The State of the World's Land and Water Resources for Food and Agriculture

Implications for Southeast/ East Asia

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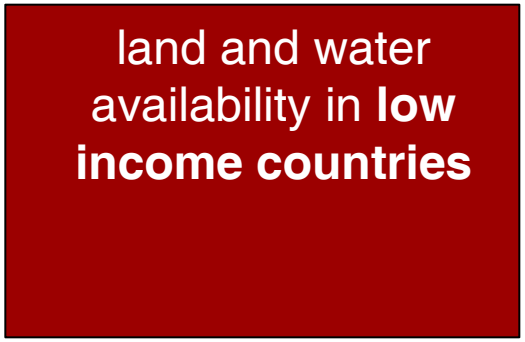
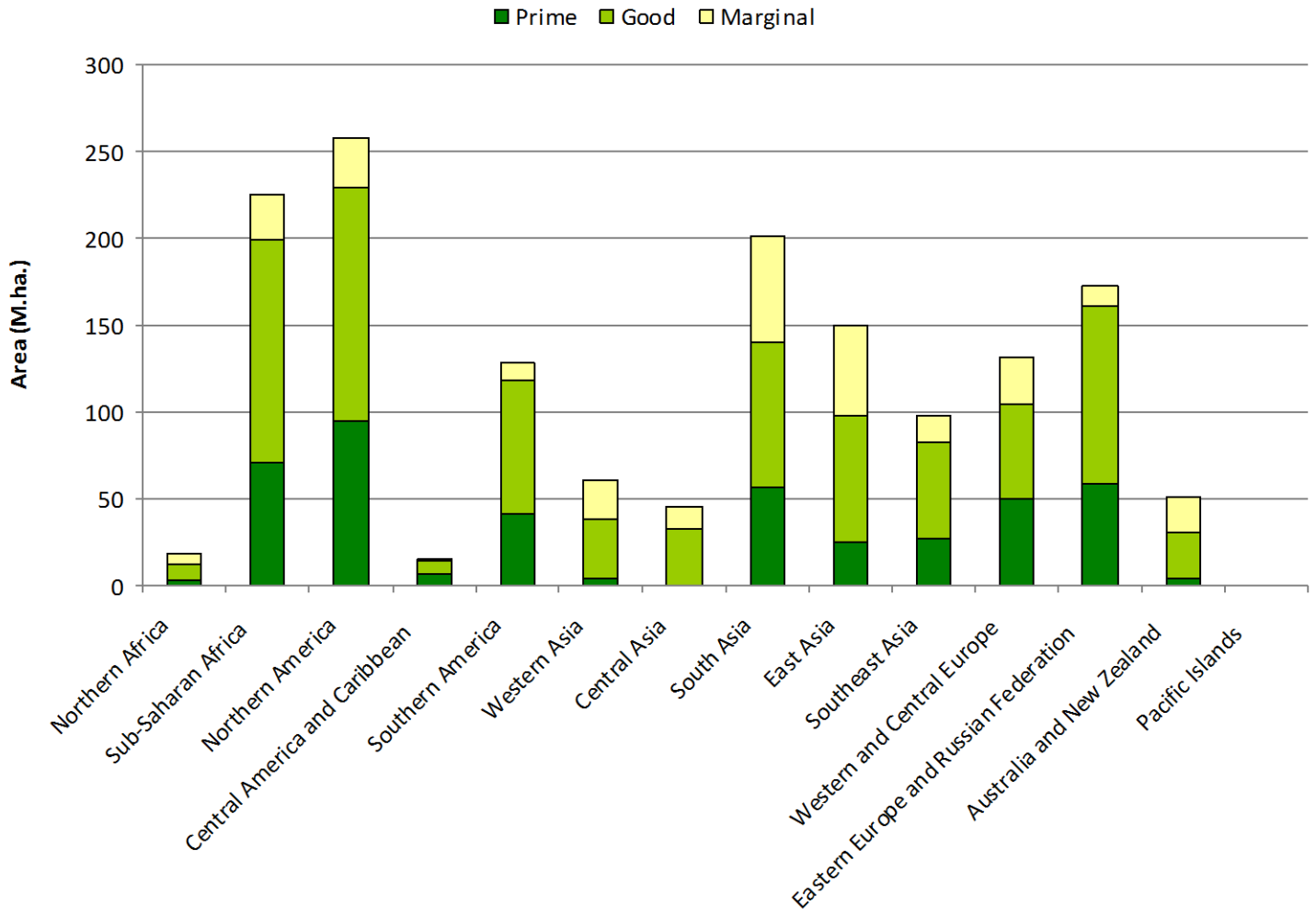
Resources availability

Japan, Korea, booming coastal areas of China, Singapore, peninsular Malaysia …



Average per capita

Uneven geographic distribution of land resources

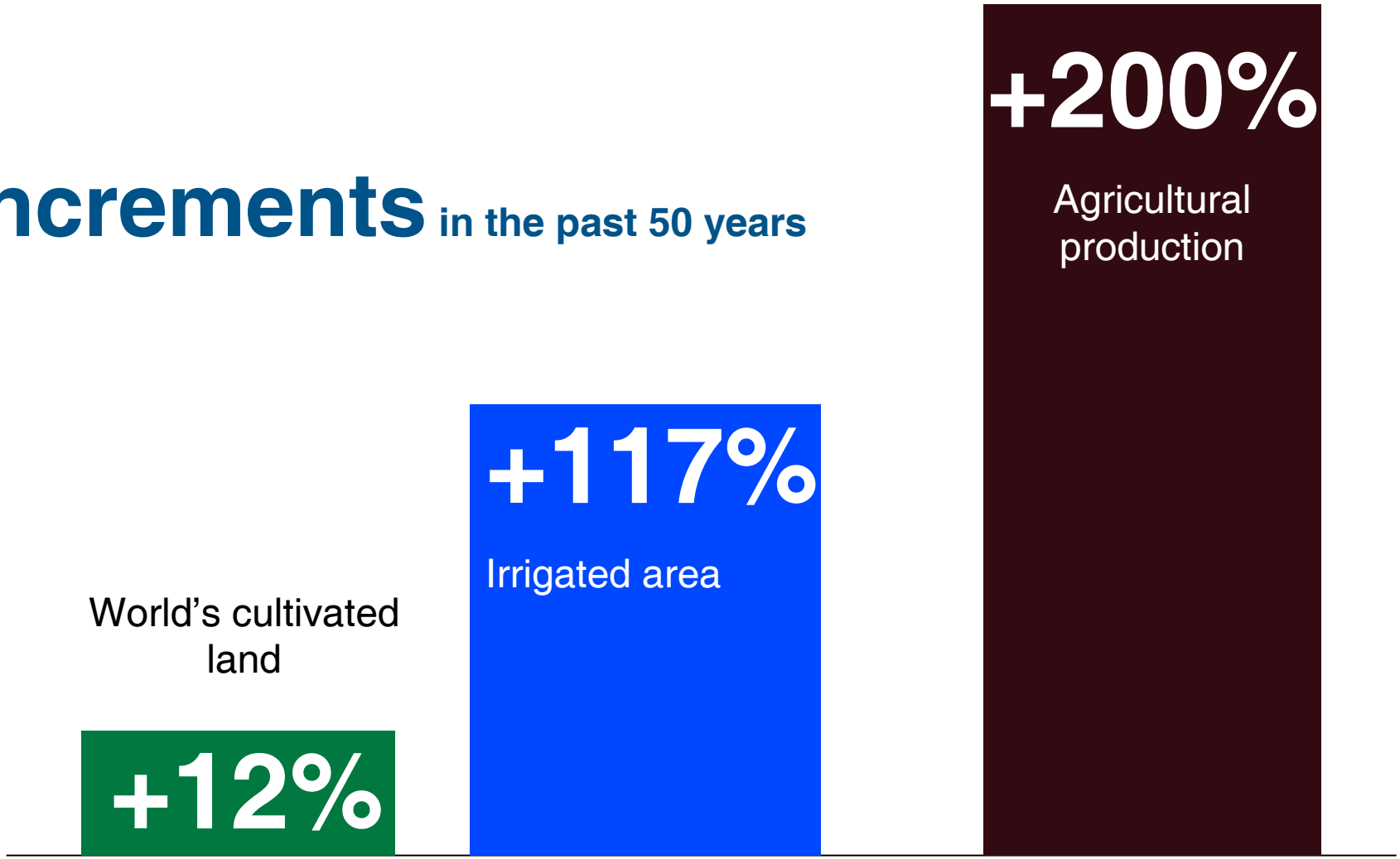


Past Agricultural Investment policies have favoured...

- Prime lands and high potential areas VS low potential and marginal lands
- Land and irrigation development VS land rehabilitation and water conservation
- Irrigated agriculture VS rain fed agriculture
- Irrigation intensification VS water productivity and water management
- Single crop production VS total farm productivity
- Export crops VS food crops and local crops

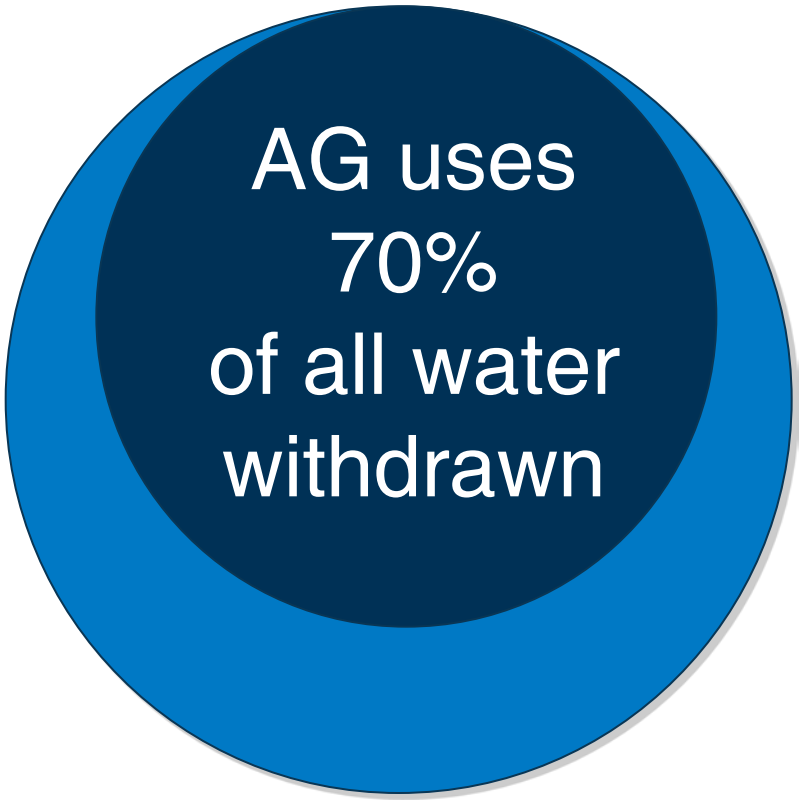
In the past 50 years…

Increments in the past 50 years

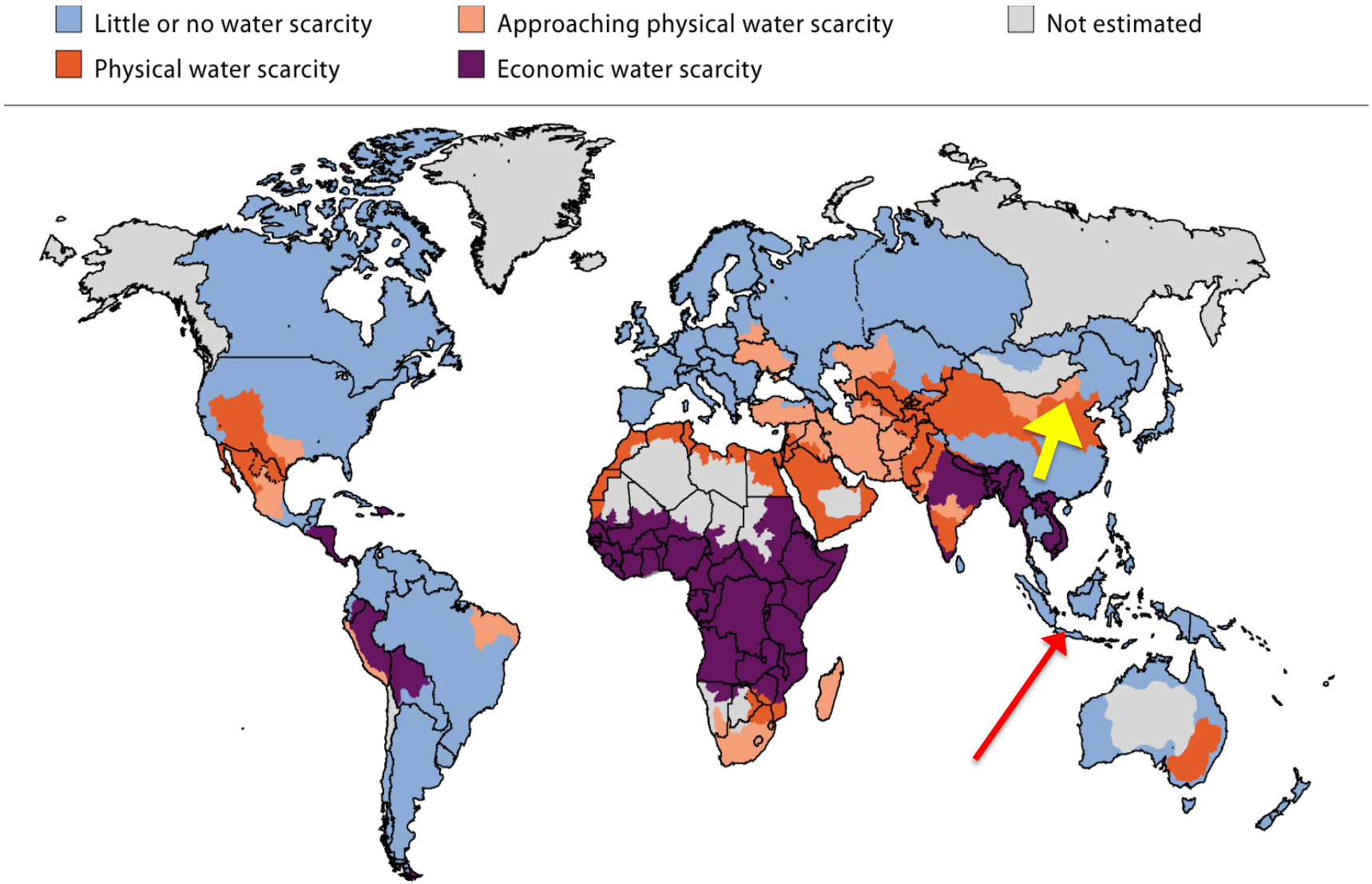


The use of resources by agriculture 2010

world's land surface

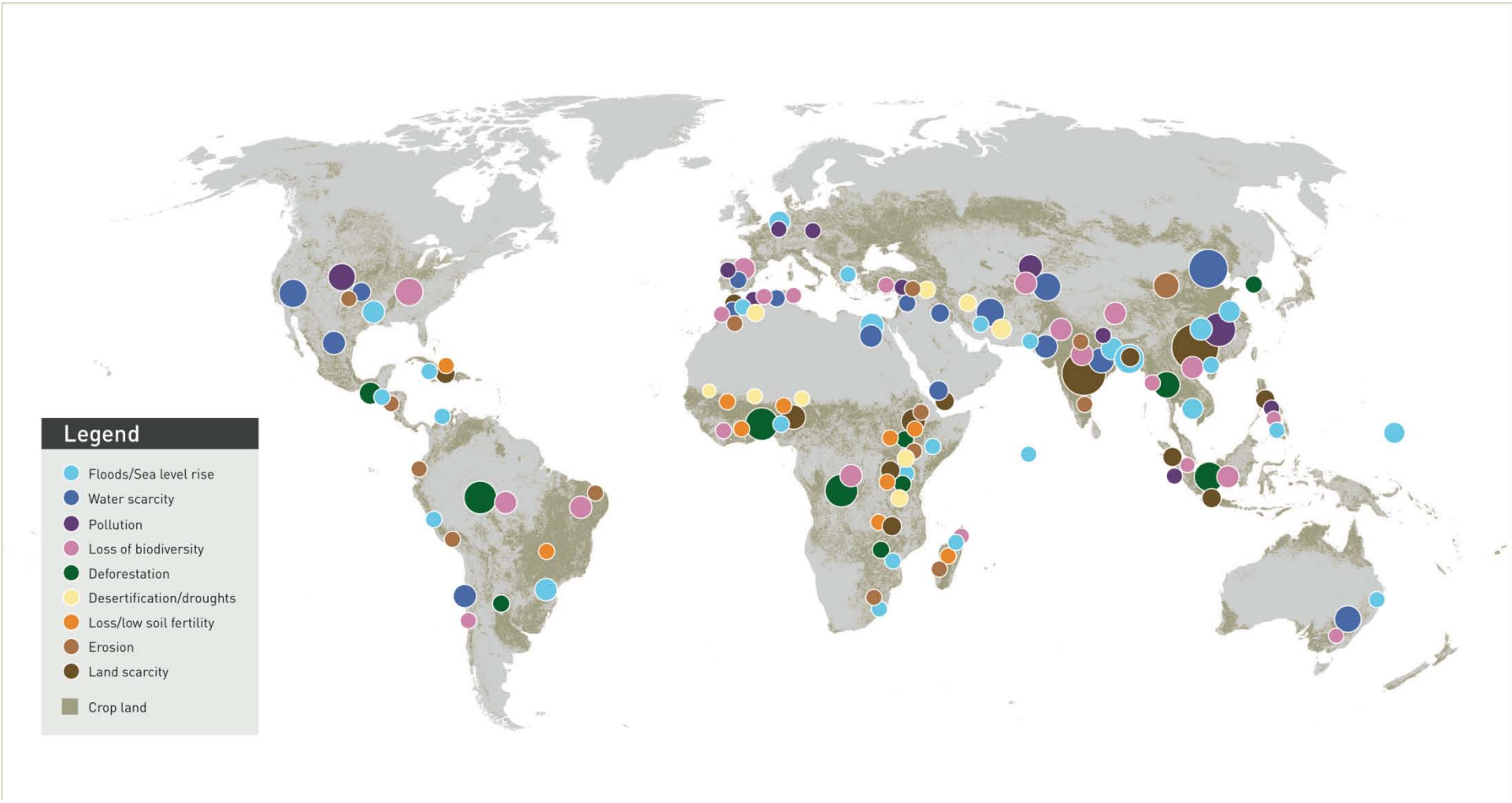


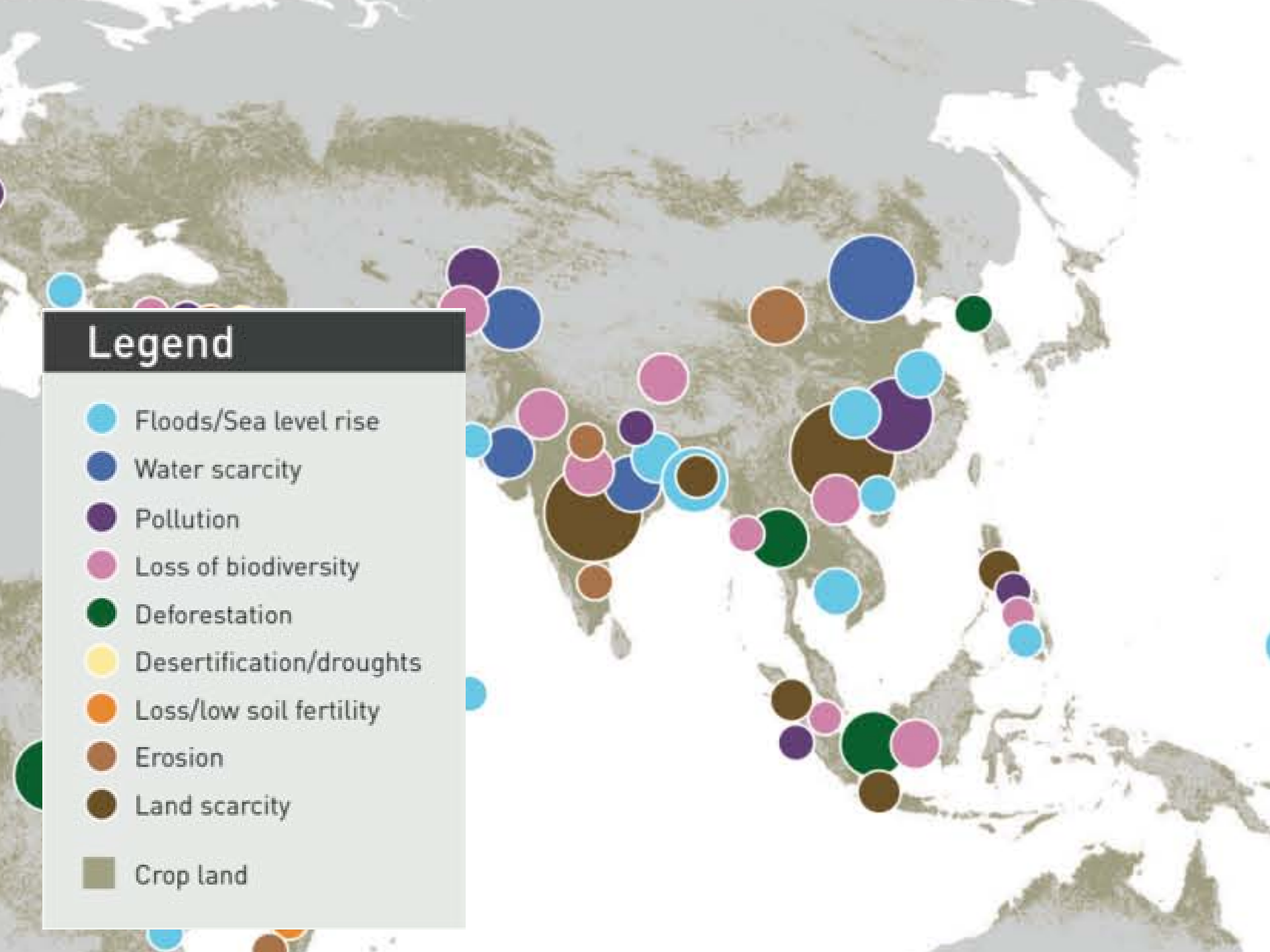
total world's water uses

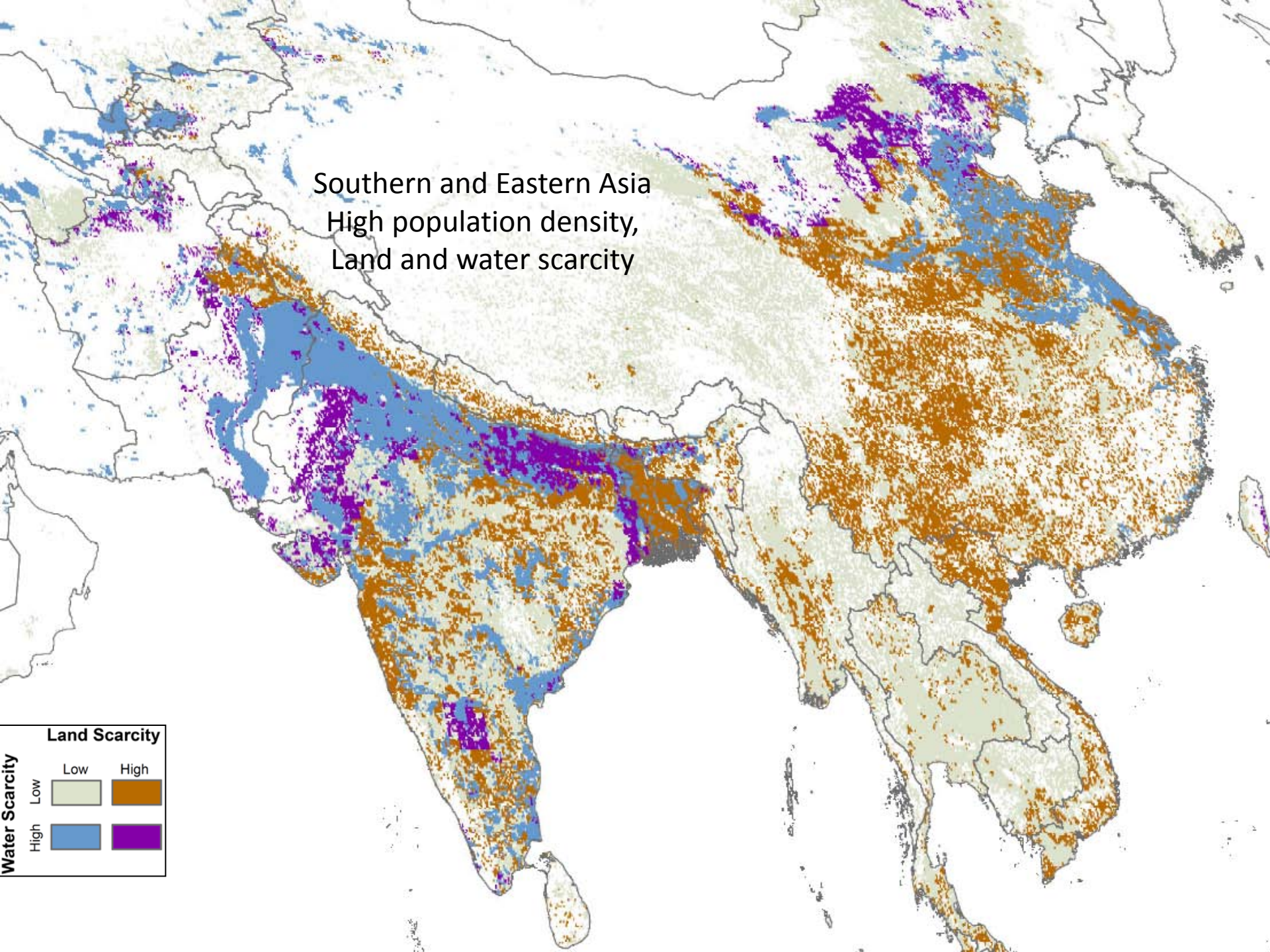


1/3 of the world's population live under water scarcity

Systems at Risk at a Glance




Legend
Floods/Sea level rise
Water scarcity
Pollution
Loss of biodiversity
Deforestation
Desertification/droughts
Loss/low soil fertility
Erosion
Land scarcity
Crop land


Southern and Eastern Asia
High population density,
Land and water scarcity
Land Scarcity
Low
High
Water Scarcity
Low
High

Land and Water Systems at Risk

- Major river basins experiencing reduced flows and salinity build-up: Indus, Yellow River
- Groundwater depletion impacting livelihoods in water resource poor countries with high population growth
- Rapidly increasing demographic pressure on resources in semi-arid tropics
- Glacier and snowmelt systems currently losing accumulated reserves
- Climate change impacts is expected to amplify water scarcity in key basins and deltas, and in small islands

Land and Water Systems at Risk

GLOBAL PRODUCTION SYSTEMS	AREAS REQUIRING PRIORITY ACTION	RISKS
RAINFED CROPPING –Highlands	Densely populated highlands in poor areas: ***Himalayas***	Erosion, land degradation, reduced productivity, intensity of floods, out-migration, poverty and food security
RAINFED CROPPING – Semi-arid tropics	Small holder farming in ***Southern India*** and agro-pastoral systems in ***Western India***	Desertification, reduced production potential, crop failures, conflicts
IRRIGATED – Rice-based systems	Southeast and Eastern Asia	Land abandonment, loss of buffer role, increasing cost of land conservation, pollution, loss of cultural values of land
IRRIGATED – Other crops	River basins in Krishna river, Indo-Gangetic plains, Northern China, Central Asia	Increased water scarcity, loss of biodiversity and environmental services, desertification, reduced water availability and shift in seasonal flows
	Aquifers in groundwater-dependent irrigation systems in India, China	Loss of buffer role of aquifers, agriculture land, reduced recharge

GLOBAL PRODUCTION SYSTEMS	AREAS REQUIRING PRIORITY ACTION	RISKS
RANGELANDS	Pastoral and grazing lands	Desertification, out-migration, land abandonment, food insecurity, poverty
FORESTS	Tropical forest-cropland interface in Southeast Asia and Himalayan forests	Cropland encroachment, slash-and-burn, loss of ecosystem services of forest, land degradation
Other locally important sub-systems	Deltas and Coastal areas in Red River delta, Ganges/Brahmaputra, Mekong, etc. and coastal alluvial plains in Eastern China	Loss of agricultural land and groundwater, sea-level rise, frequent cyclones, floods and low flow
	Small islands in Pacific islands	Loss of freshwater aquifers, water costs
	Peri-urban agriculture	Pollution, health related problems, competition for land

Land and Water Systems at Risk

Great success in the past… but still nearly one billion people are hungry

- **Key questions:**
  - **to what extent can farmers improve their food production with low-cost and locally-available technologies and inputs?**
  - **What impacts do these methods have on natural resources and environmental goods and services and the livelihoods of people relying on them?**

Our questions in Southeast/East Asia:

- **Why farmers would be interested?**
- **What type of farmers?**
- **Would this keep people in marginal areas?**

Removing the constraints!

- **Remove distortion** in the incentive framework
  - Remove subsidies?
  - Full resource pricing?
- **Improve** land tenure and **access** to resources
- **Strengthen** land and water **institutions**
- **More** knowledge **exchange**, research, etc
- Better **access to markets**

Selected areas for further action

- Technical assistance in **managing systems at risk**
- Improve **water use efficiency** through irrigation **modernization**
- **Groundwater** use planning and recharge
- Adoption of ecosystem approach and **Payment for Environmental Services**
- **Global Soil Partnership** for climate change adaptation and mitigation
- Dynamic conservation of **Globally Important Agricultural Heritage Systems**
- **Transboundary** water resources management
- Enhance national and global **monitoring** of systems at risk

Recommendations

- Broad adoption of participatory and pluralistic approaches
- Increase **investment** for improvement of essential public good infrastructure for the whole market chain
- Allocate dedicated **funds** to support sustainable land and water management in systems
- Appraise ecosystem services to frame **planning and investment decisions**
- Review mandates and activities of existing organizations to promote closer collaboration
- Promote ‘green economy’ approach
  - Which Asian countries like it?
- Work together to optimize economic value and ensure equitable benefit sharing in international river basins

Key Challenges (revisited)

- All the well-known challenges (climate change, increasing competition for water and land leading to scarcity, declining ecosystem health, widespread poverty and hunger)
- Greater interconnectedness between the water cycle, ecosystems and users.
- Decision-making is extremely complex
- There is a widening gap between official irrigation discourse and on-the-ground reality
- Many old 'solutions' are not working as expected
- Conflicting policy objectives at different levels
- Some water can be saved but not as much as is often claimed
- There are no silver bullets on the horizon on the productivity or irrigation technology side
- In many basins agriculture will need to shrink to achieve water savings
- Problems are becoming wicked

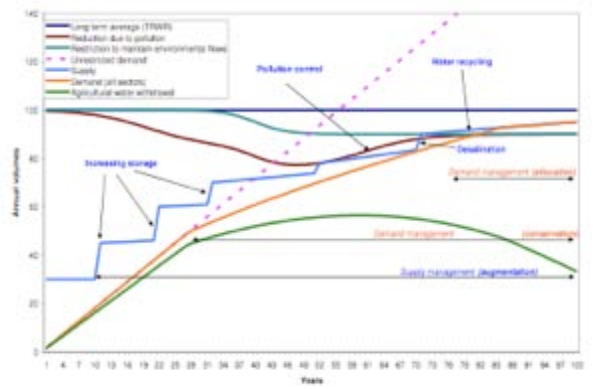


Figure 3: Coping with water scarcity: a dynamic model

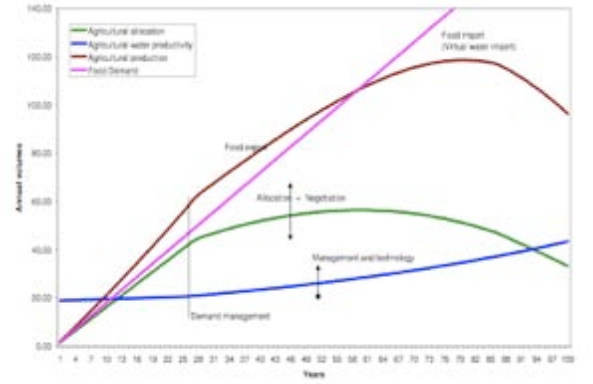


Figure 6: Dynamics of agricultural response

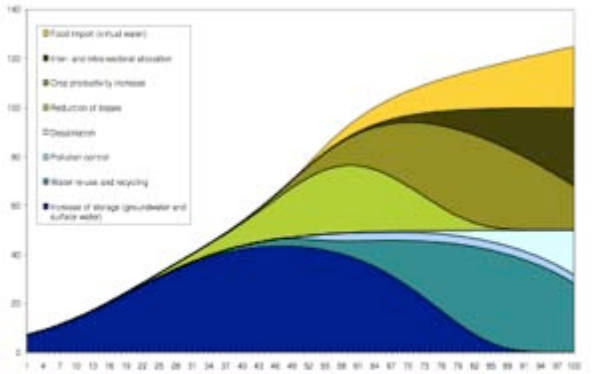


Figure 7: A schematic representation of different options over time

- The transition problem
  - Many things are happening in the basins
  - Many things are happening in the economy
  - Resilience? Sustainability?
  - Facilitate exit strategies?
  - Magnitude of CC uncertainties vs other changes?
- A more deliberately multi-sectoral multi-objective approach is needed
- A water accounting/auditing foundation

Economic trajectories
River basin trajectories
Autonomous trajectories
Local trajectories
Irrigation system trajectories

  - More food with less water= how much food?
  - Policy coherence
  - Risk management strategies
  - Coherence of actions across levels
  - Quality of investment

Evolving a coherent, effective and feasible set of policies, strategies and interventions

- Solid water accounting foundation;
- Improved processes for decision-making and negotiation among stakeholders;
- Addressing the Water, Food, Energy and Climate nexus in an integrated approach;
- Risk management strategies for national food security policies;
- Progress on monitoring of investment and results.

Explicitly addressing policy dilemmas, trade-offs and difficulties

- Managing transitions: resilience, transformation or exit strategies?
- Managing the informality of the water economies
- Economic water productivity vs. equity and other strategic goals
- National vs. local and river basin objectives
- Water-Energy-Food-CC nexus
- "ideal" vs. Plan B and second-best options
- Realistic financial arrangements for water operators: smart subsidies?

The staples question is here to stay

Asian Irrigation Forum

“三条红线”控制指标
“Three Red Lines” control targets

三条红线控制指标 Three Red Lines Control targets	全国用水总量（亿立方米） total quantity of water consumption nationwide (10^8 m^3)	万元工业增加值用水量（立方米） water consumption per RMB10,000 industrial value (m^3)	农田灌溉水有效利用系数 coefficient of effective farmland irrigation water use	重要江河湖泊水功能区水质达标率 Water Quality Standards of the Main Water Functional Zones in Rivers and Lakes
2020	**6700**	**<65**	**>0.55**	**80%**
2030	**7000**	**<40**	**>0.6**	**95%**

World Water Forum 6 Asia-Pacific Regional Target

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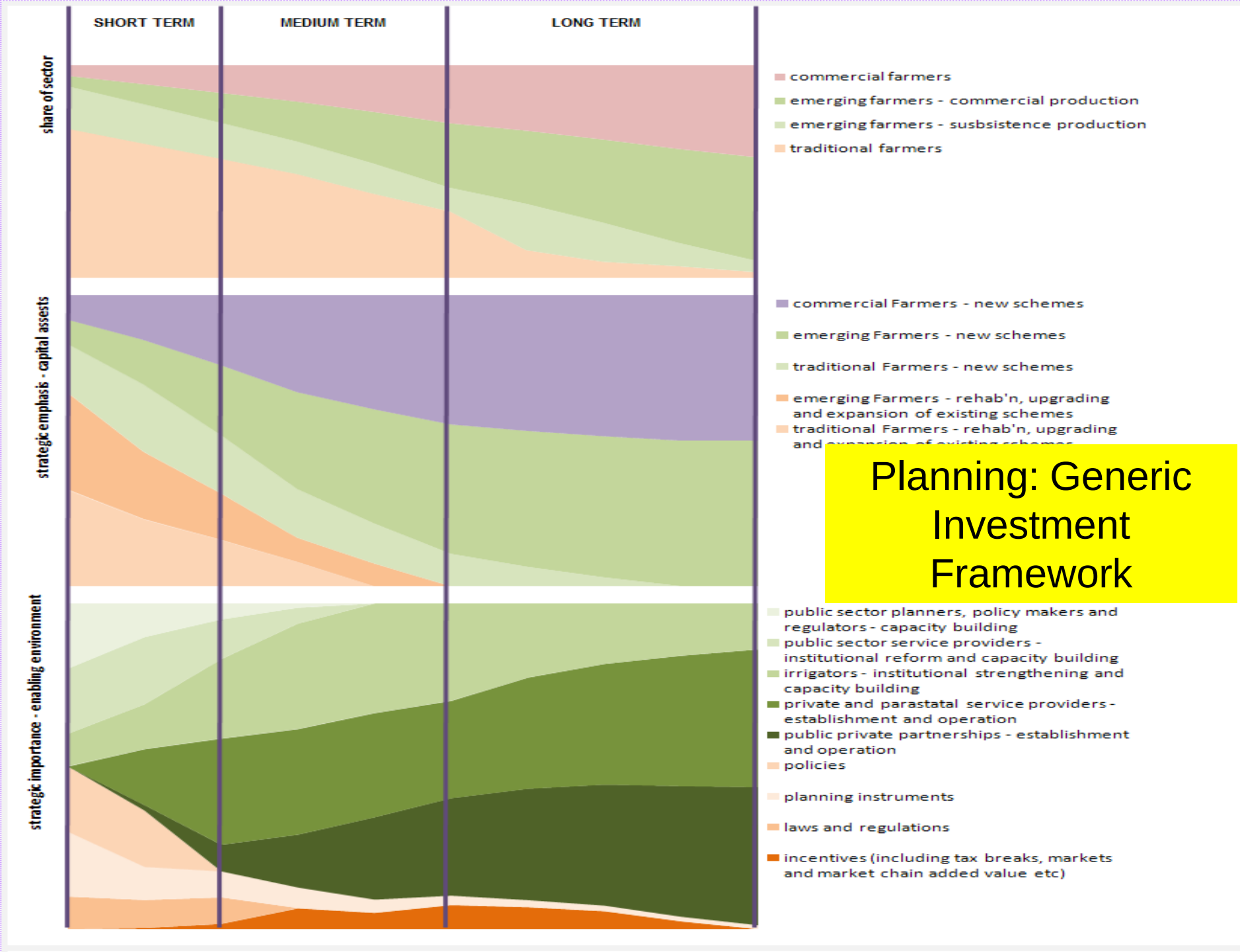

Planning: Generic Investment Framework

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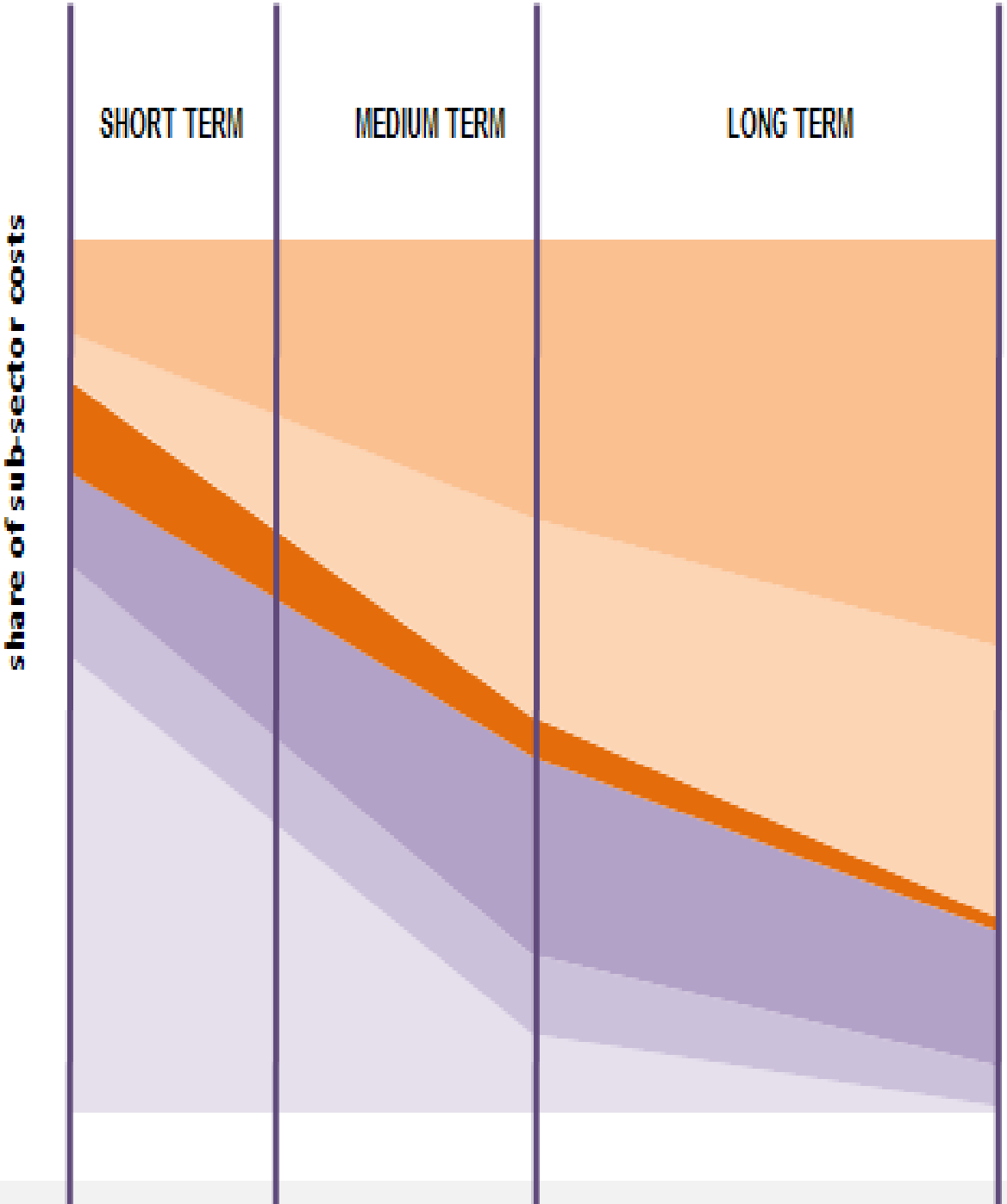

- Private Sector Recurring
- Beneficiaries Recurring
- Government Recurring
- Private Sector Capital (including NGOs)
- Beneficiaries Capital
- Government Capital (all sources, including river basin authorities)