Notions of Food System Resilience for policy, business and society

Reflections from an OECD Co-operative Research Programme Fellowship to the University of Queensland

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Objective

Taking a ‘food systems’ approach and interacting with a wide range of stakeholders,

to analyse Australian agriculture, food and natural resource management policies and practice and identify options to enhance food system resilience.
1. Review of policy and scientific literature

2. Seven seminars/feedback sessions (UQ, ANU, U Adelaide)

3. >20 semi-structured conversations with a wide range of stakeholders:
   - University academics (agriculture, economics, logistics, marketing, health)
   - CSIRO researchers (ecology, agriculture, global change and foresight science)
   - National and state-level policy makers (agriculture, food safety, biosecurity)
   - Representatives of industry associations (agriculture, marketing)
   - NGOs (health)

"Chatham House Rule"
Overall global food security ‘situation’

- Insufficient cals
  - Insufficient nutrs
  - ~ 1 billion

- Excess cals (incl. many with insufficient nutrs)
  - > 2.5 billion

- Insufficient nutrs
  - ?3 billion

- Sufficient cals
  - Sufficient nutrs
  - ?3 billion

➢ “Triple Burden of Malnutrition”
Different, overlapping forms of malnutrition the ‘new normal’
(IFPRI 2015)
What do we want from food systems?

Food Security
- Food utilisation
- Food access
- Food availability

Other Societal Interests
- Employment
- Health
- Profit
- Rural development
- Environment
- Landscape
- Ecosystem services
- Animal welfare
- Fair working conditions
- …
So what’s the purpose of the Australian Food System?

“To feed the Australian people”
“To provide safe and nutritious food for all”
“To ensure a profitable export market”
“To generate potential business opportunities”
“To give high quality food whenever at reasonable price”
“To reduce diet-related NCDs”
“To maintain vibrant rural communities”
“To reduce food-borne disease”
“To support livelihoods in the value chain”
“To give +ve outcomes for the population: health, equity and env”
“The Lucky Country”: Why worry?

> 86,500 farm businesses in Australia

- On average, each produces enough food to feed 600 people, 150 at home and 450 overseas.
- Collectively produce almost 93% of daily domestic food supply.
- Gross value of production in 2016-17 was $60 billion (3% GDP)
- Australia’s farm exports about $44.8 billion in 2016-17

“The value of our farm exports, and indeed the future of Australian agriculture, depends largely on conditions in overseas markets, due to our high level of exports.”

“We have probably the best biosecurity in the world”

“Blessed with ‘Brand Australia’”

“The Australian food system feeds 80 million people”

“This is the land of plenty. We don’t worry about vulnerability; we don’t think about resilience”

“She’ll be right, mate”

Since the late 1980s, food imports have been increasing by 4.8% a year on average, now accounting for 15% of Australia’s total food consumption.

Australia is now a net importer of:

- seafood
- processed fruit and vegetables
- soft drink
- cordials and syrup
- confectionary
- bakery products
- oils and fats
A growing worry

“Australia is not food secure”
And we also have a host of ethical concerns

- Animal welfare
- Food system workers’ rights
- Inter-generational legacy
- Food waste
- Farmer welfare and safety
- Equity and fair prices
- Civil harmony
- Food additives
- S&T
- ...
With climate change placing growing strain on the global food system, and with international tensions already heightened, the risk of geopolitically motivated food-supply disruptions increases.

Worsening trade wars might spill over into high-stakes threats to disrupt food or agricultural supplies.

Conflict affecting supply-chain chokepoints could lead to disruption of domestic and cross-border flows of food.
Top 5 Global Risks in Terms of Likelihood

- Extreme weather events
- Natural disasters
- Cyber-attacks
- Data fraud or theft
- Failure of climate-change mitigation and adaptation

Top 5 Global Risks in Terms of Impact

- Weapons of mass destruction
- Extreme weather events
- Failure of climate-change mitigation and adaptation
- Water crises
- Natural disasters

World Economic Forum Global Risks Reports 2018 & 2019
Extreme weather: temperature and drought

An extreme weather event is the occurrence of a value of a weather variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. These events are not a sign of climate change by itself, as they always existed but the occurrence and severity of at least some of these events have increased.

Heat and cold waves
Drought
Tropical storms
Heavy rains

Australia experiences hottest summer on record

© 1 March 2019
Governments may be seriously underestimating the risk of crop disasters occurring in major farming regions around the world, a study by British researchers has found.
But what about other concerns?
So what is ‘Food System Resilience’?

“The capacity over time of a food system and its units at multiple levels, to provide sufficient, adequate and accessible food to all, in the face of various and even unforeseen disturbances.” – just relates to Food Security

Enhanced understanding needed to:

✓ accommodate different perspectives looking at a common problem (esp. concerning multiple societal goals)

✓ be based on use of evidence in a value-laden debate
Defining Resilience

4 Questions

1. Of what?
2. To what?
3. For whom?
4. Over what time period?

Adapted from: Helfgott, European Journal of Operational Research, 2017
Food System Functioning (Activities)

1. Of what?

Food System Function (Outcomes)

Food System OUTCOMES

Social Welfare
- Income
- Employment
- Health
- Social capital
- Political capital
- Ethics
- ...

Food Security
- Food Availability
- Food Access
- Food Utilisation

Environment
- Climate change
- Water availability
- Water quality
- Biodiversity
- Biogeochemistry
- Soil degradation
- ...

Adapted from: Ingram, Food Security, 2011
2. To what?

*Food System Stresses and Shocks*

"Stream Trains"

Easily perceived drivers and trends that will influence change - direct and indirect

"Black Swans"

Unimagined, rare and/or unpredictable events that have a big impact
2. To what?

**Food System Stresses and Shocks**

<table>
<thead>
<tr>
<th>Stress</th>
<th>Shock</th>
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<td><em>pressure or tension exerted on a system</em> [Steam Trains]</td>
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<td>Food scares</td>
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Australian Food System

Stresses

“Labour shortage: it’s increasingly scarce, increasingly expensive”

“Agriculture dominated by family farms”

“Tariffs on importing soy”

“Water stress”

“Processing dominated by international players”

“Aging farmer population; hard to maintain skills”

“Australian ‘land grab’ by China”

“Insect pollinators in decline”

“Chilean produce cheaper threatening international markets”

“New landscape caused by changing Trade and Direct Foreign Investment”
Australian Food System

Shocks

"Drought"

"Hail storms"

"Blue tongue limiting exports to China"

"Weather extreme affecting food distribution"

"Electrical cut to the banking system"

"Frost damage in wheat"

"Russian wheat aphid"

"Food scares (e.g. strawberry industry lost $500m)"

"SARS epidemic hitting 30% of the workforce"

"Geopolitical incident affecting export market"
3. For whom?

*Food system ‘actors’*

“A beef farmer, a processor, a retailer, a consumer, an exporter?”
4. Over what time period?

- **Short-term interruptions (usually due to shocks)** to e.g.:
  - Fishing or agricultural activities (due to e.g. extreme weather)
  - Critical ingredient shortfall (due to e.g. disease outbreak)
  - Just in time groceries delivery (due to e.g. IT malfunction)
  - Consumer shopping patterns (due to e.g. food scares)

- **Longer-term disruptions (usually due to stresses)** to e.g.:
  - Natural resource degradation
  - Energy price
  - Low-carbon emission regulations
  - Change in dietary preferences
What can amplify these Stresses and Shocks?

- “Good harvests outside Aus leading to drop in world prices”
- “Horticulture at highest risk as essentially self-regulating”
- “Frequency of cyclones”
- “Volatility in markets, esp. beef price fluctuations”
- “Politics around migrant labour”
- “China politics and losing market”
- “Fuel price hikes and transport costs”
- “Public opinion, e.g. shocking news about live animal exports”
- “A few big producers can organise political power”
- “No sense of vulnerability”
<table>
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<th>Notions of Resilience of Food System Outcomes</th>
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<td><strong>1. Robustness</strong></td>
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<td><strong>2. Recovery</strong></td>
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<td><strong>3. Reorientation</strong></td>
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*All involve*

**Reorganisation** | Making changes to the system *activities* (adaptation) either directly or via ‘environments’ |
## ‘Reorganise’ to enhance Robustness

| “Trade deals aiming to diversify market” | “Maintain good relationships with China” |
| “Planting N-S instead of E-W” | “Improve transport infrastructure” |
| “Protect reputation” | “Even stronger biosecurity” |
| “Focus on food safety” | “Phase out bad farmers” |
| “Future Proofing” | “Guardsmanship” |
‘Reorganise’ to enhance
Recovery [bounce back]

- Better coordination post-farmgate
- Joining together into associations
- Enhance State Emergency Service
- Import food temporarily (e.g. Sunrice)
- Use scenarios and foresight
- Adaptability of social and institutional structure
- Improve logistics infrastructure
- Enhance biohazard response
- Path dependency vs. deviant dependency
- Automation
‘Reorganise’ to encourage *Reorientation* [bounce forward]

- “Introducing sector-led minimum standards of operation/efficiency”
- “Using renewables in production”
- “Aim for high-value commodities for sale on world market”
- “Healthier diets; eating seasonally”
- “Reduce food waste”
- “Reduce processed foods and aim for NOVA classification”
- “Reduce red meat consumption”
- “Food/diet classes need to be part of national policy”
- “Recommission National Agriculture White Paper”
- “Aim for systemic innovation (i.e. avoid component innovation)”
Enhancing Resilience 1
Reorganise the Food System Activities

Do the “doing” words differently
Enhancing Resilience 2

Reorganise the Food System ‘Environments’

**Social:** education, media, household structure, social movements, health care systems, ...

**Policy:** agri-environment schemes, nutrition, labour, health and safety, ...

**Market:** preference, market structure, competition, trade, ...

**Sci & Tech:** farm inputs, food processing, food preparation, logistics and health technologies, ...

**Biophysical:** climate, soil, water, pollution, biodiversity, ...

Adapted from: The Institute of Medicine & The National Research Council of the National Academies, 2015
“Providing a healthy, affordable, and environmentally-friendly diet for all people will require a radical transformation of the system.

This will depend on:

- better farming methods,
- wealthy nations consuming less meat and
- countries valuing food which is nutritious rather than cheap.”
<table>
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<th>Challenges for enhancing resilience</th>
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<tr>
<td>“3-5 yrs max planning timeframe for ag enterprises”</td>
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<tr>
<td>“Need both public and policy ‘will’ to work on interventions”</td>
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<tr>
<td>“Take consumer sentiments seriously”</td>
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<tr>
<td>“People value eating out; changing hospitality culture difficult”</td>
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<tr>
<td>“Better understanding of the dynamics and sensitivity of the system”</td>
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<tr>
<td>“There is no real use of scenarios or foresight”</td>
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<tr>
<td>“No comprehensive strategy in place; more planning is needed”</td>
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<tr>
<td>“Reliance on mixing of supply in food processing”</td>
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<tr>
<td>“No sign of legislation because of fear of “nanny state””</td>
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<td>“Need Food Systems thinking”</td>
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Food security...

exists when all people, at all times, have physical, economic and social access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

“enough for a particular purpose; as much as you need”

... OED
Aim for healthy diets from sustainable food systems

Great Food Transformation
The unprecedented range of actions taken by all food system sectors across all levels that aim to normalise healthy diets from sustainable food systems.

Sustainable Food System Activities
- Environmentally sound
- Socially acceptable
- Economically/Enterprise viable

Healthy Diet Outcomes
- Calorie and nutrient density
- Quality
- Diversity
- Safe
- Affordable
- Acceptable
- Sufficient
When complacency poses a risk to the Australian food system

8 August 2019
John Ingram

www.foodsecurity.ac.uk/blog/when-complacency-poses-a-risk-to-the-australian-food-system/