Imperatives for Securing the Food Production Base

SETTING THE SCENE

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Key points

- Stock-taking Agricultural Evolution
- Food Production At Crossroad
- Implication and Way Forward

Stock-taking

Transformation of human society

- Agricultural revolution – new knowledge about how to use inexpensive and abundant land
- Industrial revolution – new knowledge about how to use fossil fuels
- Knowledge revolution – new knowledge about how to use information technology

Agriculture in transition

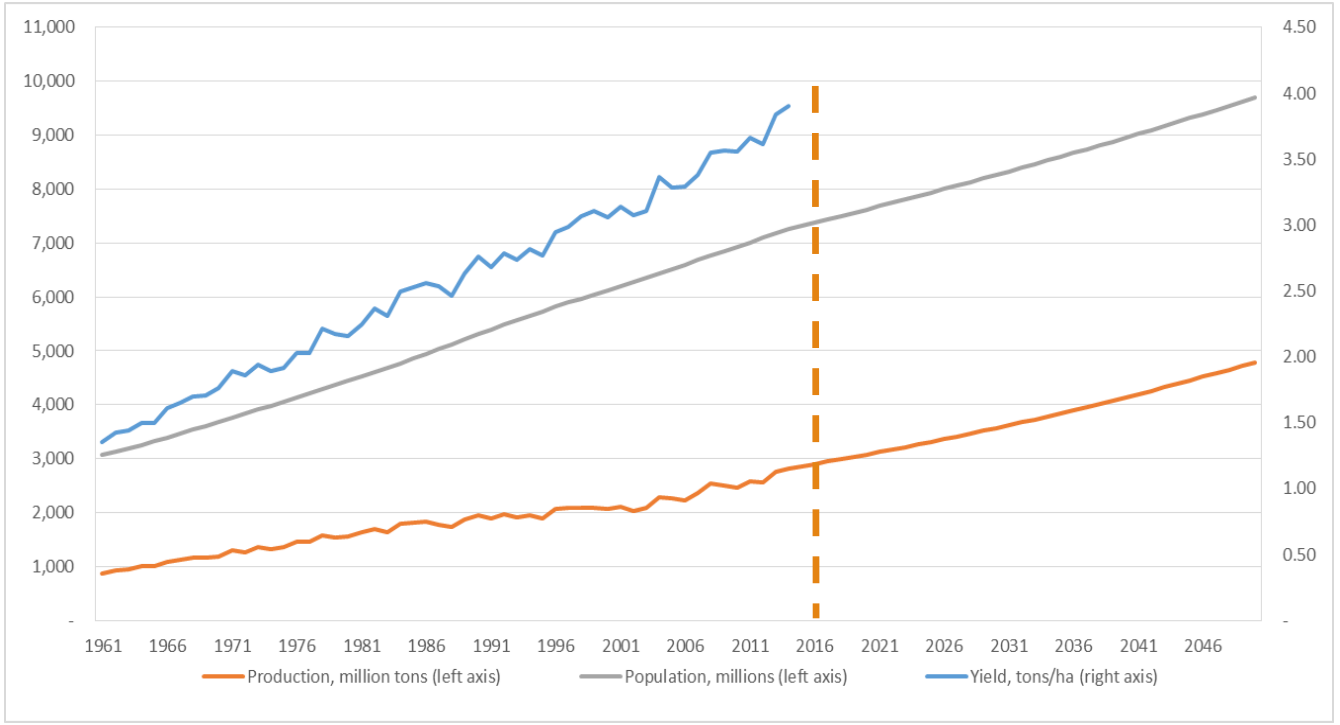
As *Way of Life*

- Dependent on nature
- Supply-driven; depends on availability of land, inputs, favorable climate
- Subject to uncertainty
- Food security at risk from harvest failure

As *Way of Business*

- Dependent on technology
- Knowledge driven; Science-driven; Information – driven
- Manage risk
- Potential to bypass/leapfrog development phases

Global trends in population and cereal production, 1961 – 2014; projection to 2050



Source: FAOStat; Projections from FAO (2012)

- Production outpaced population growth
- Annual growth rates
  - population: 1.6%
  - production: 2.2%
  - yield: 2.0%
  - per capita supply: increased 40%
- **Can this be sustained to supply extra 60% by 2050?**

Structural shift

	In employment		In GDP	
	1970 (nearest year)	2015 (nearest year)	1970 (nearest year)	2015 (nearest year)
East Asia				
China	80.8	28.3	34.8	8.8
Japan	17.4	3.6	5.1	1.1
Korea, Rep.	50.5	5.2	27.5	2.3
South Asia				
Bangladesh	58.8	48.1	54.6	15.5
India	NA	49.7	42.0	17.5
Pakistan	57.3	48.4	36.8	25.1
Southeast Asia				
Indonesia	61.5	32.9	23.3	13.5
Philippines	50.4	29.1	29.5	10.3
Thailand	76.7	32.3	25.9	9.1

Source: World Development Indicators; FAOStat

- Science and technology transformed all sectors – per capita output increased
- Agri growth outpaced by industry, services growth
- Employment share of agri has fallen

Other structural changes

- Demographic shifts: urbanization, aging rural population, feminization of agricultural work force
- Changing food habits and preferences
  - More animal proteins, fruits and vegetables
  - More packed/processed foods
  - Higher quality standards

https://commons.wikimedia.org/wiki/File:Supermarket_in_Sigatoka,_Fiji_5.jpg

Resource limits

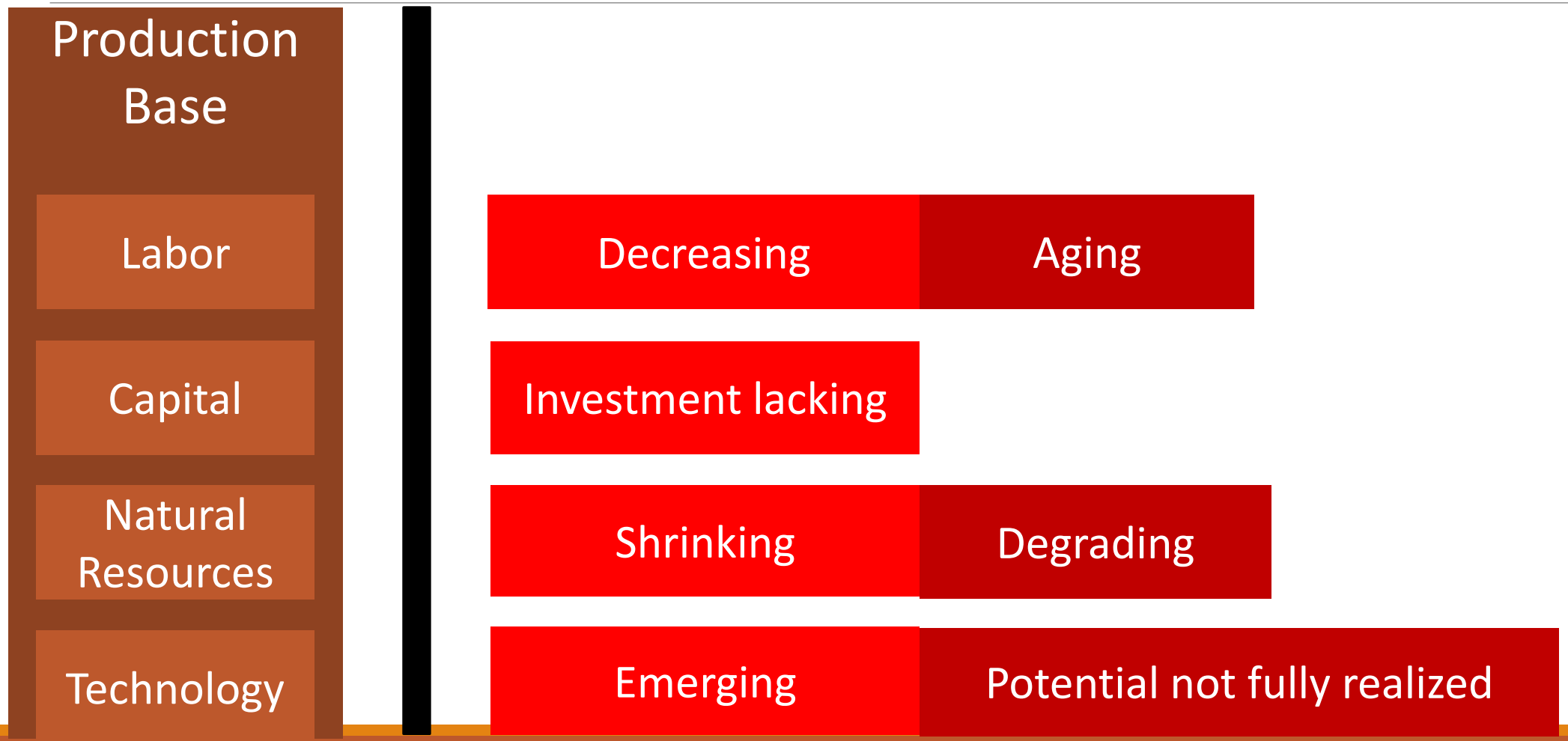
- Land expansion no longer possible
- Pasture land overgrazed
- Water resources depleting
- Fish stocks vanishing
- Habitats being lost
- Worsening impact of pollution from agri-chemicals on land, water, ecosystems, human health

The era of climate change

- Worsening extremes: frequent droughts, coastal flooding, cyclones
- Overall: harsher environment for agriculture (especially in tropics)
- Significant carbon footprint from agricultural activity
- Conventional agriculture at risk

Food Production At Crossroad

Factors eroding food production base



Call for paradigm shift

Traditional Approach

Increasing Productivity through

Labor Intensive
Resource Intensive
Input-Based Agriculture

Knowledge Intensive Agriculture

Precision Farming
Green Technology
Commercial Farming
Entrepreneurship Support

Precision farming in operation

https://drive.google.com/open?id=0B_TCMluqwirBZ0dKdHhVZk5IWFU

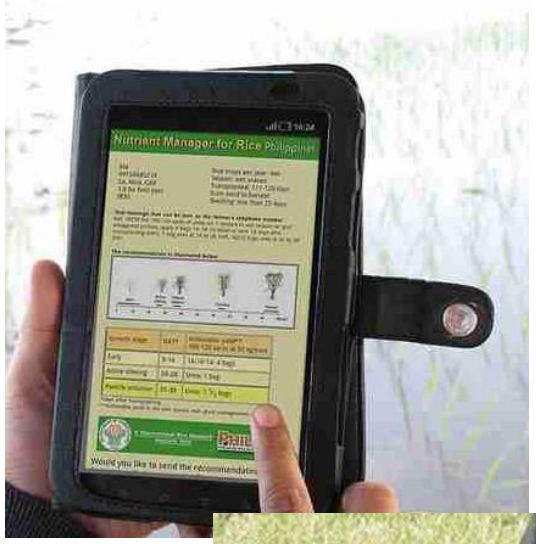
Factors determining future of production base

High Technologies				Knowledge and Skills	
Remote Sensing	GIS/GPS Drone	Fertigation	Biotech	Management and Finance	Logistics
LED	Big Data Data Analytics	Green House	Robotics	Experiential Learning	Storage

Examples

- Production – based on automation, sophisticated use of data

- Collect, organize Big Data - from handheld devices, trackers, drones, remote sensing



Photos: http://irri.org/news/media-releases/feeding-rice-just-got-easier-with-smartphones; https://nova.adalidda.com/posts/JixAuYXBSSFhs3YbA/role-of-unmanned-aerial-vehicles-in-precision-farming; Creative Commons/Dohduhdah

Implications and Way Forward

Emerging models for securing food production base

- Contract farming – Large corporation hedging the market risk for producers
- Producers' cooperatives – production and marketing level consolidation
- Micro agri entrepreneur – small scale local service provider; with potential to thrive through vertical integration

Gansu Internet-Plus Based Socialized Agricultural Service System Development Proj

Government plays catalytic role to promote precision agriculture by facilitating network connected sensors (Internet of Things) to control & monitor soil moisture, fertilizer & pesticide application & yield quantity and quality

Producers organize themselves through cooperatives to generate and take advantage of economies of scale

Private sector works in partnership with producers by providing logistic services, agricultural inputs and outputs

Marketing through e-commerce platform with consumer-interface (traceability): a two-way information exchange system between producers and consumers

Actions and way forward

- Farmer education, e-extension, services outsourcing
- Organization of farmers – consolidation of operations (not ownership)
- Greater access to finance for smallholders
- Efficiencies in trade and logistics
- Big data for better-designed risk instruments, e.g. weather-based insurance
- PPP and aggressive private investment

Thank you!