



Will managing food systems for resilience make us more food secure?

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Fundamental Questions

- How will Global Environmental Change affect the vulnerability of food systems in different regions?
- How might food systems be adapted to cope with GEC so as to enhance food security?
- What would be the consequences of adaptation options for environmental and socioeconomic conditions?

GECAFS Goal

To determine strategies to cope with the impacts of GEC on food systems and to assess the environmental and socioeconomic consequences of adaptive responses aimed at improving food security.

Food security...

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

(World Food Summit 1996)



Components of Food Security & Key Elements

FOOD UTILISATION

- *Nutritional Value*
- *Social Value*
- *Food Safety*

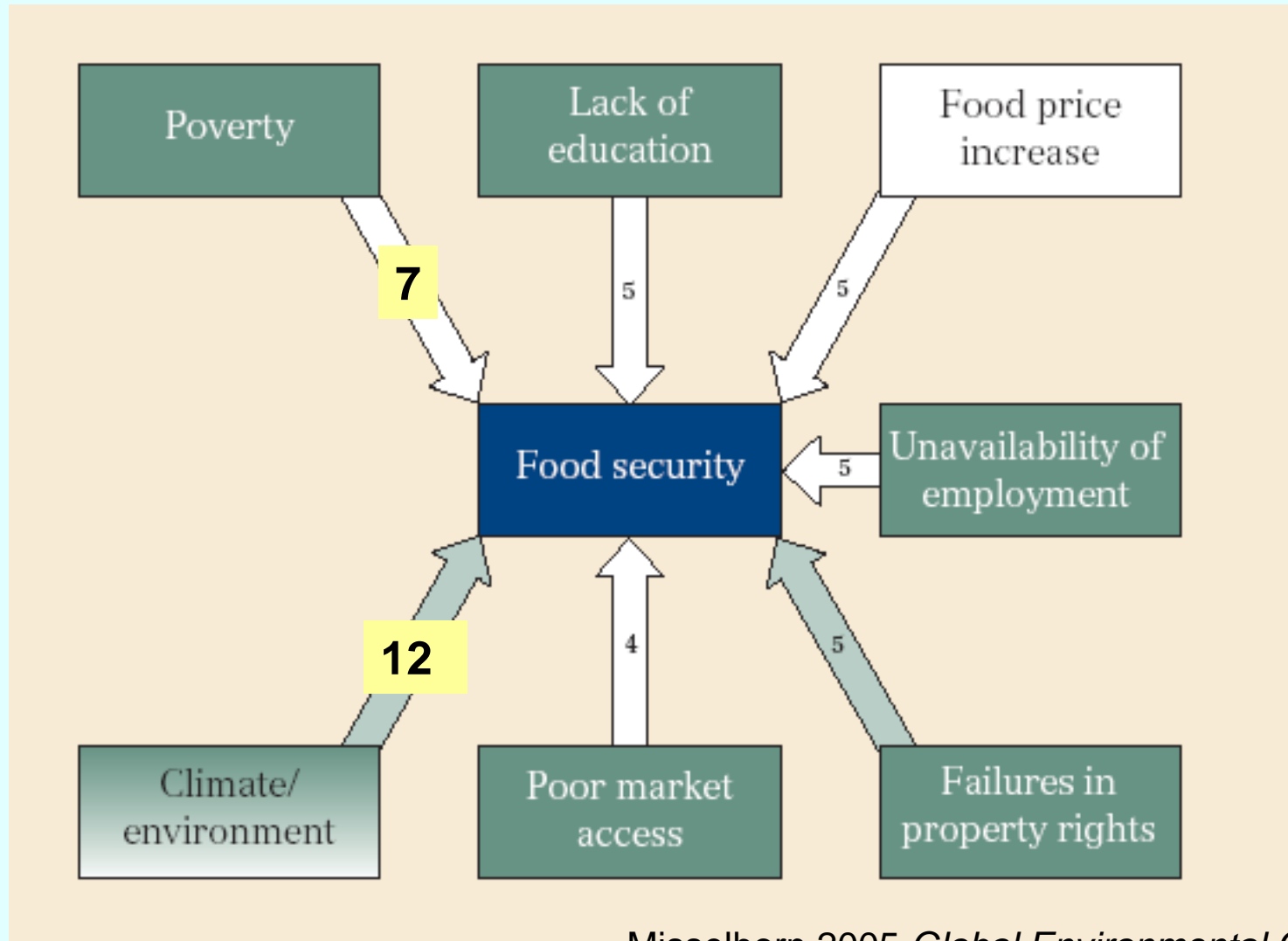
FOOD ACCESS

- *Affordability*
- *Allocation*
- *Preference*

FOOD AVAILABILITY

- *Production*
- *Distribution*
- *Exchange*

Multiple Exposure: Food insecurity arises from overlapping and interacting stressors



Food systems -- evolving

Food system feature	“traditional” food systems	“modern” food systems
Principal employment in food sector	In food production	In food processing, packaging and retail
Supply chain	Short, local	Long with many food miles and nodes
Typical food consumed	Basic staples	Processed food with a brand name; more animal products
Purchased food bought from	Small, local shop or market	Large supermarket chain
Nutritional concern	Under-nutrition	Chronic dietary diseases
Main source of national food shocks	Poor rains; production shocks	International price and trade problems
Main source of household food shocks	Poor rains; production shocks	Income shocks leading to food poverty
Major environmental concerns	Soil degradation, land clearing	Nutrient loading, chemical runoff, water demand, GHG emissions

Food systems framework

Food System ACTIVITIES

Producing food: *natural resources, inputs, technology, ...*

Processing & packaging food: *raw materials, standards, consumer demand, ...*

Distributing & retailing food: *marketing, advertising, trade, ...*

Consuming food: *acquisition, preparation, customs, ...*



Food System OUTCOMES Contributing to:

Social Welfare

- Income
- Employment
- Wealth
- Social & political capital
- Human capital



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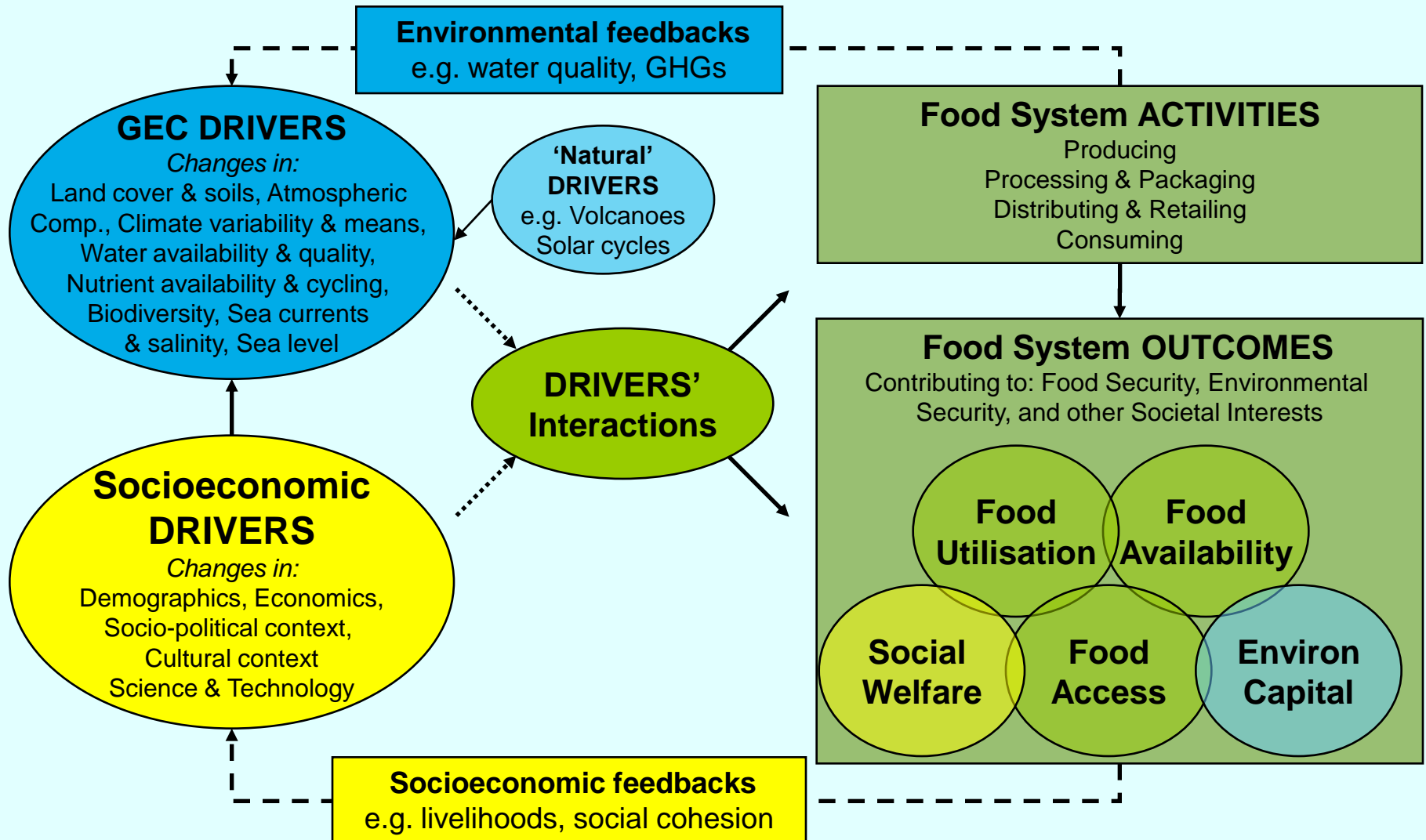
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Environmental Security / Natural Capital

- Ecosystems stocks, flows
- Ecosystem services
- Access to natural capital

Analysing FS in context of drivers and feedbacks



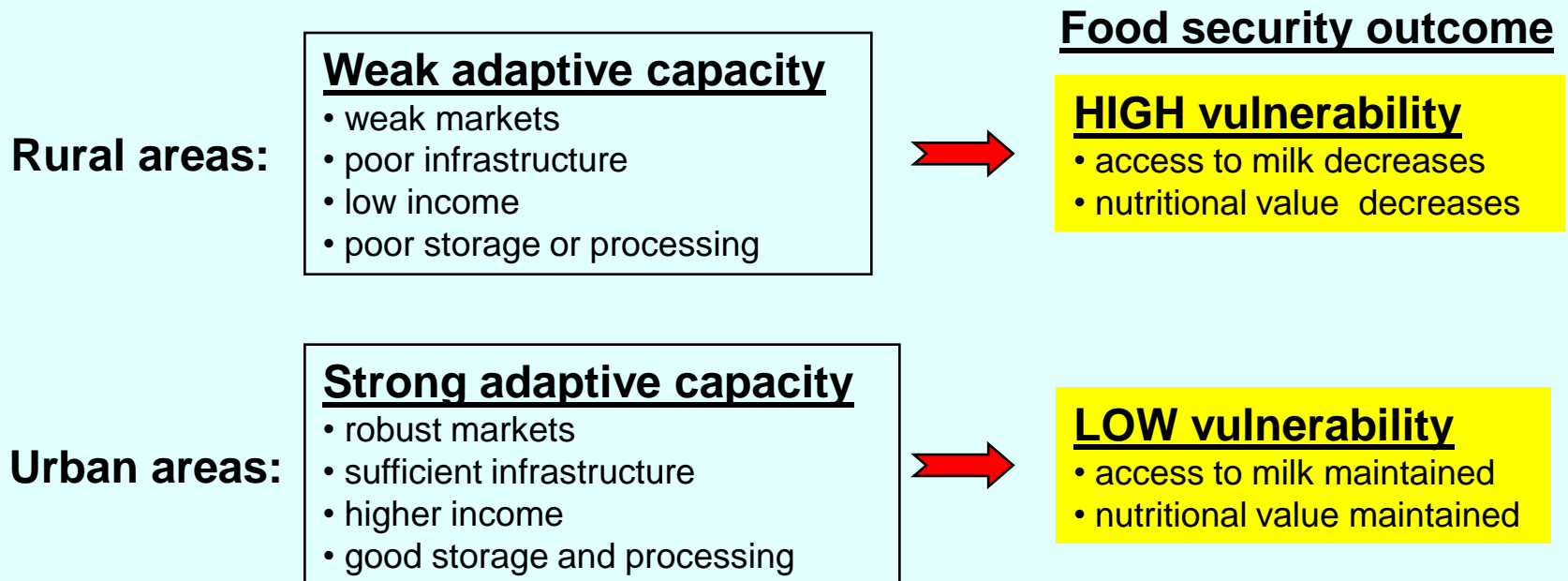
Using the framework

Elements of ACCESS to food	Characteristics of food security element	Major determinants	Origin of determinants
Affordability	Staple grains are cheap if imported; expensive if local.	Costs of local production higher than external. Income determines purchased quantity.	Food system activity: Producing. Social welfare: income.
Allocation	Most food only available in supermarkets.	Supermarket chains dominate in urban areas; local markets have been driven out of business.	Food system activity: Retailing.
Preference	Fish and rice are traditional foods.	Cultural preferences; agro-ecosystem characteristics.	Social welfare: Social Capital. Ecosystem services.

Vulnerability of food systems depends upon adaptive capacity

Example: Nutritional diversity (milk) in the Indo-Gangetic Plain

 **Milk production is sensitive to drought (it decreases)**



Definition of resilience

- Resilience is the ability to persist through continuous development in face of change, and innovate and transform into more desirable configurations. Folke 2006
 - Amount of change a system can undergo w/o altering function
 - Capacity for self-organization
 - Capacity to learn and adapt Carpenter et al 2001

Resilience approach...

- Coupled social and ecological system
- Focus on structure and function of system and key processes/ dynamics, especially feedbacks
- Scale is critical!!
 - Resilience at one scale embedded in higher and lower
- Change is the norm, and often so is surprise

Food system functions

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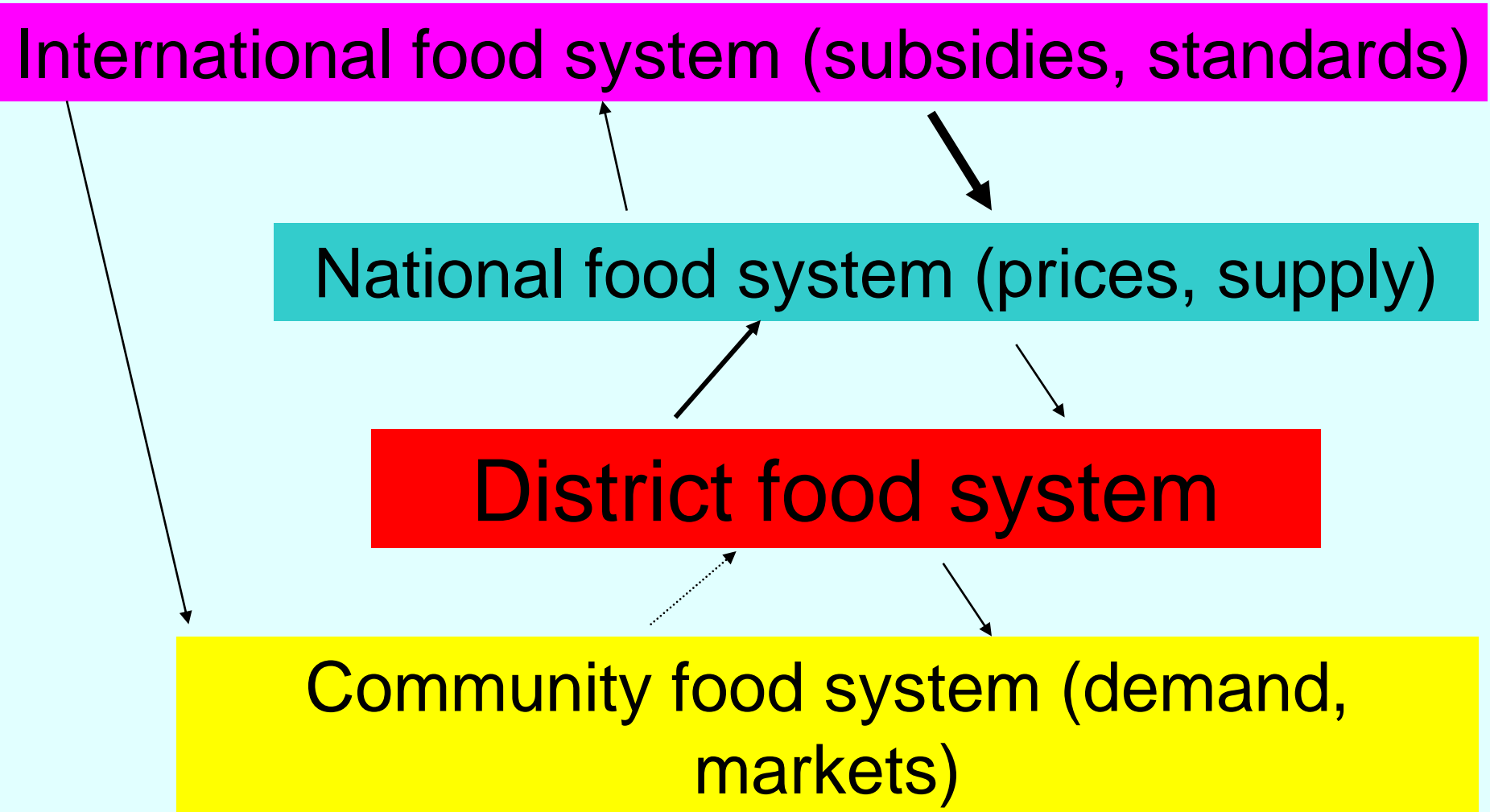
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Food systems and scale



Cross-scale tradeoffs in global food system

- **Wealthy food security at cost of poorer**
(McMichael 2006)
- **Food miles or fair miles?** (McGregor and Vorley 2006)
 - Where are the real ecological costs?
 - Global environmental goods versus poverty
- **Water for agriculture or water for ecosystems or water for cities?**
- **Social protection or economic growth?**
Food security?

Resilience... (2)

- Adaptive capacity arises from diversity
 - Among assets and strategies, and at multiple levels
- Adaptive management requires monitoring and learning by institutions
 - Governance and capacity are required
- Disturbance provides opportunities for innovation and renewal

Pastoralist food insecurity in Northern Kenya

- Droughts increasingly trigger food insecurity
- Adaptive capacity of local pastoralists slowly eroded
 - Climatic as well as social and political
 - Conflicts, sedentarisation, marginalisation
 - Little economic support
- Early warning system limited by poor information, institutional weakness and lack of donor trust
- Difficult to change current state

European food insecurity (?)

- Foot and mouth disease – local and regional
 - Farmers bear brunt
- Dairy and wheat price shocks – global coincides with regional and local
 - Consumers pay costs
- Unsustainable consumption levels (interdependence)
- Unhealthy or unsafe food
- Easier to ignore feedbacks .. My food system seems resilient to me as I am food secure

Managing for resilience

(Lebel et al 2006, Ecology and Society)

- Managing involves both building and eroding resilience, depending upon the desirability of the state; may need transformations
- → **For WHOM is resilience?**
- → **Governance** issues, politics and power
 - Accountability, polycentric institutions, participation

Transforming food systems

- Concern w/ signs of vulnerability
 - E.g. inequities; disease outbreaks; food price shocks; shrinking diversity
- Competing objectives and perspectives among global and local actors (profits, availability vs sovereignty, trade and subsidy regimes....)

Transforming for resilience

(Olsson et al 2006 Ecology and Society)

- Requires preparation and transition phases; linked by a window of opportunity
- Preparation: knowledge, networks and leadership
- Navigating the transition requires flexibility and cross-scale interactions
- → stress adaptive governance and role of disturbance as opportunity

Northern Kenyan pastoralists

- Governance authority at national level; some decentralization to local level; but international donors still important
- Accountability difficult
- Participation is largely top down
- Outside subsidies necessary to regenerate
- Transforming the system could mean livelihoods and identities change

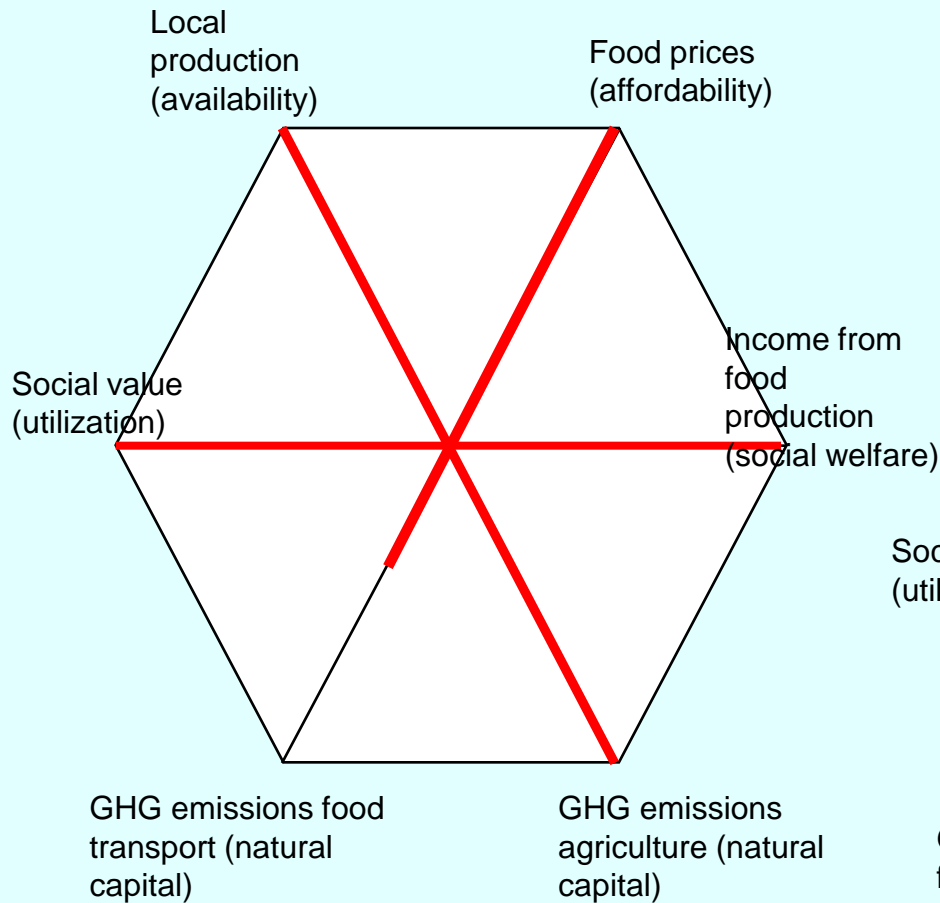
European consumers

- Food systems governed by business and national government
 - Building a polycentric structure requires multiple actors
- Local movements for transformation growing
- Self-organizing capacity unclear because of interdependence
- Participation unequal due to wealth, location, etc.

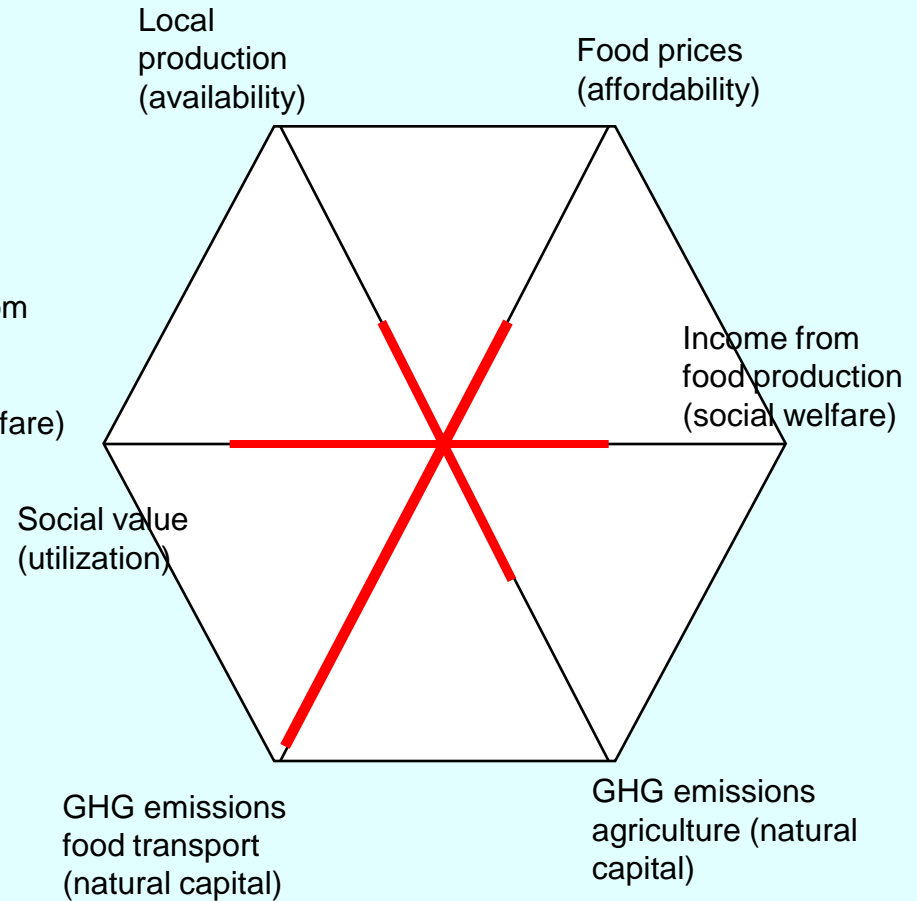
Resilience in food systems: challenges

- Resilient state not necessarily desirable
 - Who gets to decide what is desirable?
e.g. pastoralists or government?
 - does it require “agreement” across objectives?
- Cannot assume social and ecological resilience move in the same direction
 - E.g. food production increases while diversity decreases (MA 2006)
 - Savanna biomass increase but not pastoralist food security (Galvin et al 2004)

Tradeoffs are inevitable

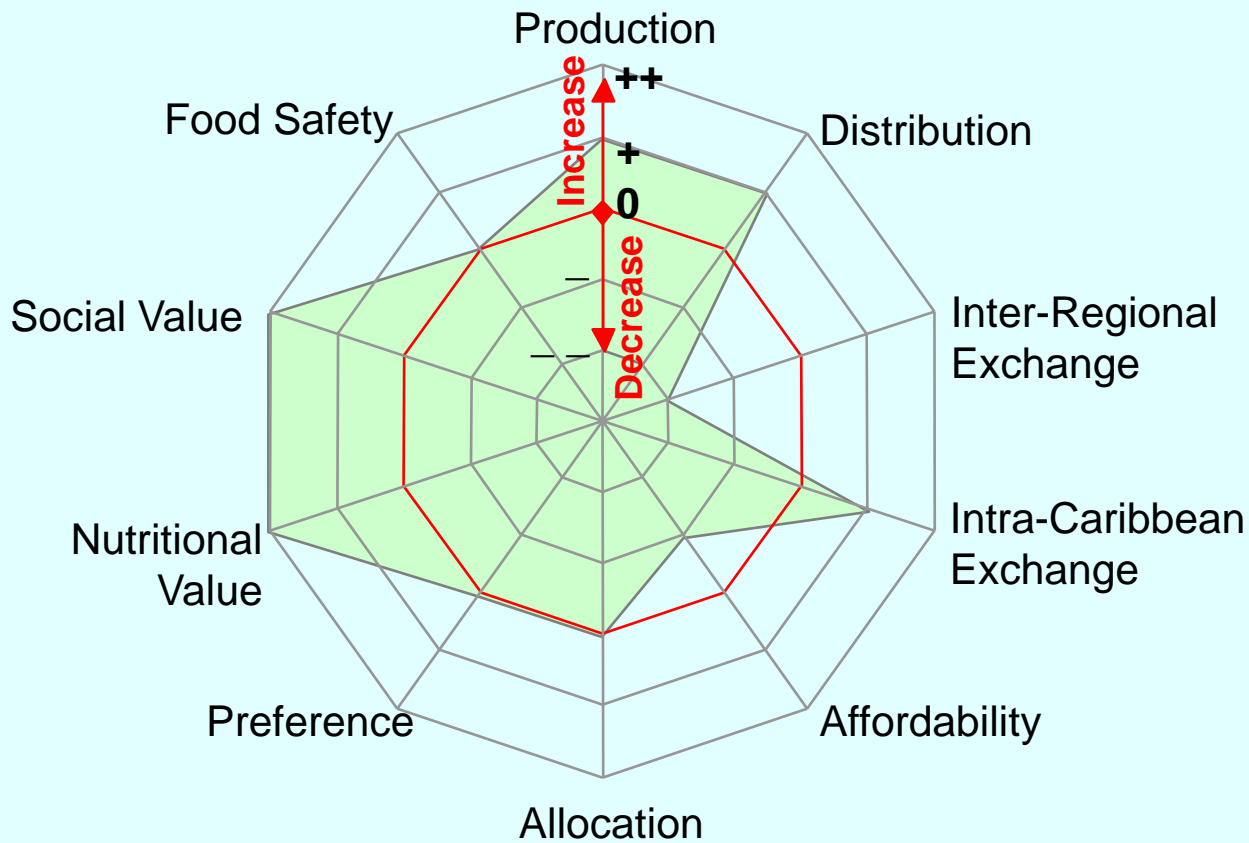


With support for local production



Without support for local production

Food system outcomes - tradeoffs



Resilience in food systems: challenges (2)

- Managing at the appropriate scale
 - Trust and accountability at local level?
 - How to link across scales, esp. w/ tradeoffs?
- Managing for disturbance
 - Conflict with the current paradigms?
 - Long planning horizons; emphasis on stability, MSY
 - Little flexibility in corporate systems

Challenges re adaptive governance

- Who governs food systems?
- Who decides what to transform?
- Who should self-organize?
 - Can any food system function w/o subsidies from outside?
- Can we achieve polycentric institutions?
- Can everyone participate?

Resilience in food systems: challenges (3)

- Is globalisation a help or a threat to adaptive capacity (Eakin and Lemos 2006)?
- Social dynamics replacing biophysical in globalised systems (Young et al 2006)
 - Connectedness increased but maybe random
 - Speed of connections increased
 - Scale stretched so slow and fast variables changing
 - Diversity decreased

Two examples from globalised food systems

- Maize price shocks in Mexico
 - NAFTA impact on domestic production
 - Biofuels feedback from US
 - Local protests → awareness, ????
- Brazil deforestation (Nepstad et al 2006)
 - BSE in Europe and China demand increase soy production
 - International attention offers conservation opportunity

Food system vulnerability

Food system structural characteristic	Potential links to vulnerability in the food system
Low diversity in assets or entitlements	Consumers have few options; production susceptible to disturbance; diversity of assets critical to resilience.
Institutional weaknesses and low institutional capacity	Institutional capacity critical to management for social and environmental outcomes.
Lack of functioning markets and low levels of economic activity	Markets help demand meet supply; low levels of economic activity constrain access to food.

Food system resilience

Food system function	Scale	Resilience features
Affordable food	National	Buffered against price shocks
Nutritious food	Local	Unprocessed, safe, trusted sources
Agro-diversity	Landscape	Land use planning enforced
Agricultural income	Local	Buffered against commodity price shocks

Sources of adaptive capacity in food systems

- Social movements?
 - Local and global
- Experience with disturbance and crisis?
 - Opportunities for renewal and innovation
- Alternative agriculture for ecological lessons?
- Learning opportunities?

Concluding thoughts

- Resilience approach suitable for the complexity and heterogeneity of food systems
- Cross-level and scale interactions must be highlighted and analyzed
- Adaptive management is challenging
- Ecosystem feedbacks as social dynamics substitute?
- Contested and competing outcomes?
- Managing for disturbance?

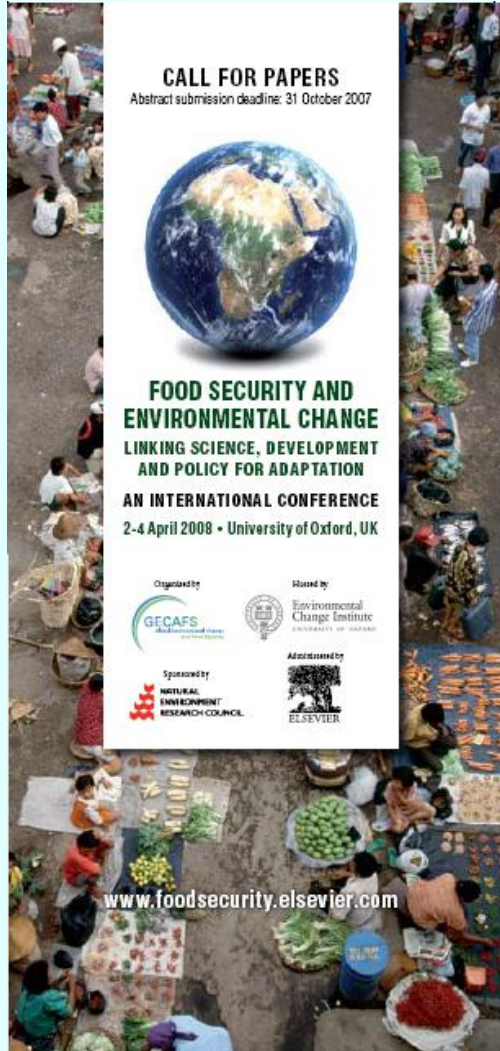


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International Conference

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Food Security and Environmental Change

*Linking science, development
and policy for adaptation*

Purpose:

To engage the research and policy communities addressing food security, environmental change and food policy interested in jointly developing adaptation options.

Themes:

- Concepts and methods
- Regional research
- Links to the development agenda and policy
- Emerging issues and frameworks for adaptation