Distributional Effects of Disasters on Food Security in ASEAN

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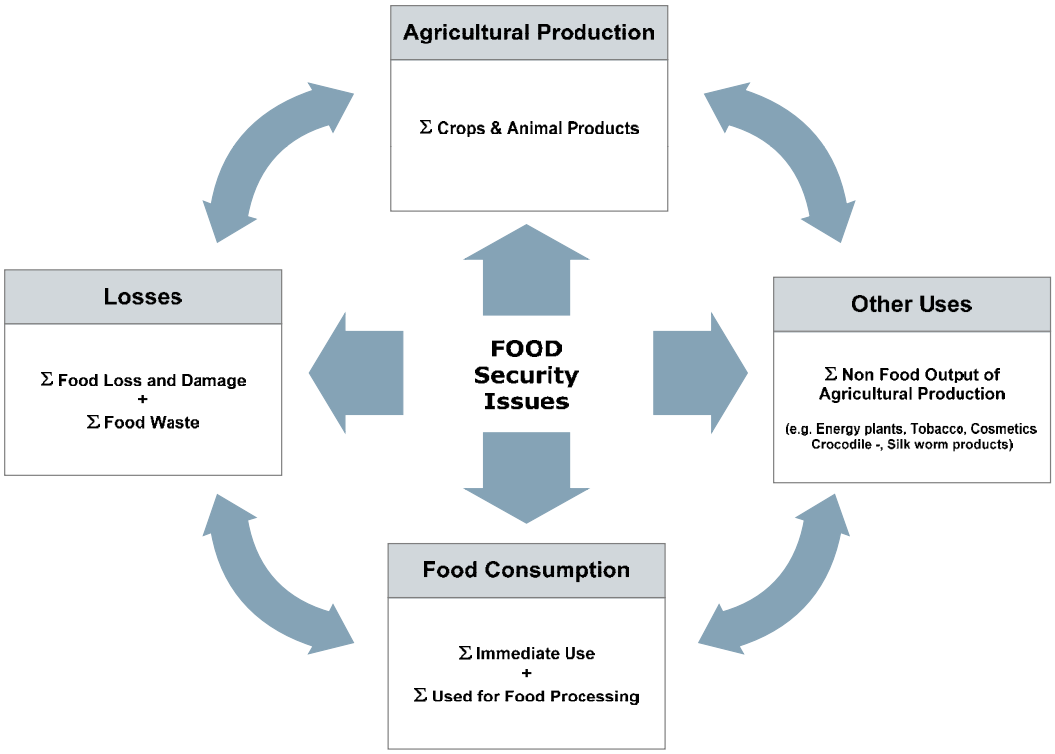
Distributional Effects and Change of Risk Management Strategies

Cost Effective Regimes in Europe and Implications for ASEAN

Food Security Issues

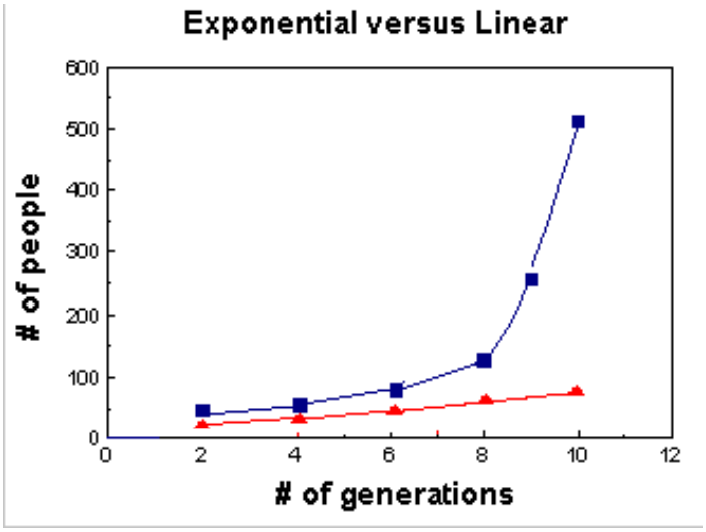


Hypothesis

- Disasters challenge local resilience of agricultural production; damage is aggravated by coincidence with aging populations and less ecosystem management
- Weakening of local resilience will over time sum up to regional environmental decline and more disaster losses and damage
- At current, there is enough flexibility to balance more disaster damage by optimizing the agricultural production and food value chain
- Current impacts of disasters on food damage are particular harmful in poor countries depending on local agricultural production
- Local resource depletion and reduced agricultural production outputs may not be considered as economically substantial in emerging economies due to ever more possibilities of food imports
- Local resource depletion can widely be abated in mature economies – such as rich EU countries – due to the existance of government programs and rural support schemes

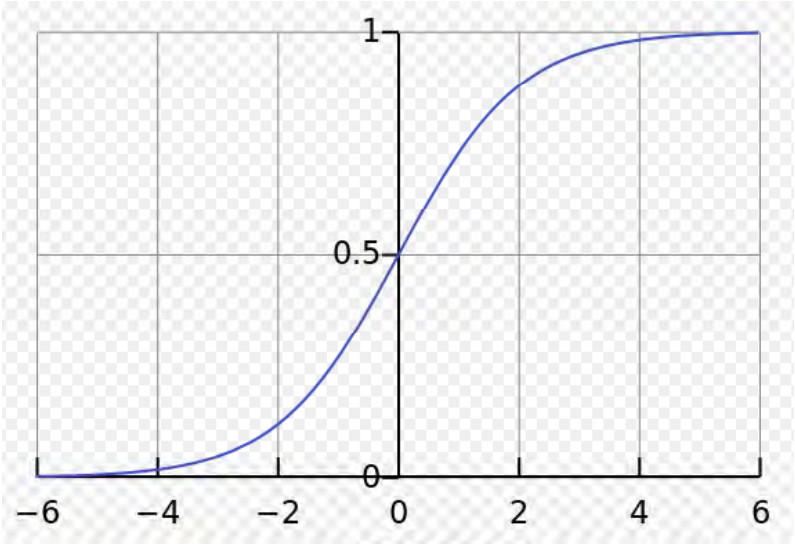
Malthus (1798)

- Linear growth of agricultural production and food (red)
- Quadratic growth of population (blue)



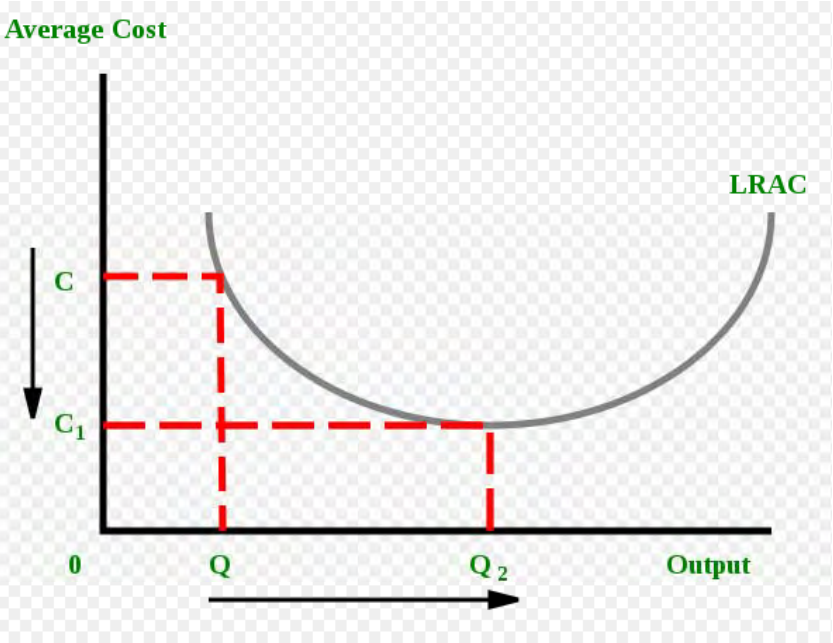
Verhulst (1838)

- Resource constraint will lead to logistic curve
  - Definition of carrying capacity



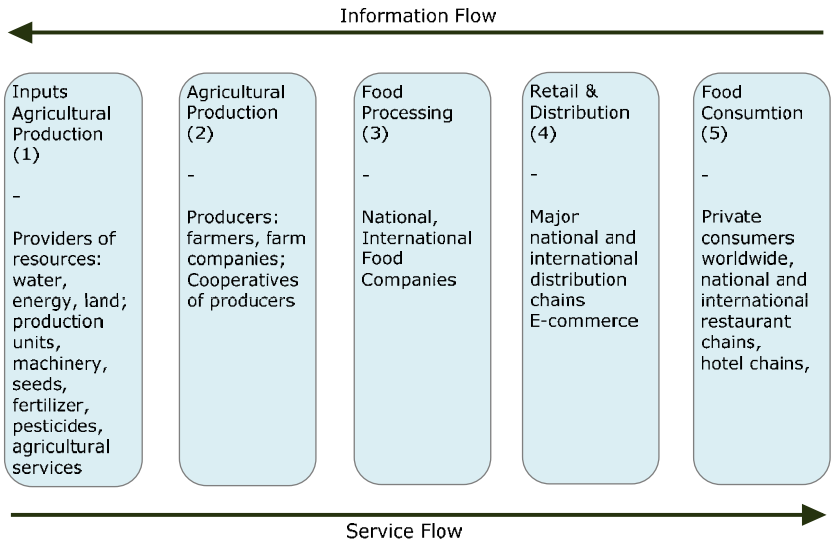
Economies of Scale

- cost advantages that enterprises obtain due to:
  - Size
  - Output
  - Scale of operation
  - Speed of operation
- cost per unit
  - Generally decreasing with increasing scale
  - Fixed costs are spread out over more units of output

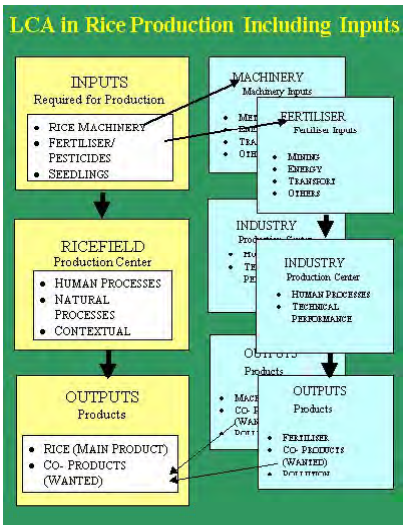


Source: Kkaaii ,https://en.wikipedia.org/wiki/Economies_of_scale#/media/File:Economies_of_scale.svg

Food Supply Chain



Inputs to Agricultural Production (1)



- Agricultural Production needs ever more resource inputs
  - The inverse situation to the economies of scale
  - CO2 emissions increase in other sectors
    - Transport
    - Waste
- Example rice production in Japan
  - Rice related GHG emissions of inputs surpass direct GHG emissions
    - http://www.breiling.org/publ/lcaricejap-en.pdf

Agricultural Production (2)

- Highly productive land
  - Further intensification of agricultural production
  - Trend to larger production units
    - Buying up family farm land for agricultural cooperatives
- Less productive land
  - Cost effectiveness is bought by resource depletion/deterioriation
    - Soil degradation,
    - water scarcity,
    - farm management & human inputs
  - Loss of ecosystem services
    - disaster resilience

Food Processing (3)

- Global players
  - Mergers to increase profitability

Share of global packaged food retail sales, by manufacturer, 2007 1/

	Region					
Top 50 companies	Western Europe	Eastern Europe	North America	Latin America	Asia Pacific	World
	Percent					
Nestlé SA	2,9	2,6	3,9	6,0	1,8	3,3
Kraft Foods Inc	1,9	1,8	7,0	1,7	0,7	2,6
Unilever Group	3,1	1,4	2,2	2,4	0,6	2,1
PepsiCo Inc	0,9	0,7	4,6	3,1	0,3	1,8
Danone, Groupe	1,9	1,4	0,7	1,4	0,7	1,3
Cadbury Schweppes Plc	1,4	0,7	0,7	1,5	0,4	1,0
Mars Inc	1,2	0,9	1,9	0,2	0,2	1,0
Kellogg Co	0,5		2,3	0,8	0,1	0,8
General Mills Inc	0,2		2,5	0,2	0,2	0,7
Lactalis, Groupe	1,4	0,6	0,1			0,6
Campbell Soup Co	0,2		1,7			0,5
ConAgra Foods Inc			2,0	0,2		0,5
Dean Foods Co			2,1			0,5
Ferrero Group	1,2	0,5	0,1	0,3		0,5
Heinz Co, HJ	0,8	0,4	0,7	0,1	0,2	0,5
Hershey Co, The			2,1	0,2		0,5
Wrigley Jr Co, William	0,4	1,1	0,8		0,3	0,5

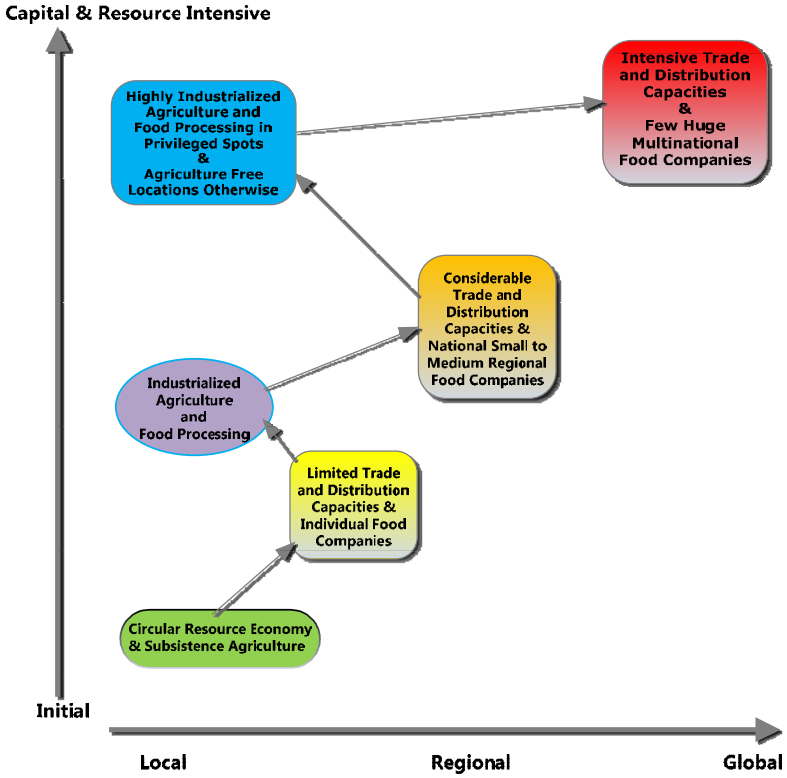
Food Retail Industry (4)

- global food retail industry experiences steady growth
  - USD 7,500 billion by the end of 2019 (Aruvian Research 2016)
- Major players
  - Carrefour SA,
  - Coop Italia,
  - Costco Wholesale,
  - Delhaize,
  - J Sainsbury,
  - Lotte Shopping,
  - Metro AG,
  - Wal-Mart,
  - Lidl
  - Aldi

Food Consumers (5)

- Individuals, ever more diverging tastes and needs
- Hotels and restaurants, specialized on special foods
- Seoul Food 2017 – one of major global food exhibits

Food Distribution Upscaling

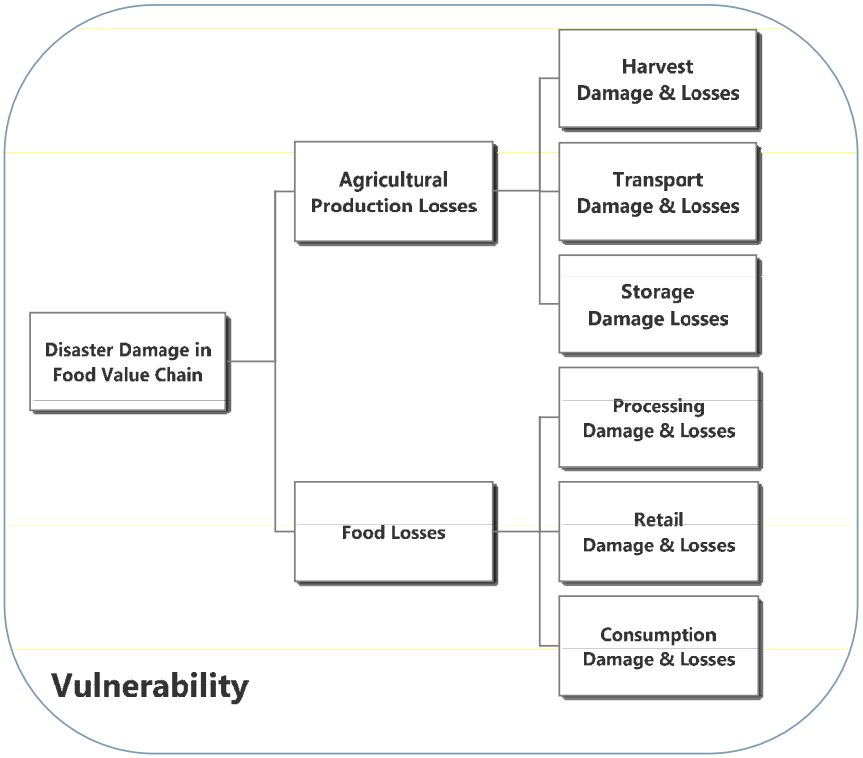


Local Food Supply Chain

Regional Food Supply Chain

Global Food Supply Chain

Disaster Damage in Food Supply Chain



Agricultural Production Losses Due to Disasters

- Harvest
- Transport
- Storage

Food Losses Due to Disasters

- Processing
- Retail
- Consumtion

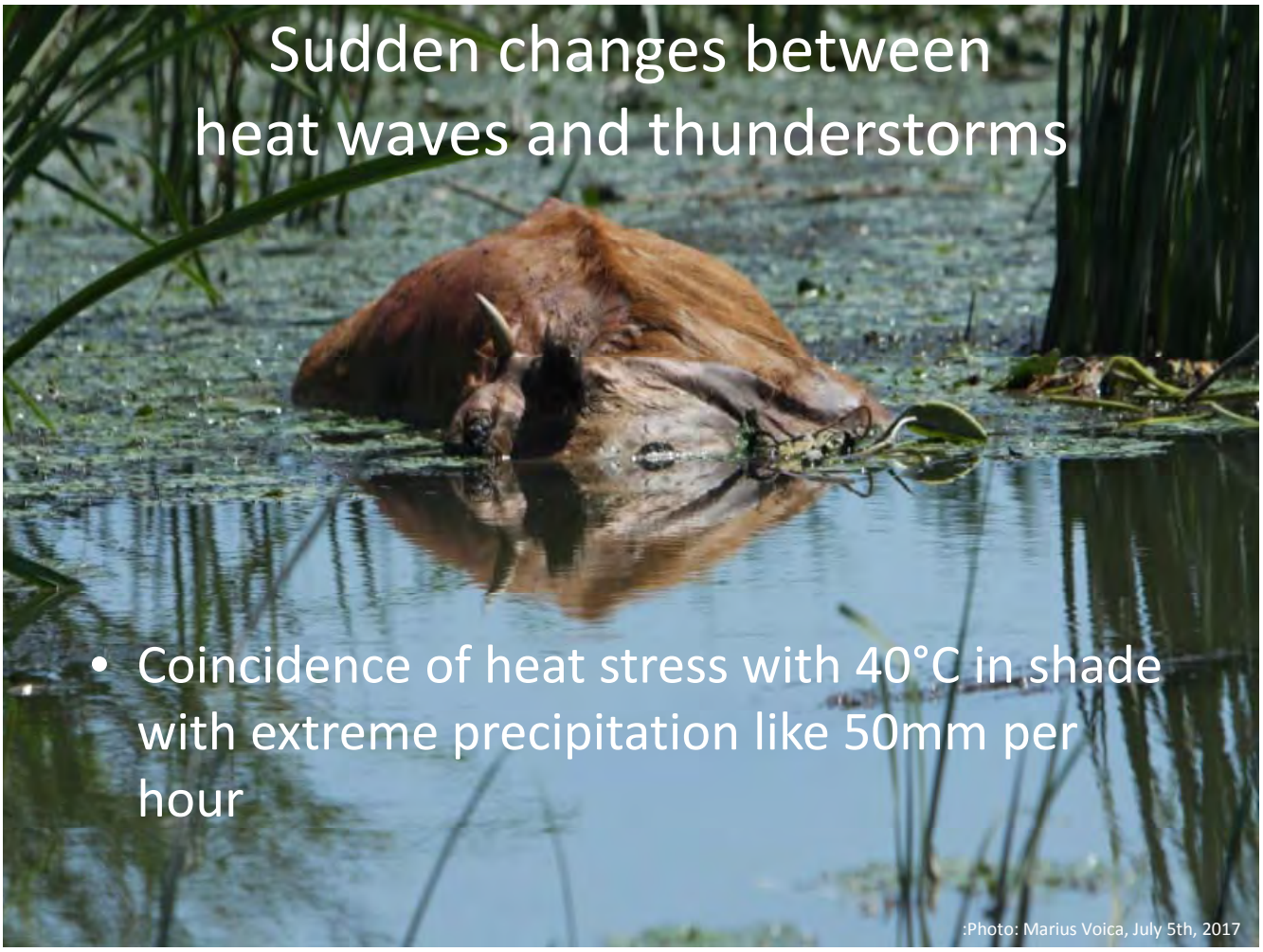
Examples of Local Disaster Damage and Losses in Agriculture from Europe

- Flood damage killing cattle, Danube Delta, Romania (July 5th, 2017)
- Local farm product market in Ploiesti County, Romania (July 2nd, 2017)
- Extreme precipitation event, Lower Austria (June 3rd, 2017)
- Hail event in Klagenfurt, Carinthia, Austria (June 23rd, 2017)

Dead Cattle – Flood in Danube Delta

Source: Marius Voica, July 5th, 2017

Sudden changes between heat waves and thunderstorms



- Coincidence of heat stress with 40°C in shade with extreme precipitation like 50mm per hour

:Photo: Marius Voica, July 5th, 2017

Extreme weather conditions enhancing food damage at local market

- Apricots rottening

Photo: Meinhard Breiling, July 2nd 2017

Local market in countryside, Romania

Photo: Meinhard Breiling, July 2nd 2017

Extreme precipitation – Lower Austria

Source: Meinhard Breiling, June 3rd, 2016

Different Vulnerability based on Crops and Soil Management

Source: Meinhard Breiling, June 3rd, 2016

Hail event in Klagenfurt –Austria

Source: Meinhard Breiling, June 23rd, 2014

Why there is not yet a food security issue in EU? (1)

- Rural municipalities in periphery Europe have negative population growth
  - Local food base remains stable
  - Disaster damage is not felt as food security issue as local food production generally exceeds the needs of local population (negative curve taking Malthus model)
  - Local food production is source of food specialities
  - EU programs for rural development bring economic incentives to keep population in place
  - Especially in rich EU countries local food production is rather a hobby or lifestyle rather than a need
  - It is important to keep farming, food production and land management for eco-system services

Why there is not yet a food security issue in EU? (2)

- Regional food value chains work well
  - High capacities allow to produce varied kinds of food
  - Regional disasters do occur, particular heat waves and floods, in general agricultural damage is not classified
  - Disasters – similar to the kind of Fukushima effecting strategic nodes of the regional food chain could change the favorable situation
  - There is much room to adjustment in favour of the food chain due to non food agricultural production like energy plants
  - Emerging markets provide possibilities of growth and expansion
  - Infrastructures are built out well and allow high capacities

What are the implications for ASEAN

- ASEAN countries are more diverse than EU countries
- Problem context varies more from region to region – poverty and local food distribution is more of a problem here than in EU
- There are more disasters in ASEAN with higher damage and losses in agriculture than in EU
- The accumulation of the local resource decline can seriously impact the regional food supplies
- The models of Malthus, Verhulst and Economies of scale do exist in parallel and this will lead to major regional migration within ASEAN similar of what happened in EU