

Food Security: Water, Energy, and Other Considerations

Regional Energy Governance and the Water-Energy-Food
Nexus Perspective: Challenges in the Asia Pacific Region
International Conference

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[The views expressed herein are entirely those of the author and do not necessarily reflect the position of the agency he serves]

OUTLINE:

- 1. INTRODUCTION –**
- 2. BACKGROUND – new dynamics of food security**
- 3. FOOD-WATER-ENERGY SECURITY NEXUS**
- 4. OTHER CONSIDERATIONS**
- 5. CONCLUSION**



INTRODUCTION:

Purpose:

Provide an appreciation of the new dynamics in **Food Security**, within the context of the **Food-Water-Energy Nexus**, with an **ASEAN** and **Rice** slant

Underlying theme:

It is crucial to have **public and policy dialogue** so as to understand these new dynamics in Food Security, in order to continue getting the **‘basics’ and ‘balance right’**.

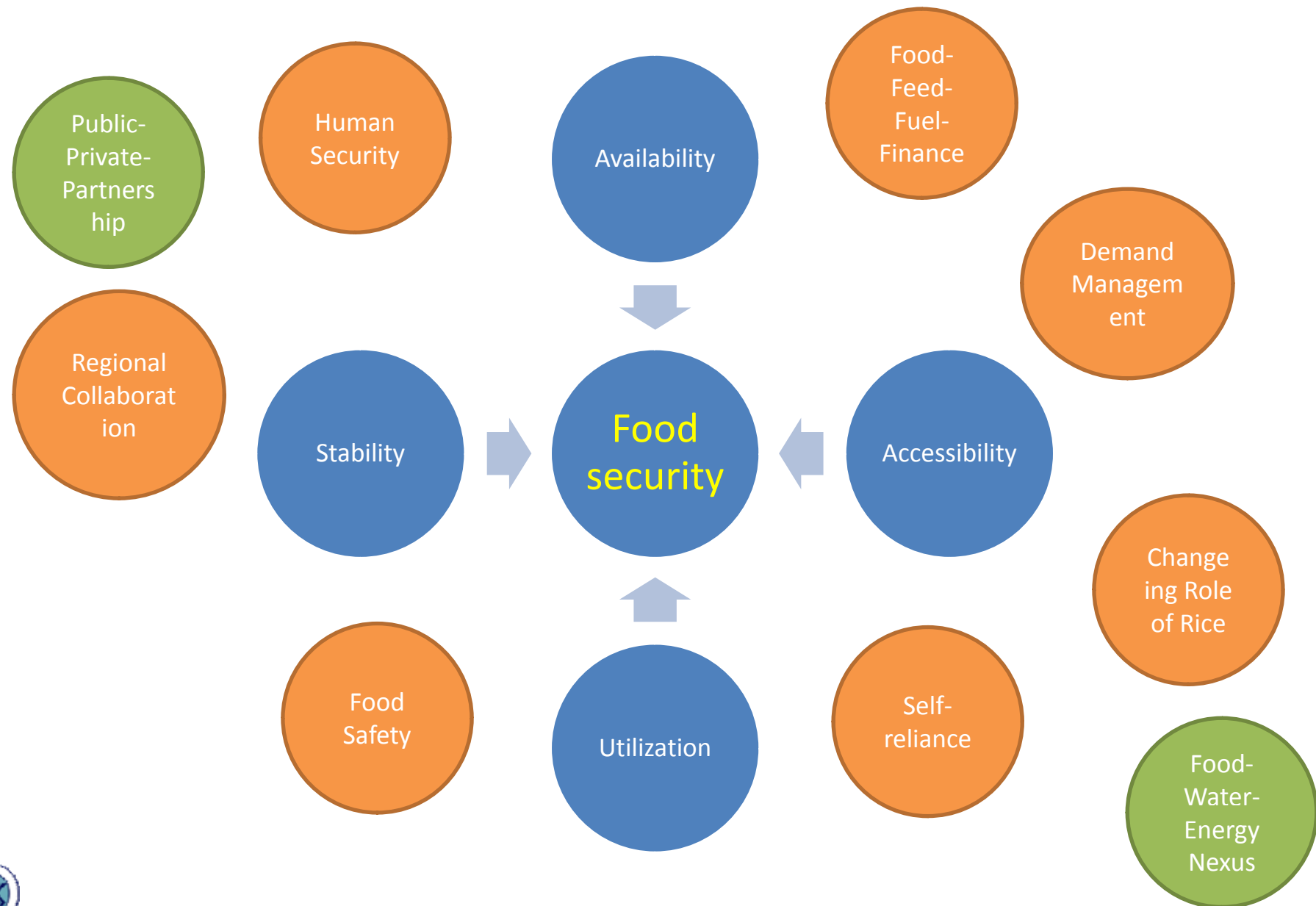


KEY TAKE-HOME MESSAGES:

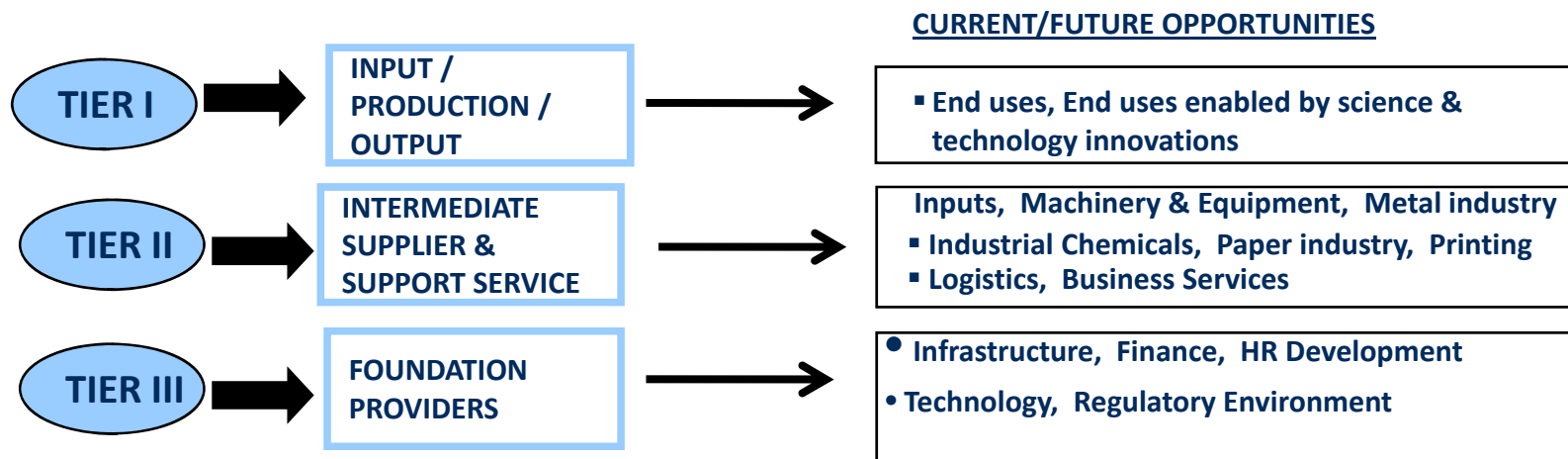
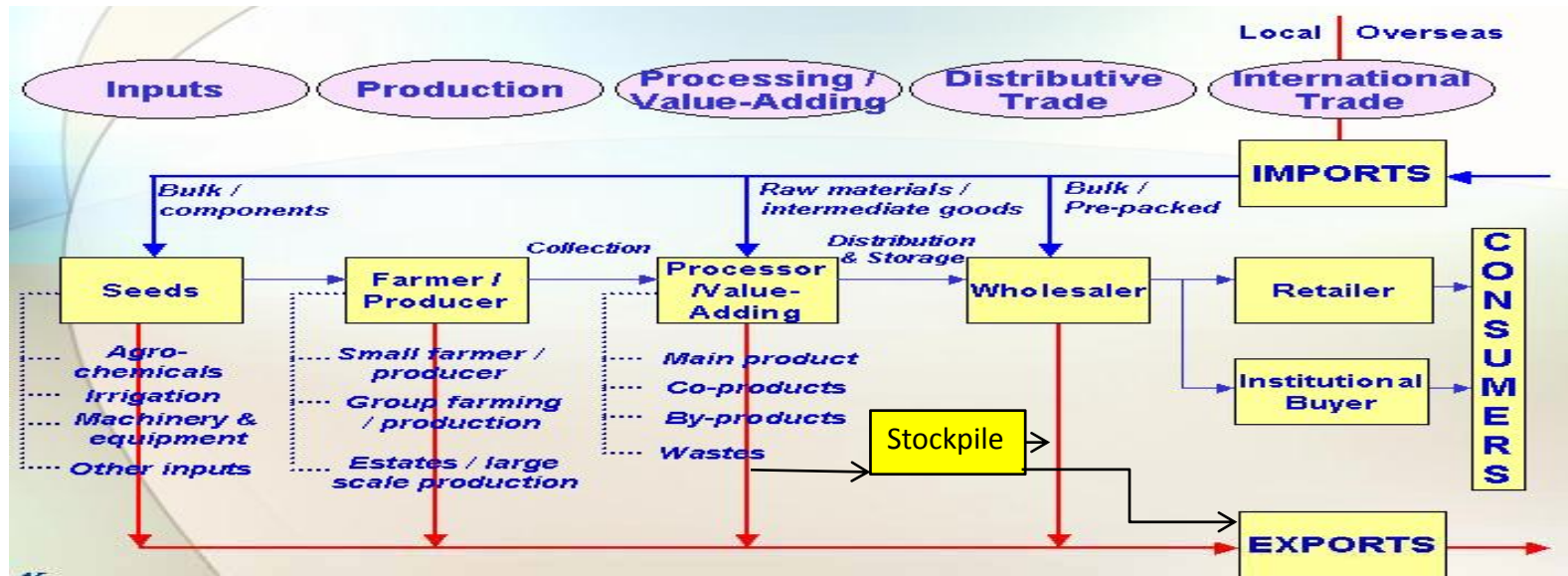
- Food Security – increasingly **more complex, multi-scale and interdependent** – so, need to continuously **(re)frame problems well**
- Need **trans-disciplinary, networked solutions** factoring in supply chains and trading networks and new dimensions rather than **isolated solutions** aimed at just one problem, issue or even sector in an increasingly interlinked **food-water-energy security nexus** that is increasingly private sector driven - **Public Vs Private goods** dichotomy increasingly blurred
- **Food, Water and Energy security**, represent **3 pillars of Sustainable Development**
 - **Food and Water**: Basic social needs
 - **Water**: needed by all in the environment, often a limiting factor. Yet at times water can be so destructive
 - **Energy**: driver of economic growth and creature comforts/livelihood
- Guided by the new dynamics in food security, we should be **wary of being trapped in the mindset of the 1970s** - ignoring **realities & opportunities of the 2010s** when formulating food security policy and strategies – **rice-centric, production-centric, public sector-centric, and nation-centric**
- **Sea** - the next frontier for **food, water, energy security?** – ‘**Blue Economy**’ (Expo 2012 in Yeosu, Korea)



FOOD SECURITY: FROM TRADITIONAL TO NEW DIMENSIONS

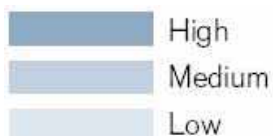


Agrifood Supply Chain – The Big Picture – Economic Activities



FOOD LOSSES & RESOURCE UTILIZATION ALONG SUPPLY CHAIN

	Inputs/Agriculture	Primary Processing	Secondary Processing and Distribution	Retail	Consumption
Relationship Power	Small/medium-sized organizations	Private organizations	Own label Brand owners	Four dominant organizations	Marketing-led product development
Energy	Fertilizer production	Refrigeration	Transport and cooking	Refrigeration	Transport and cooking
Resource Usage	Land Labour	Water	Transport infrastructure	Urban Land	Power
Direct Emitted Carbon	Nitrogen and livestock methane		Transport		Landfill
Product Wasted or Lost	5%	5%	2%	10%	33%



◦ This is an indicative interpretation of the UK supply network. Waste figures based on work undertaken by the Food Process innovation Unit at Cardiff University on behalf of the Food Chain Centre. WRAP estimates have been used for consumer waste figures. Available online at:

◦ http://www.wrap.org.uk/wrap_corporate/news/food_waste_set_to.html (15.10.08).



OTHER CONSIDERATIONS:

- FAO (2009) – future production growth – **10:20:70 rule** (10% area expansion, 20% cropping intensity increases, BUT 70% from Technology, Innovation and Policy)
- Ambler-Edwards et al. (2009) –Future food **production/Supply systems** going to be **more uncertain and prices more volatile**; food **wastage** along supply chain – **highest at consumer level**
- Need **to increase productivity along entire supply chain** (not only at production level – where **land, water, labour and capital** are traditional sources of productivity increases) within context of **structural transformation**
- **‘More with less’, ‘More Crop per Drop’, Ecosystem Engineering Vs Genetic Engineering**
- **Hunger for Land and Thirst for Water**
- **Cross-border investments** – can help develop **comprehensive supply chains and trading networks, transfer of technology, export platforms** – ASEAN as a common market and production base – AEC - ASEAN 2015; ADBI's ASEAN 2030 Study – **‘Towards a Resilient, Inclusive, Competitive, and Harmonious (RICH) ASEAN’**



VIET NAM'S "3 REDUCTIONS, 3 GAINS" – More with Less

NÔNG DÂN CẦN THƠ TÍCH CỰC THAM GIA CHƯƠNG TRÌNH

3 GIẢM 3 TĂNG

Giảm LƯA GIỐNG

Giảm U RÊ

Giảm THUỐC TRỪ SÂU

Tăng SẢN LƯỢNG GẠO

Tăng CHẤT LƯỢNG GẠO

Tăng LỢI NHUẬN

VIỆN NGHIÊN CỨU LÚA QUỐC TẾ (IRRI) - VIỆN NGHIÊN CỨU LÚA ĐBSCL - ĐẠI HỌC CẦN THƠ
CỤC BẢO VỆ THỰC VẬT - SỞ NÔNG NGHIỆP VÀ PHÁT TRIỂN NÔNG THÔN CẦN THƠ

XIN LIÊN HỆ VỚI PHÒNG NÔNG NGHIỆP & PTNT ĐỂ ĐƯỢC HƯỚNG DẪN THÊM

CÁC BƯỚC THỰC HIỆN

- 1- Trên ruộng của mình đắp bờ đánh riêng khoảng 1 công làm thử biện pháp "3 giảm 3 tăng".
- 2- Phân ruộng còn lại làm theo cách nông dân vẫn thường làm.
- 3- Ruộng làm thử nghiêm áp dụng 3 biện pháp kỹ thuật mới, còn tất cả các biện pháp khác như: diệt cỏ, giữ nước, phòng trừ bệnh đều được áp dụng như nhau ở cả 2 ruộng.
- 4- Khi thu hoạch, so sánh năng suất, chi phí đầu tư (giống, phân bón, thuốc trừ sâu) giữa 2 ruộng, tính hiệu quả kinh tế.

HIỆU QUẢ

- ✓ Tăng năng suất
- ✓ Tăng chất lượng gạo
- ✓ Tăng lợi nhuận

Kính mời bà con tham gia chương trình "3 giảm 3 tăng" để tăng lợi ích kinh tế, bảo vệ môi trường trong lành, bảo vệ sức khỏe mọi người.

Hãy liên hệ các địa chỉ sau đây để được hướng dẫn thực hiện:

- Cần Thơ Khuyến Nông xã.
- Hội Nông Dân xã.
- Trạm Bảo Vệ Thực Vật huyện.
- Trạm Khuyến Nông huyện.
- Trung Tâm Khuyến Nông tỉnh Cần Thơ
Số 04 Ngõ Hữu Hạnh - TP Cần Thơ
ĐT: 820783
- Chi Cục Bảo Vệ Thực Vật tỉnh Cần Thơ
Số 58 Đường Xô Viết Nghệ Tĩnh - TP Cần Thơ
ĐT: 823787

**Chúc Bà con
Trồng mùa Trùng gạo**

Chương Trình 3 Giảm 3 Tăng

Giảm

Giảm

Giảm

Tăng

Tăng

Tăng

SỞ NÔNG NGHIỆP & PHÁT TRIỂN CẦN THƠ

GIẢM LƯỢNG LÚA GIỐNG

- 1- Sử dụng hạt giống thuần khiết.
- 2- Loại bỏ hạt lép bằng: ngâm nước muối 15% (pha 1,5 Kg muối trong 10 lít nước) cho giống vào, vớt bỏ ngay hạt lép, lắng nổi trên mặt nước, sau đó vớt bỏ hạt lép và ngâm bình thường.
- 3- Giặt sạch với hướng giống thích hợp. Có thể sử dụng phương pháp:
 - * Dùng cụ sạ bằng: 70 - 100 kg/h.
 - * Số hạt trên: 100 - 120 kg/h.

GIẢM LƯỢNG PHÂN Đạm

- 1- Sử dụng bảng so màu lá lúa để bón phân đạm cho lúa vào 2 thời điểm là 20 đến 25 ngày sau sạ và 40 đến 45 ngày sau sạ.

GIẢM PHUN THUỐC TRỪ SÂU

Không phun thuốc trừ sâu cuốn lá trong giai đoạn từ 0 đến 40 ngày sau sạ. Vì trong giai đoạn này cây lúa có khả năng tự bảo vệ chống lại sâu cuốn lá.

Lợi ích của việc giảm thuốc trừ sâu:

- Bảo vệ cân bằng và động vật có ích, hạn chế sự bùng phát của nhiều sâu hại khác.
- Giảm ô nhiễm môi trường.
- Giảm chi phí.

2- Điều chỉnh lượng phân đạm để giữ màu sắc lá lúa luôn ở không màu số 4.

3- Dùng cân đối phân Lân và phân Kali theo hướng khuyến cáo (từ phân lân kế m theo).

SẠ DÂY	SẠ THỦA
- Đẻ bẹ sâu bệnh	- Ít sâu bệnh
- Đẻ đổ ngã	- Ít đổ ngã
- Mọc giống	- Ít tén giống
- Tén nhiều phân	- Ít tén phân
- Tén nhiều tén	- Tén hiện tén



WATER SAVING OPTIONS FOR RICE – More Crop per Drop

	Conventional	Safe AWD	Dry seeded	Aerobic rice
Land prep	Puddled	Puddled	Not puddled	Not puddled
Establishment	Transplant; wet seed	Transplant; wet seed	Dry seed	Dry seed
Water	Flooded; saturated	Saturated; mild drying	Early: drained; then saturated	Drained
Soil aeration	Anaerobic	Anaerobic; mild drying	Aerobic; then anaerobic	Aerobic

Conventional



Safe Alternate Wet & Dry (AWD)



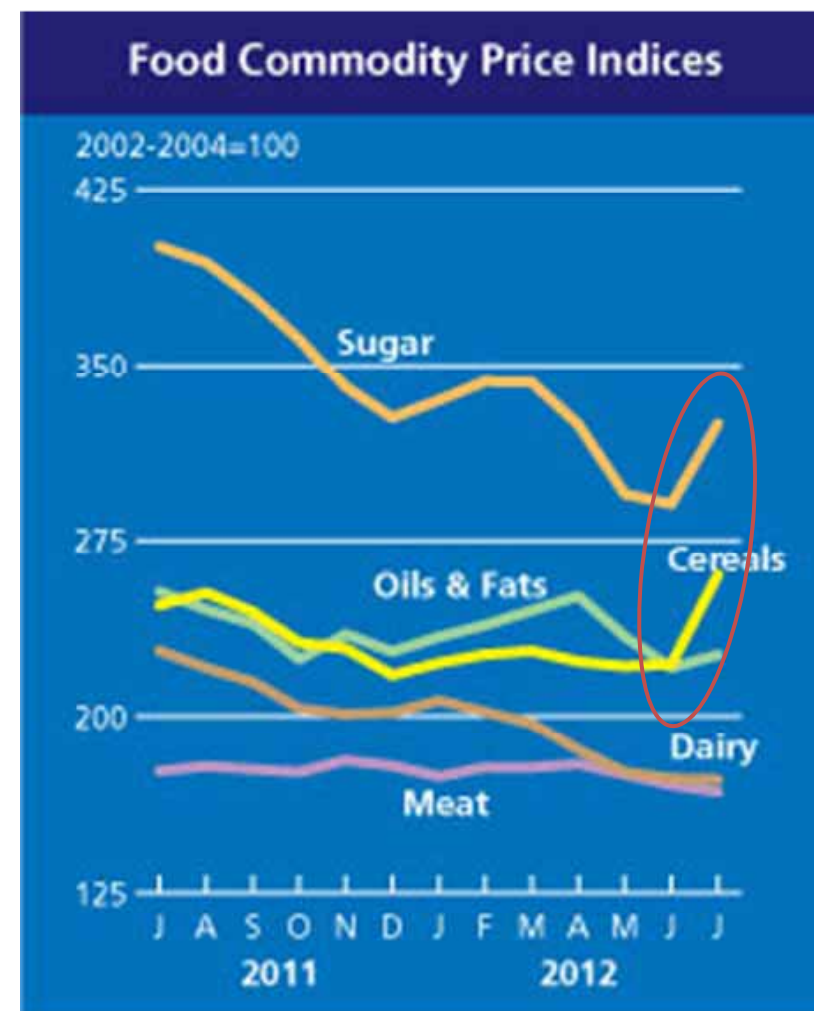
Dry seeded



Aerobic rice



FAO'S FOOD PRICE INDICES BY CATEGORIES

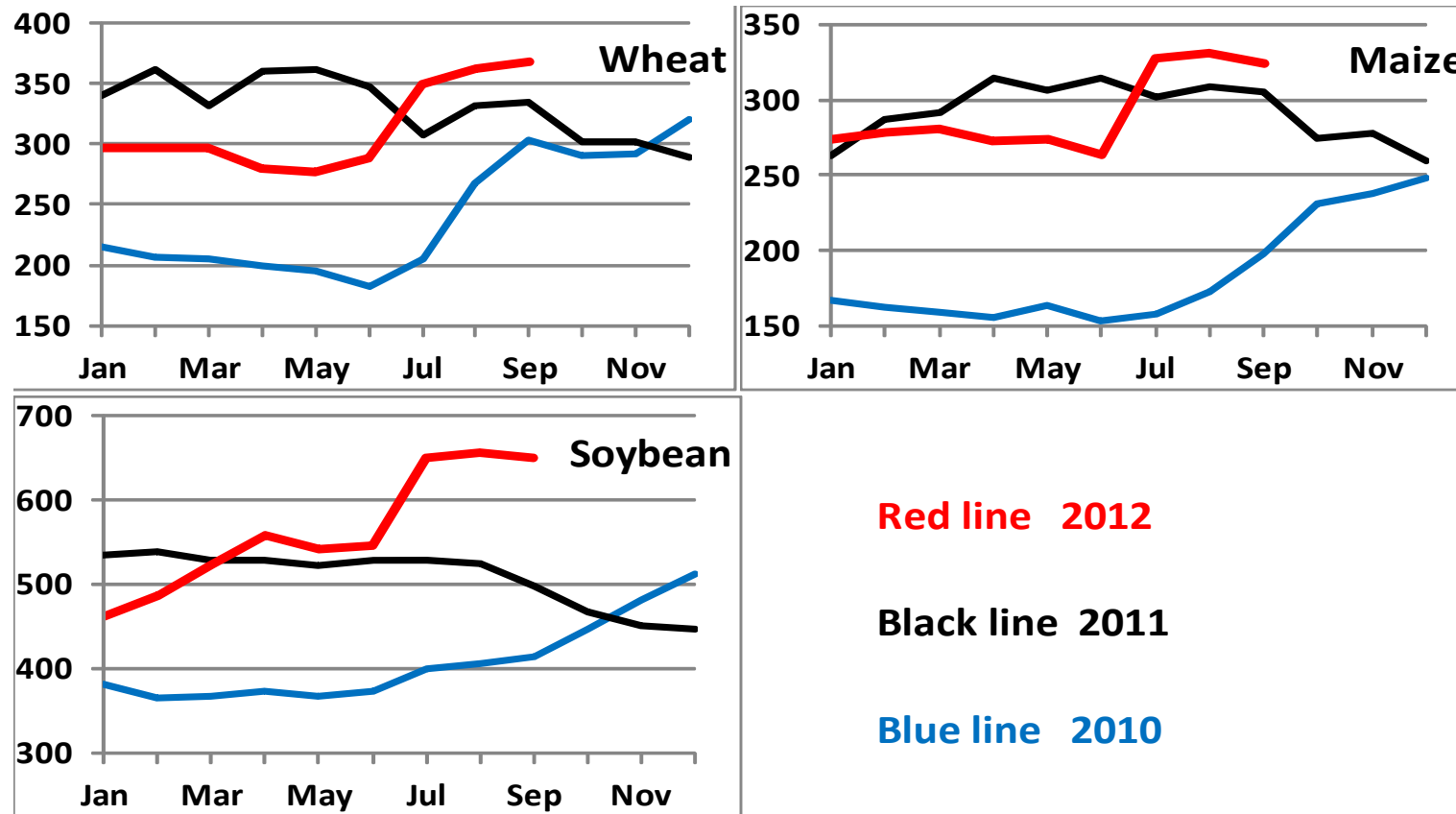


Source: FAO (2012)



RECENT CONCERN OF BREWING FOOD PRICE CRISIS

2012 prices in summer seemed like in 2010/11 (as well as 2008) crisis
(world market prices, USD/tonne)



RECENT CONCERN OF BREWING FOOD PRICE CRISIS



FALSE ALARM - No Food Crisis?

- **Food Prices expected to remain high**

- Global **maize** & **wheat** market balances tight and so vulnerable to any unexpected negative event (e.g. export restriction)
- **Rice** situation more stable (large stocks, and export bans less likely this time)

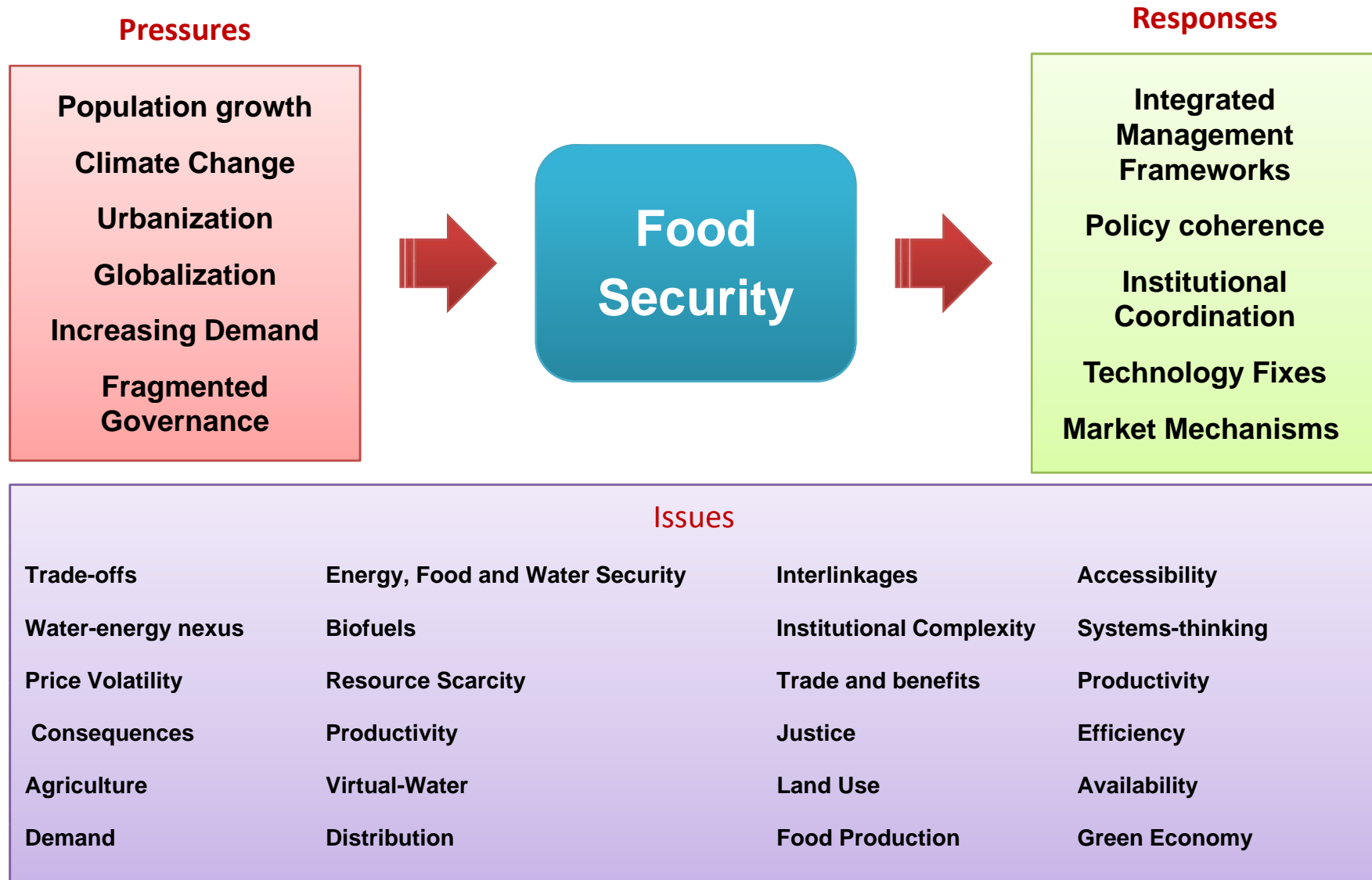
- **In spite of high prices, market conditions and fundamentals very different from 2007/08, scenario most notably:**

1) slower econ. growth => reduced demand; 2) Lower oil prices than in 2007/08; 3) much reduced speculative fund in food futures; 4) deceleration (if not contraction) in maize use in ethanol; 5) freight rates near record lows; and 6) fertilizer prices well below 2007/08.

BUT need to be vigilant ...



FOOD SECURITY – PRESSURES, ISSUES AND RESPONSES





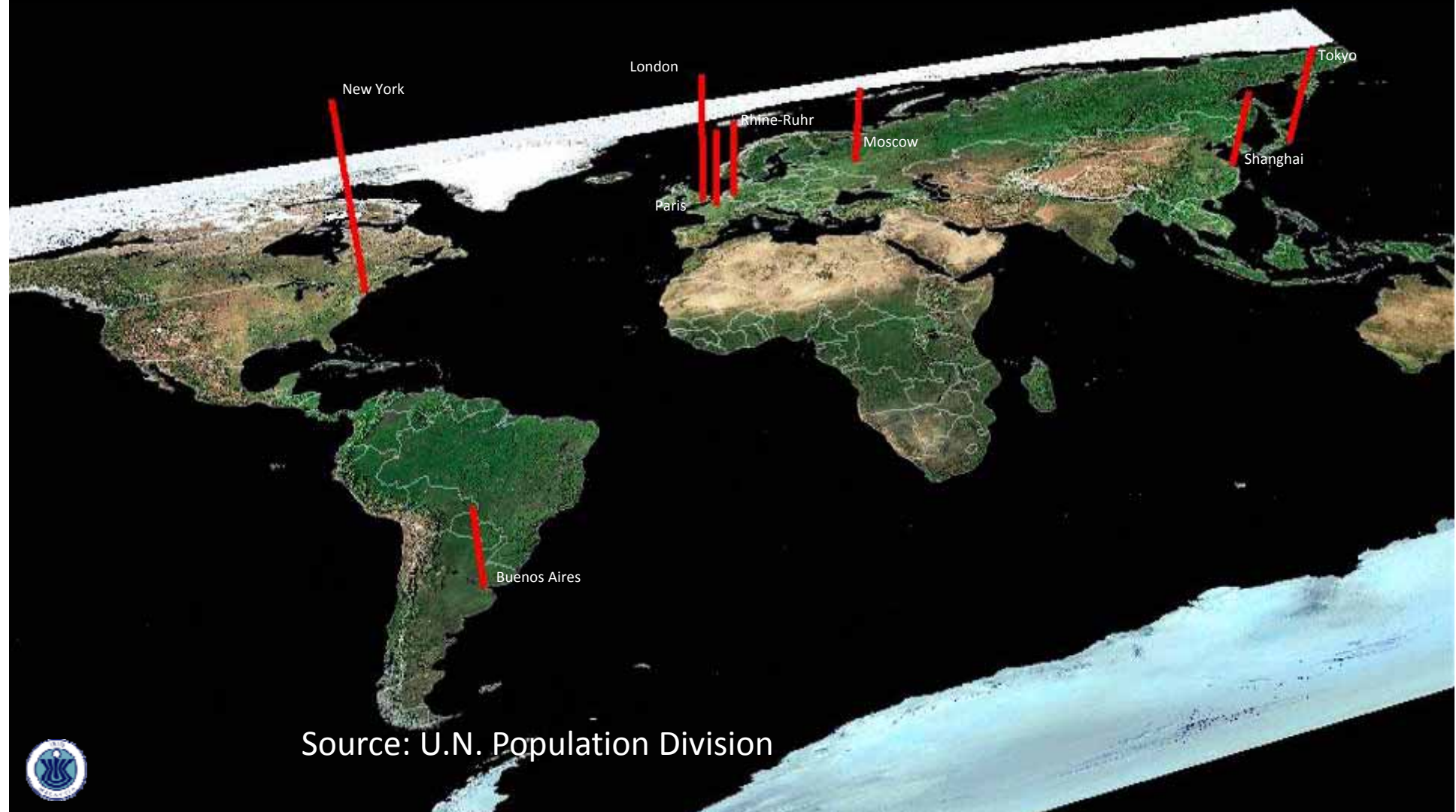




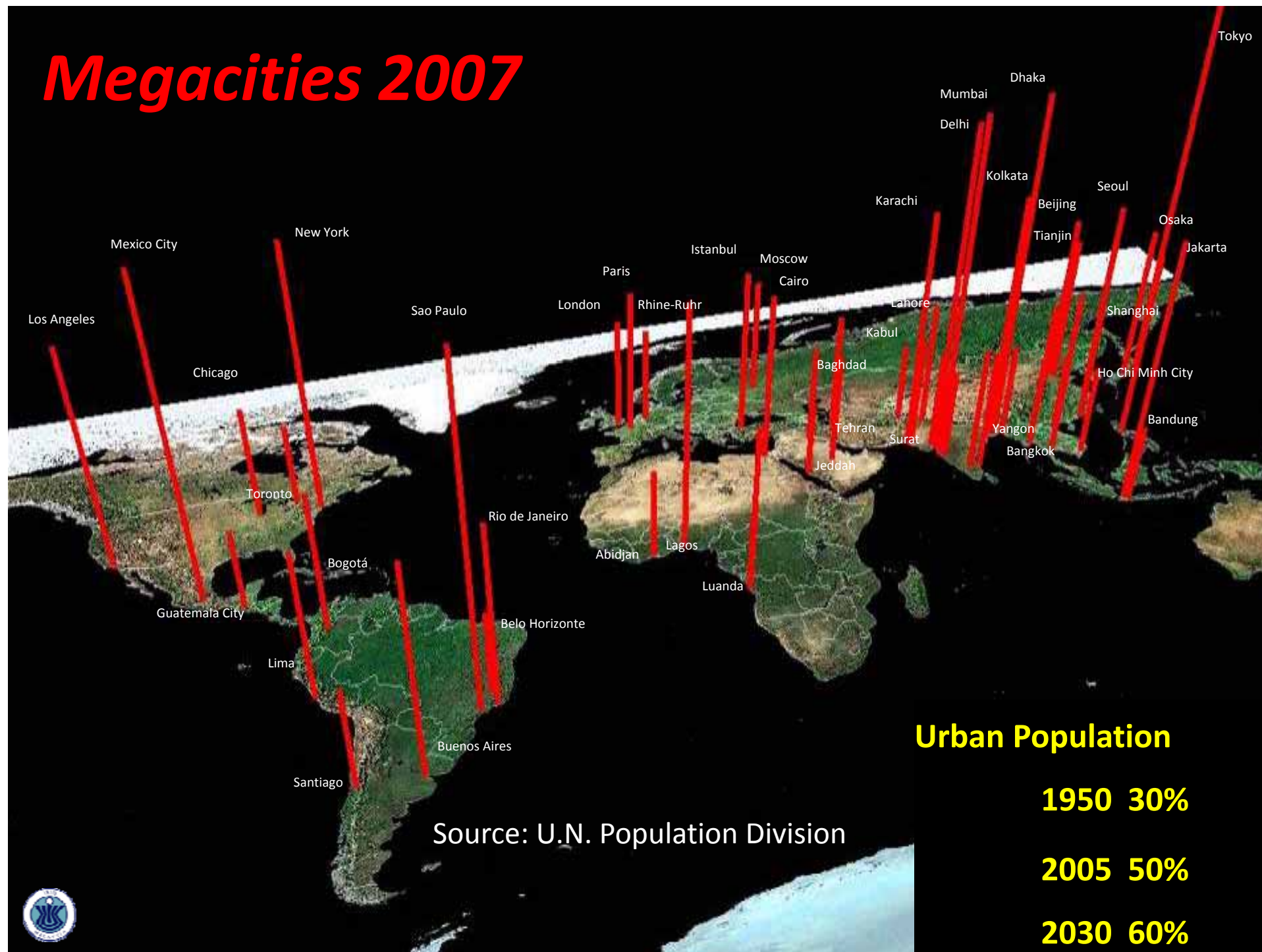
URBANIZATION

Megacities 1950

(Population > 5 million)



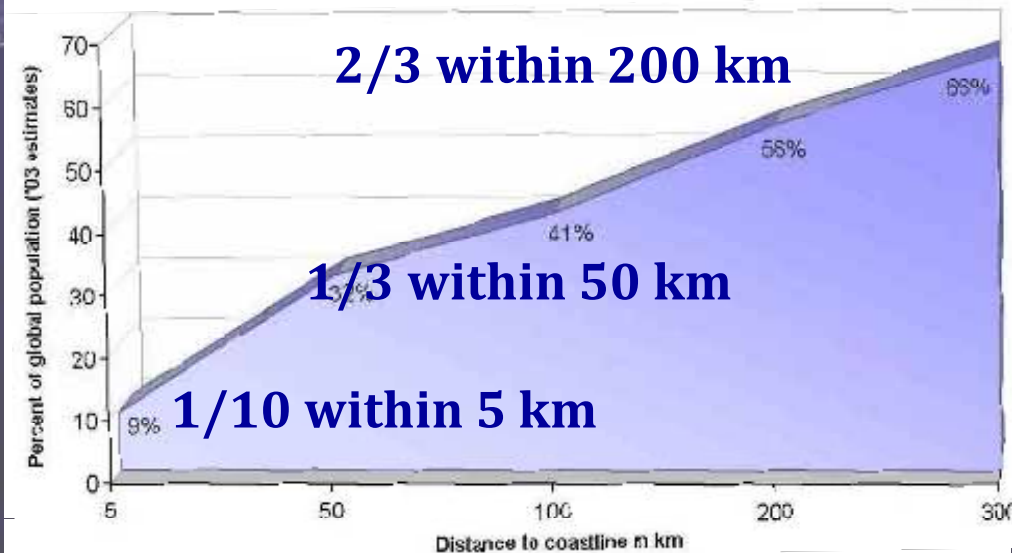
Megacities 2007



CONCENTRATION OF POPULATION IN COASTAL AREAS

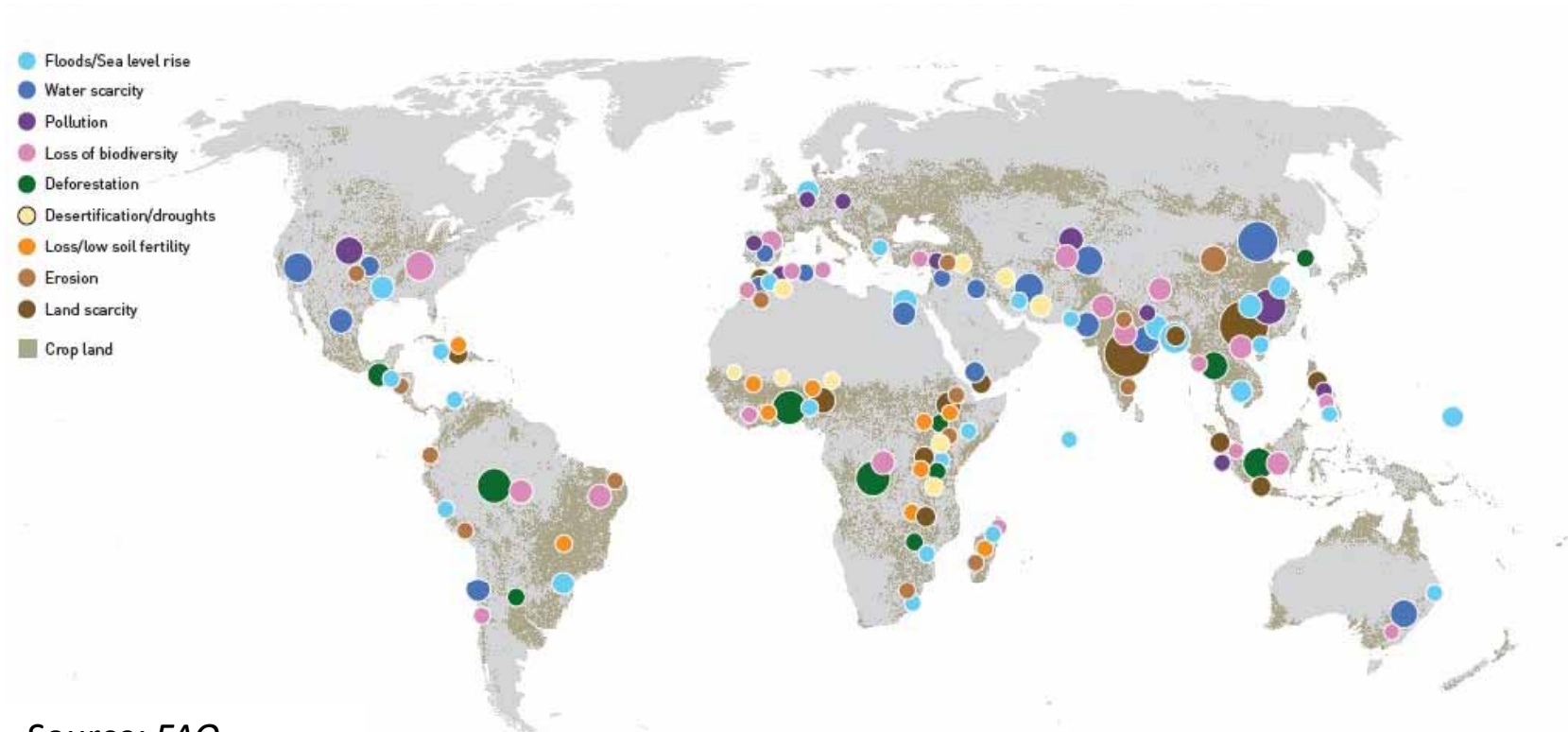
The earth at night

Population in coastal areas (2003)



Value concentration along coasts

GEOGRAPHICAL HOT SPOTS FOR WATER-FOOD NEXUS

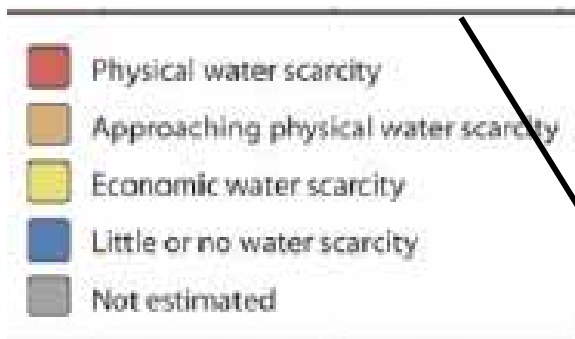


Source: FAO

Highlighting risks associated with main agricultural production systems and interactions across the nexus (i.e. interdependence between water & food)

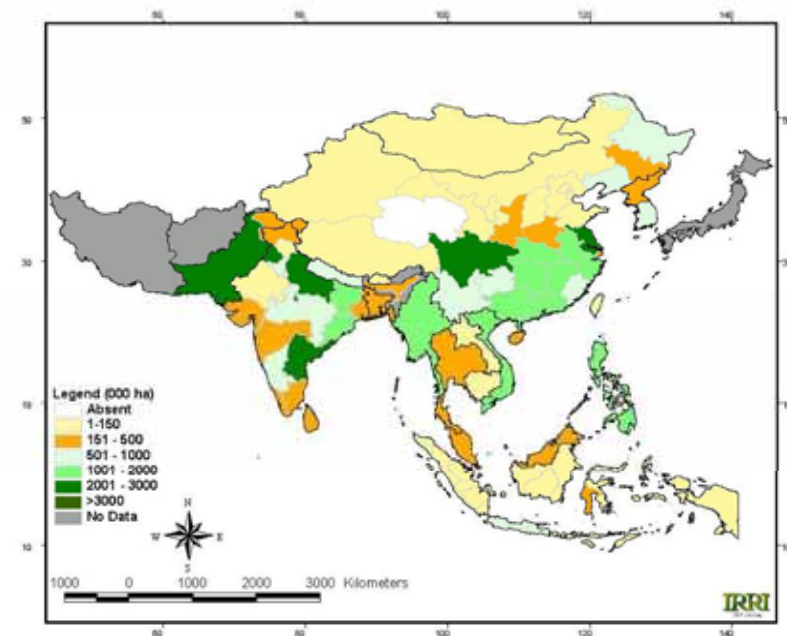


EXPECTED INCREASING WATER SCARCITY



**2025: 15-20 million ha irrigated rice
will suffer some water scarcity**

Asia WS irrigated rice

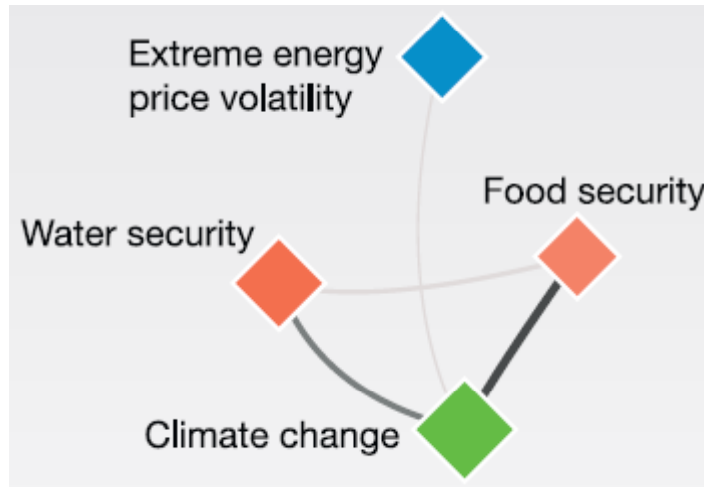


IRRI Data base (GIS laboratory)

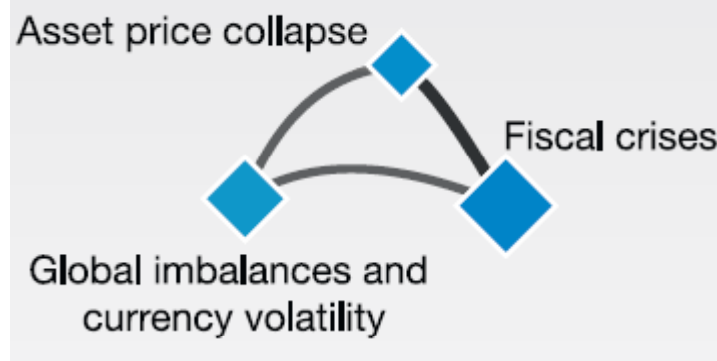
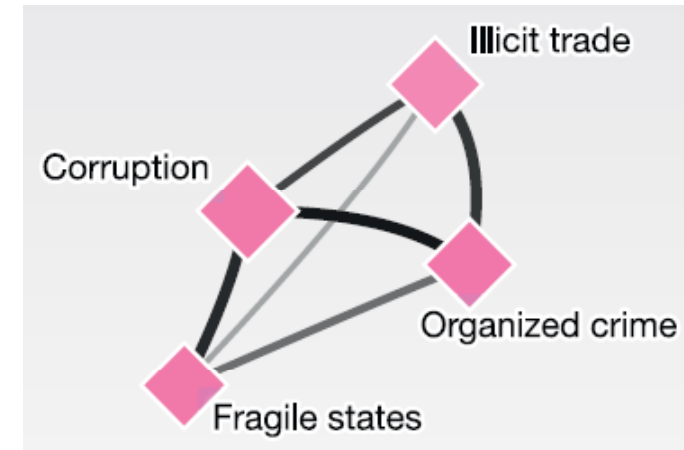


WEF 2011 GLOBAL RISKS – THREE KEY NEXUS:

Water-food-energy nexus



Illegal economy nexus



Macroeconomic imbalances nexus

Source: Adapted from
WEF 2011



WHY WATER- FOOD-ENERGY NEXUS?



Adapted from Bazilian et al 2011

- **Why these three resources?**
 - **Shared concerns about access** to water, sanitation, energy, and food; compounded by growing challenges to **resource availability, management and sustainability**;
 - *Water, energy, and food sectors are connected in important ways, and **actions in one sector** have the potential to **either help or harm the other two**;*
 - Based on a better understanding of the inter-dependencies across water, energy and food challenges, the **nexus approach provides a more comprehensive base for allocating scarce resources.**



Bonn Perspectives



WHY WATER- FOOD-ENERGY NEXUS?

Energy, water and food are inextricably linked

- **Water for energy** currently amounts to about **8% of global water withdrawals** (45% in industrialized countries, e.g. in Europe).
- **Food production** and supply chain is responsible for around **30% of total global energy demand**
- **Food production** is the largest user of **water** at the global level, responsible for **80% of blue water use**
- **Biofuels** links **food, energy, water,**

Projections for 2050 with 9.2 billion people:

- **70% increase in agricultural demand for food by 2050**
- **40% energy demand increase by 2050**
- **But by 2030: confronting water supply shortage of ~ 40%**





4 Major Rivers (3 of which originate within own border)

Sagaing Region

Rakhine State

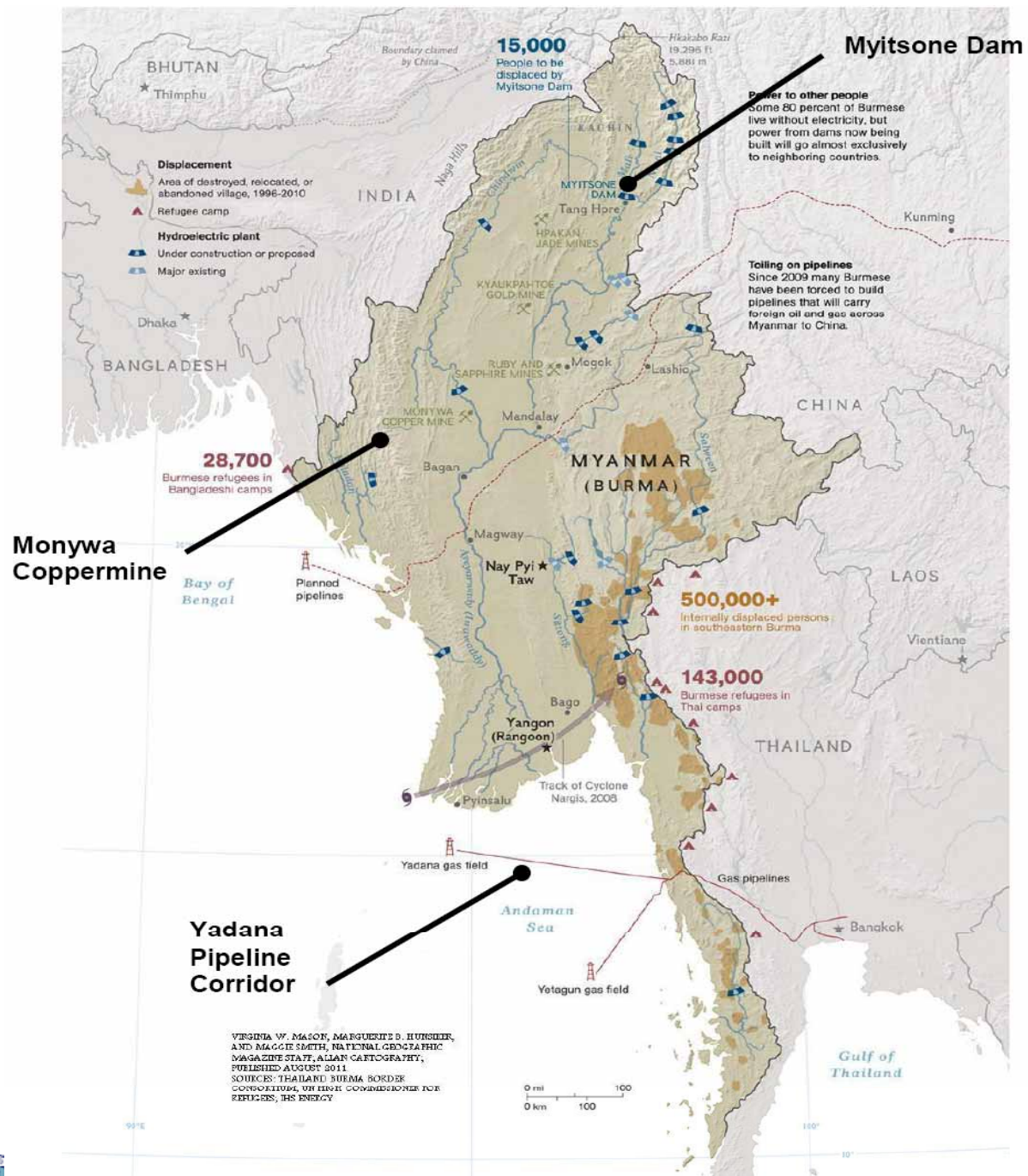
East & West Bago Region

Ayeyarwaddy Delta Region

Four Major Rice Granaries in Myanmar

Myanmar- potentially water-energy-food secure at macro level – yet transient food insecurity & malnutrition in some areas

Map from National Geographic



ASEAN COUNTRIES – MAJOR AGRI-FOOD COMMODITIES PRODUCED AND WORLD RANKING

Country	Major Ag Commodities Produced	World Ranking
Brunei	rice, vegetables, fruits; chickens, water buffalo	
Burma (Myanmar)	rice, pulses, beans, sesame, groundnuts, sugarcane;	2- pigeon pea, cowpeas; 3- sesame
Cambodia	rice, rubber, corn, vegetables, cashews	
Indonesia	rice, cassava (tapioca), peanuts, rubber, cocoa, coffee, palm oil, copra; poultry, beef, pork, eggs	1- palm oil, cloves, cinnamon, coconuts; 2 – rubber, pepper; 3 – coffee, cocoa
Laos	sweet potatoes, vegetables, corn, coffee	
Malaysia	rubber, palm oil, cocoa, rice, coconuts, pepper, poultry, eggs	2 – palm oil; 3 - rubber
Philippines	sugarcane, coconuts, rice, corn, bananas, cassavas, pineapples, mangoes; pork, eggs	2 – coconuts, pineapple
Singapore	orchids, vegetables; poultry, eggs; fish	
Thailand	rice, cassava (tapioca), rubber, corn, sugarcane, coconuts, soybeans	1 – rice & shrimp exporter; 1 – rubber, pineapple; 2- eggs
Vietnam	rice, coffee, rubber, cotton, tea, pepper, soybeans, cashews, sugar cane, peanuts, bananas; poultry; fish, seafood	1- cashew pepper; 2 - coffee; 2 – rice exporter

Source: FAO (2009)



ASEAN: AGRI-FOOD TRADE BALANCES, 2007. US\$ BILLION

Country	Exports	Imports	Surplus (Deficit)
Indonesia	23.4	10.5	12.9
Malaysia	20.5	10.6	9.9
Thailand	25.0	8.4	16.6
Vietnam	11.7	6.1	5.6
Cambodia	0.1	0.3	(0.2)
Laos	-	-	-
Myanmar	-	-	-
Brunei	*	*	*
Philippines	3.2	4.3	(1.1)
Singapore	6.0	8.3	(2.3)

ASEAN
WORLD

89.9
1128.0

53.2
1128.0

36.7

Source: R. Dy. 2009

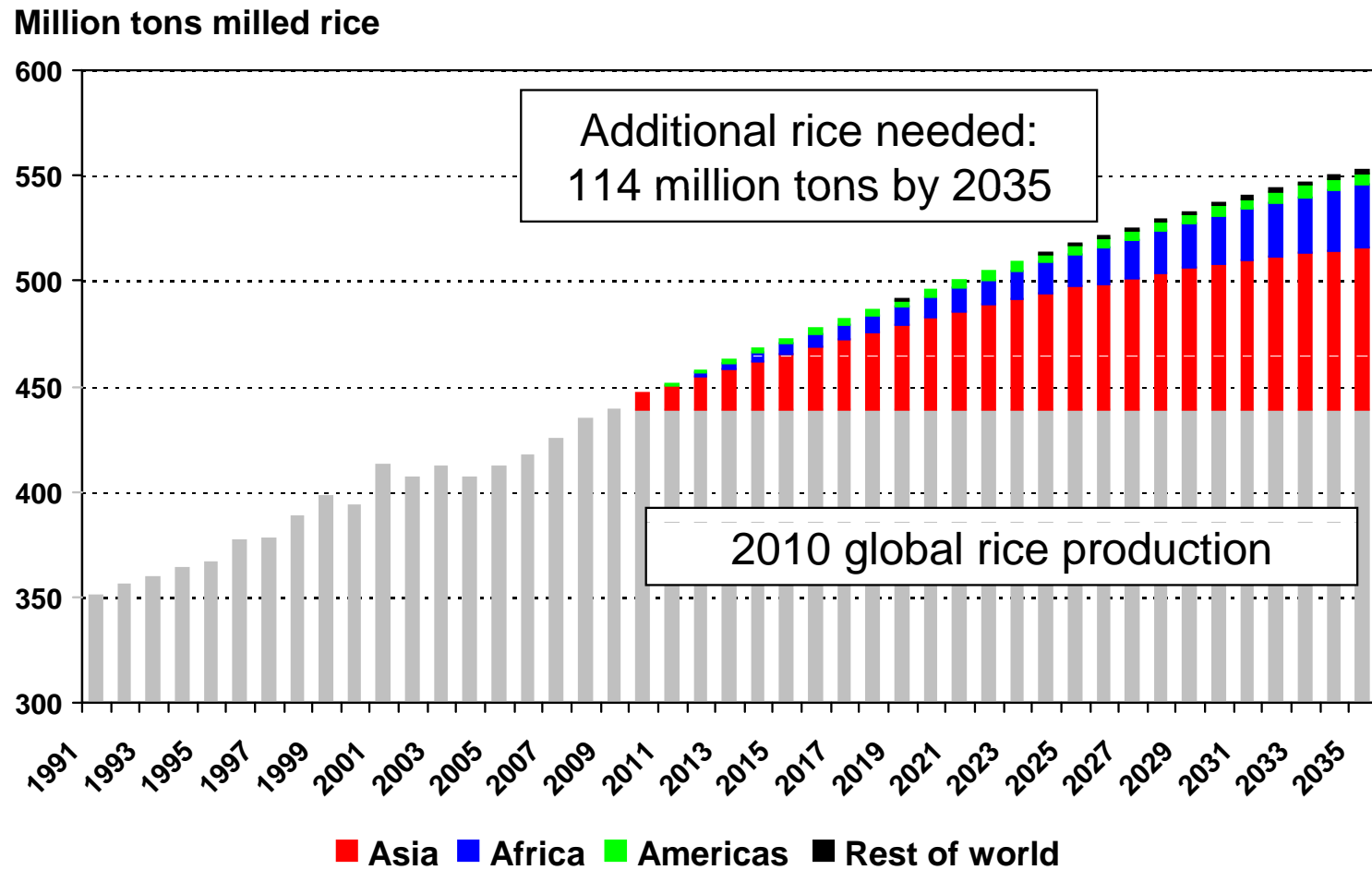


THE ROLE OF THE PRIVATE SECTOR

- **TNCs** active in the region – Nestle, Cargill, Tesco, Carrefour – regional chains, export platforms, CSR, also CSV (“**Creating Shared Value**”)
- **Cross Border Investments** – ASEAN Business Council (ASEAN Business Advisory Council); Business Angel Network of Southeast Asia (BANSEA); Malaysian South-South Association (MASSA)
- **Comprehensive Cross Border Investments** - along entire supply chain(s)
 - **Oil Palm** – FELDA, Sime Darby, KLK, SinarMas
 - **Livestock** – Charoen Pokphand Group (in Malaysia, Indonesia, Viet Nam, Cambodia, Myanmar – animal feed, layers, broilers, pigs, shrimp); Leong Hup Holdings (in Indonesia, Viet Nam – animal feed, layers and broilers). Initial step is to supply host country’s market – subsequently integrate sourcing of inputs and marketing on regional basis
 - New -‘**Super Farm**’ – 600,000 ha in Cambodia
 - **Rice** – more sensitive – need to balance the interests of farmers, consumers and regional food security – cross-border investment: comprehensive supply chain Vs ‘land grab’ (water grab?)
 - **Transition economies** (Viet Nam, Laos PDR, Myanmar) involving **private sector** in price stabilization and **managing food reserves** of their country



GLOBAL RICE PRODUCTION INCREASES NEEDED TO MEET DEMAND BY 2035



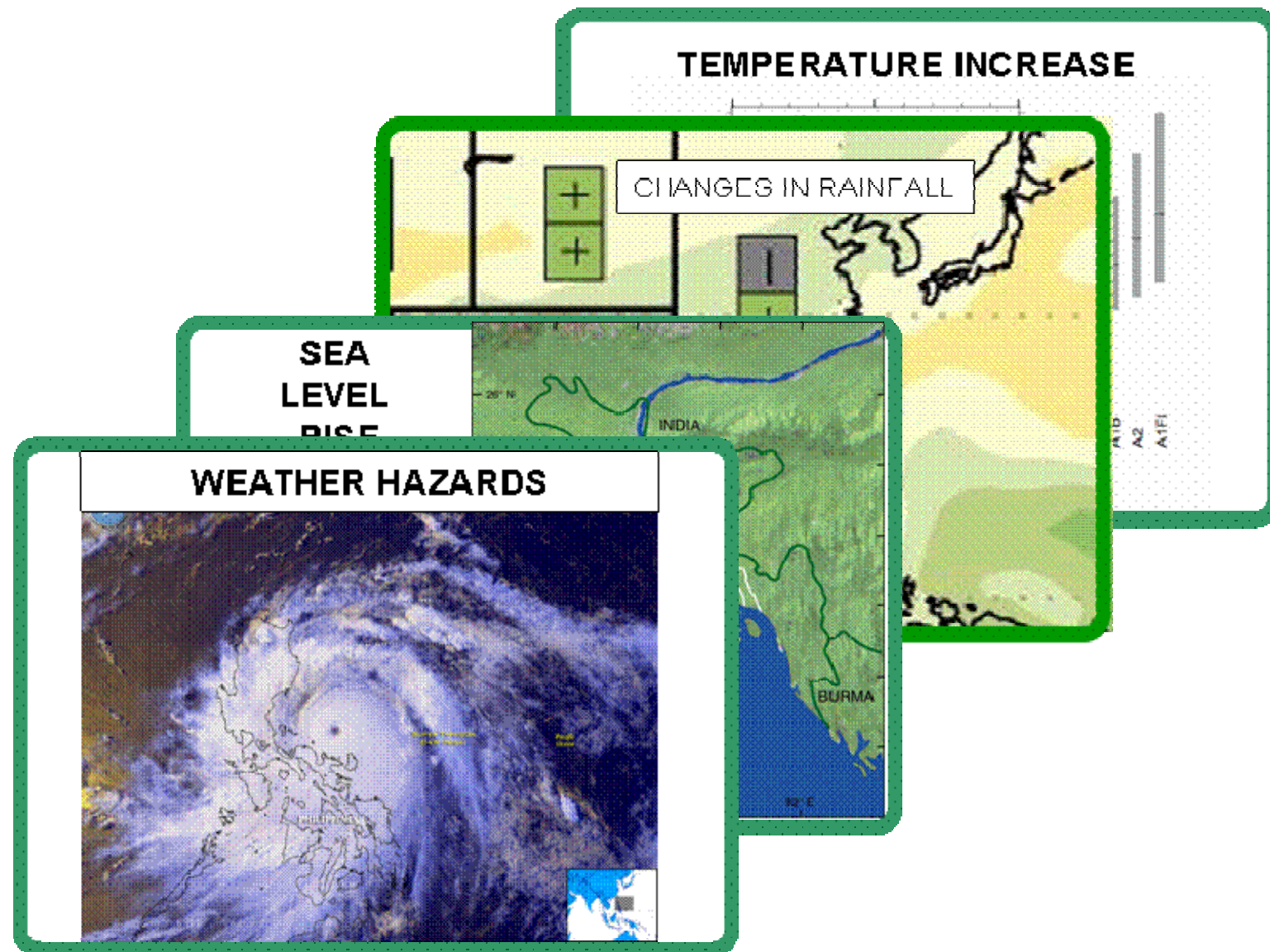
WHERE WILL THE WORLD'S RICE COME FROM?

IRRI's Take:

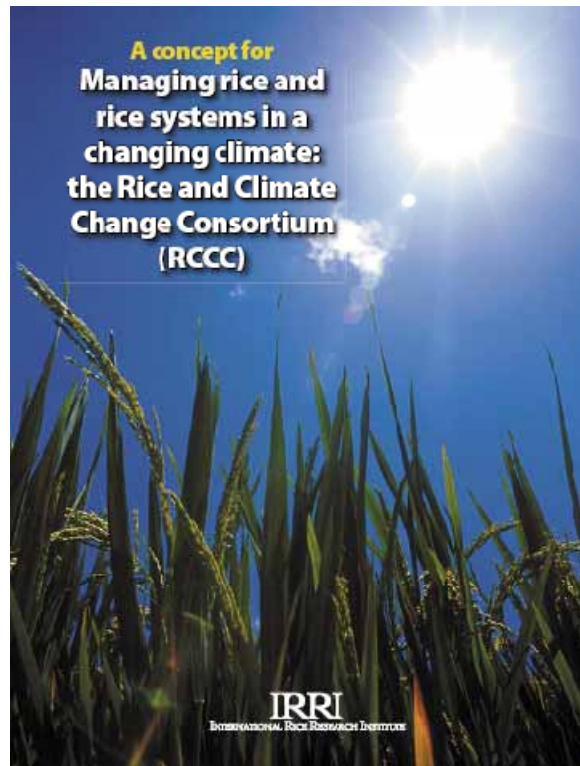
- Ideally from increasing productivity on existing rice lands, mostly in Asia, (in 20+ years increasingly from Africa)
- BUT, in Asia:
 - Land is moving out of rice
 - Labor is moving out of rice
 - Water is moving out of rice
- Major changes in production practices and increases in efficiency *Just to stay where we are*
- If Asia does not produce sufficient rice, the world will be food insecure



CLIMATE CHANGE EFFECTS IN ASIA WILL HIT RICE PRODUCTION HARD



CLIMATE AND RICE



- Global climate change will affect rice farmers for decades to come.
 - *Rising temperatures can negatively affect yield. (+1°C = 10% yield drop!)*
 - *Extreme environmental events can increase frequency of drought, flooding, and sea water intrusion.*
- Changing rice production systems will change GHG emissions from rice fields

The occurrence, distribution and severity of rice pests will almost certainly change with climate change.

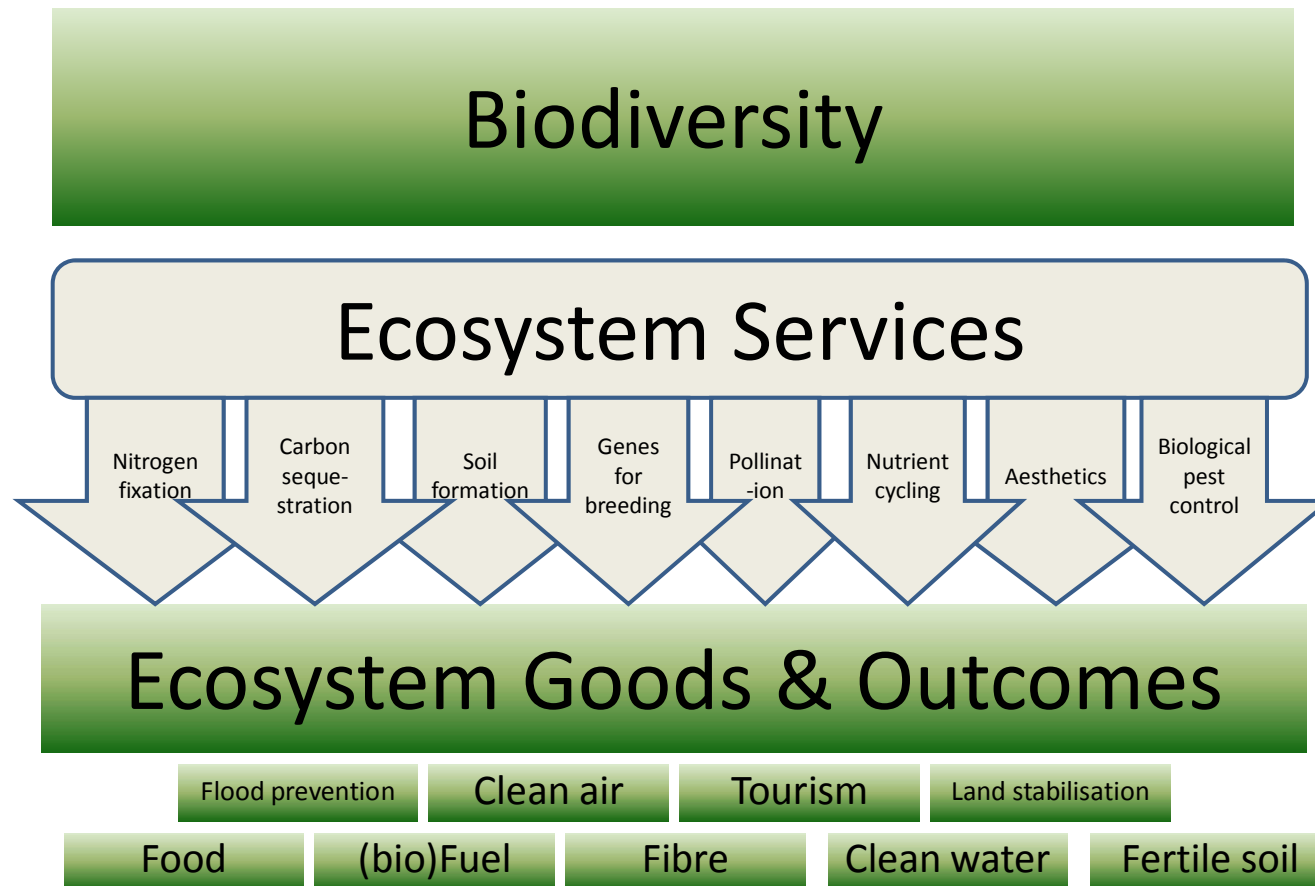
IN NEED OF A DOUBLY GREEN REVOLUTION!



MAKING RICE CLIMATE-READY – Genetic Engineering



Ecosystem services/Engineering



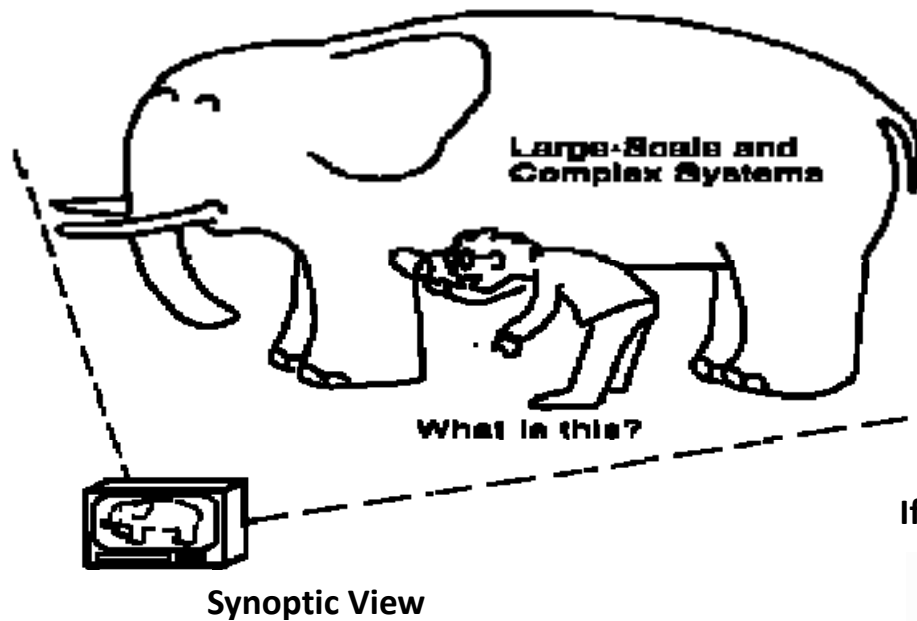
BUT: NOTE THE CHANGING ROLE OF RICE

- Rice increasingly food of the **poor and rural segment** – impacted most by **volatility** as well as **‘high stable’ (incentive) prices** as mechanism to achieve **food security at macro level** and high level of **self-sufficiency**
- **Urbanization** lowers **per capita consumption** of rice – variety of substitutes – changing diets
- Better **food supply chains/systems** – rural h/h **can afford to be < self-sufficient** in food **production and consumption**, especially rice
- Relatedly, modern supply chains/supermarkets **have linked and changed interactions** between farmers, markets and consumers
- **Share** of total **calories** from rice **declining**, **food budget share** of rice declining **even faster** < 20% (higher for poor); **> 80% on other food**, including processed & convenience
- Consequently, **share** of rice in **agricultural output** and in **overall economy** also **declining rapidly**

Unfortunately, current food security debate **still mired in the mindsets of the 1970s** .. rice-centric, production-centric, public sector-centric, nation-centric (self-sufficiency), etc... **we can and should do better**



WE ARE DEALING WITH... 'WICKED PROBLEM'



If all you have is a hammer, then everything looks like a nail!



Stakeholders have different perspectives of the best solution to the problem & will continue to adhere strongly to them



POSER: ELEPHANT IN THE ROOM FOR WATER-FOOD-ENERGY SECURITY

The SEA!

- 70% Earth's surface, 97% total water
- Growth medium for animals and plant-life – fish, crustaceans, mollusks – sea weed, algae (especially spirulina)
- Wave and geothermal – for energy
- Desalination using microbes
- Futurist group
- '**Blue Economy**' (Expo 2012 in Yeosu, Korea)

Sea – the next frontier?



CONCLUSION:

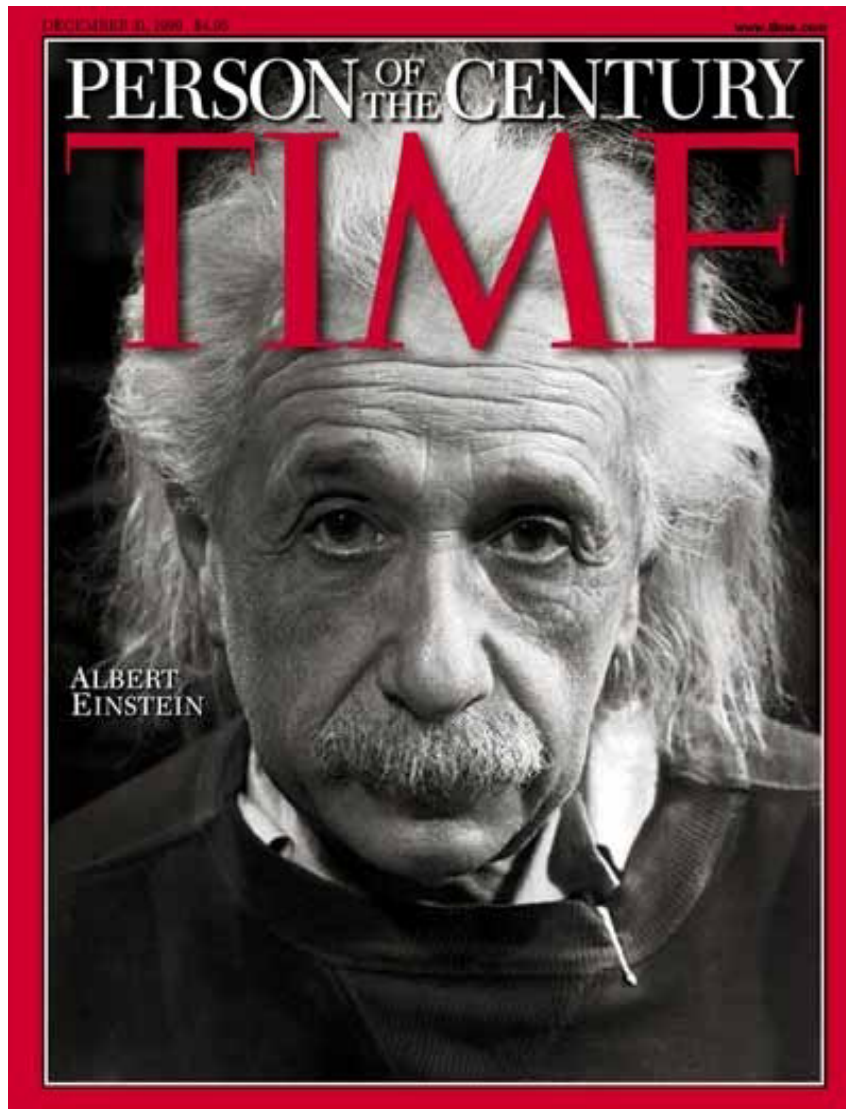
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- **Sea** - the next frontier for **food, water, energy security?** – ‘**Blue Economy**’ (Expo 2012 in Yeosu, Korea)



CONCLUSION (Cont'd) :

- With increasing **interconnectivity/interdependence** in Technology, Productivity and Food Security – need to view as **food ecosystem** – increasingly develop and apply **systems and trans-disciplinary approach**,
- Interesting work is being conducted incorporating **‘complex theory’** – involving systems approach innovatively combining hard and soft systems analysis, coupled with systems **to manage information/knowledge** for **‘wicked’ problems**
- New dynamics arising from food-water-energy nexus, increasing role of private sector, and the changing role of rice requires an urgent **rethink of food security** and the development of a **new framework for regional/national/policy dialogue** in order to get the **basics and balance right**, ultimately targeted at **inclusive and sustainable growth**.





“The significant problems we face today cannot be solved at the same level of thinking we were at when we created them”

Albert Einstein



THANK YOU!

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