...

DEMAND:
- 216,000 more people every day
- More babies + longer lives
- Population >11 bn by 2100
- Meat demand soaring in NICs
- Food demand +100% by 2060s
- 40-50% climate penalty by 2100

LIMITATIONS:
- ‘Peak water’
- ‘Peak land’
- ‘Peak oil’
- ‘Peak P’
- ‘Peak fish’
- ‘R&D drought’
- ‘Capital drought’
- ‘Climate extinction’
Peak water

“Current estimates indicate we will not have enough water to feed ourselves in 25 years time…”
– Colin Chartres, IWMI
The struggle for water

- Energy sector - tripling by 2050
- Cities - doubling by 2050
- Minerals processing - doubling by 2050
- Manufacturing
- Environment
- .....how much is left for farmers and food?
Unsustainable: 10 kilos of soil lost for every meal eaten

“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, USA, 2006
Megacities: mega-risks

By 2050...
- 7.7 billion will live in cities
- Total urban area = China
- 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>
</tr>
<tr>
<td>Manila</td>
<td>36</td>
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<tr>
<td>Mumbai</td>
<td>30</td>
</tr>
<tr>
<td>Delhi</td>
<td>30</td>
</tr>
<tr>
<td>New York</td>
<td>20</td>
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</tbody>
</table>
Peak oil

Car numbers growing 7x faster than oil supplies

Food & oil prices are in lockstep
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 by 2050 >
Hotting up: +4° by 2100

4-5 degrees global warming by 2100: IPCC

10% of food lost for each 1° of warming

= We will need 140% more food by peak population

Source: IPCC
Re-arm ag science
What are the solutions?

- Reinvent farming & food systems: sustainable, low-input eco-farming
- Reinvest massively in food research
- Reinvent the global diet: so it is healthier, damages less planet
- Redesign cities: to recycle water, nutrients, energy back into food.
Urban farming: climate-proof
Bioculture boom
25,000 edible plants
Algae boom

By 2050 algae could be a $55 billion industry for Australia supplying transport fuels, health food, stockfeed, plastics, textiles, chemicals, paper etc.
Fish farm boom

World demand for 550mt of meat and fish by 2100 will require \textbf{2-3 bn tonnes extra of plant-based feed.}
Revegetate, recarbonise, rehydrate
Future farming

- Double global investment in ag and food R&D to $200bn by reducing military spending 10%
- This will reduce conflict AND boost food security
- Ecofarming: combine best of high-tech farming with permaculture and automation
- Radically reduce all resource inputs.
- Major focus on soil biology, crop science, nutrient cycling, soil, water, energy & carbon conservation
- Systems that operate at large and small farm scales, across landscapes
Great challenges ... wonderful opportunities

- Develop eco-farming by global sharing of knowledge between farmers
- Reshape world diet for health and sustainability
- Design cities that do not waste
- Reward farmers for producing good food and caring for water, land, wildlife and atmosphere.