



Research
Program on
Water, Land and
Ecosystems



INTERNATIONAL FOOD
POLICY RESEARCH INSTITUTE
sustainable solutions for ending hunger and poverty

Overview of IFPRI Water Research, CGIAR Water Land and Ecosystems Program and Key Research Ideas/Activities

10th GWSP SSC Meeting
Oct 1-3, 2012

CGIAR



IFPRI Water Research Areas

1. Water sustainability & food security

- **Economic impact, investment, growth**
 - Water and growth
 - Economic impacts of water scarcity
 - **Investments in water (public/private)**
- **Water and climate change linkages:**
 - Climate change impacts on water supply
 - Adaptation to climate change
- **Water quality impacts of agricultural intensification**
- **Water and energy**
- Water management and ecosystem health

IFPRI Water Research Areas

2. Governance structures, policies & institutions for water management

- **Incentives for better water management** (links to economics, conflict, and climate change)
- **Managing water transfers between sectors**
- **Property rights for land and water allocation**
- **Groundwater management**
- **Managing water to avoid conflict**

IFPRI Water Research Areas

3. Water, gender, and health

- **Gender implications of multiple use systems**
- **Implications of water access (or lack of) and management for women**
- **Water management and water borne diseases**
- **Rural water quality management**
- **Gender and climate change: impacts and adaptation**

To what extent can increased water productivity affect economic growth?

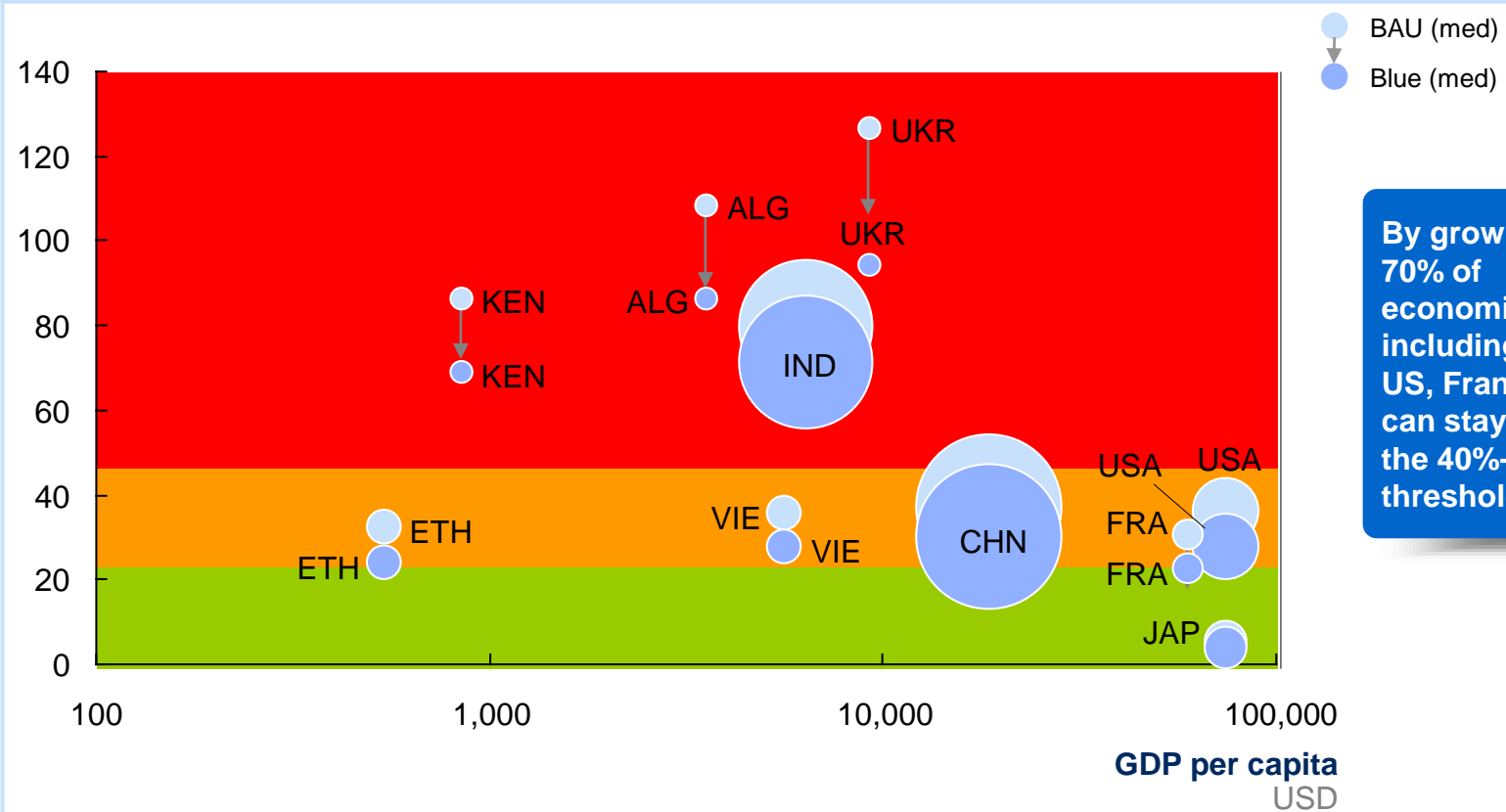
Size of bubble reflects size of population

- 0 - 20%
- 20 - 40%
- > 40%

Medium growth

Water stress by country over GDP per capita¹

Percent



By growing blue 70% of economies, including China, US, France, etc. can stay below the 40%-scarcity threshold

1 Year 2000 prices

SOURCE: IFPRI; team analysis

Interactive AWM Solutions Investment Scenario tool

<http://ferb.harvestchoice.org>

INVESTMENT VISUALIZER



AGRICULTURAL WATER MANAGEMENT SOLUTIONS

Investment Scenario Modeling for Sub-Saharan Africa and South Asia

The Agricultural Water Management Solutions Project (AWM Solutions) has identified a variety of small-holder agricultural water management interventions (AWM Regional Mapping) that have a high potential to improve food security and livelihoods of the rural poor in sub-Saharan Africa and South Asia. The analysis underlying the scenarios is based on an integrated modeling system that combines geographic (GIS) data analysis, biophysical and economic predictive modeling, and crop mix optimization tools to assess the regional potential for smallholder agricultural water management across sub-Saharan Africa and South Asia. An ex-ante GIS analysis uses a set of suitability criteria to identify areas where the technology could potentially be applied, pixel by pixel, across the region based on environmental suitability and labor availability. The results are then further refined through the application of two biophysical and economic predictive modeling tools: the Soil and Water Assessment Tool (SWAT) and the model of Dynamic Research Evaluation for Management (DREAM) for a combined agronomic-economic-hydrologic cost-benefit analysis for each crop and technology assessed. Given limited market access in much of sub-Saharan Africa, we simulate local, national and international crop markets for this region, for vegetable, root and cereal crops, respectively.

REGION:

SUBREGION/COUNTRY:



TECHNOLOGY:

Small reservoirs are earthen or cement dams that are less than 7.5 meters deep. They can store up to 1 million cubic meters (m³) of water. Capital investment is generally externally driven, and community management remains the norm. Small reservoirs provide significant opportunities for soil and water conservation, drought proofing, and for developing small-scale, community-based irrigation schemes. A well-designed reservoir can support multiple water uses including livestock watering, fisheries.



CLIMATE:

To investigate the impacts of climate change on the expansion potential of agricultural water management strategies, results were estimated under three climate scenarios. The baseline climate reflects actual 2000-2010 climate. Two alternative scenarios represent the "driest" and "wettest" scenarios among 12 future climate change scenarios for 2050 projected by general circulation models for each region. In sub-Saharan Africa, these models were the CSIRO-Mk3.0 model and the CNRM-CM3.



AGRICULTURAL COMMODITY PRICE:

To account for the effects of price changes on the economic profitability of irrigation development, the implications of a 30 percent increase and a 30 percent decrease in initial crop prices on the potential expansion of agricultural water management technologies was assessed. The baseline prices are average 2007-2009 crop prices by country derived from agricultural price statistics in FAOSTAT, which initialized the simulation modeling.



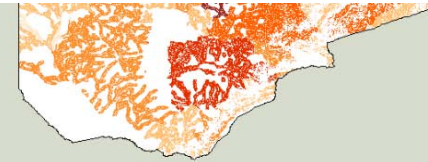
AWM COSTS:

The analysis assumes crop-level production costs for each agricultural water management intervention. These include capital investment and operating costs for each intervention. Given that the cost-benefit results are very sensitive to these cost assumptions two additional cost scenarios are considered. The first assumes that agricultural water management costs increase by 50 percent and the second assumes a 50 percent decrease in these costs. Baseline irrigation costs were estimated by the AWM.

WHAT ARE THE COSTS AND BENEFITS OF THIS INVESTMENT SCENARIO?

AGWATER SOLUTIONS

Improved livelihoods for smallholder farmers



PERSONS REACHED

Population (number of people)



8,873,078 PERSONS REACHED



PROFIT PER HECTARE



INVESTMENT VOLUME

436,999,115 \$/YEAR



AWM AREA WITH TECHNOLOGY

554,567 HECTARES



YIELD IMPROVEMENT (MAIZE)

301.00 % IMPROVEMENT



YIELD IMPROVEMENT (TOMATO)

293.00 % IMPROVEMENT

NUMBER OF RURAL PEOPLE REACHED



8,873,078 people reached

68 % of 12,996,400 rural people reached

NUMBER OF POOR RURAL POPULATION (\$1.25) REACHED



5,911,013 people reached

96 % of 6,172,540 rural poor (\$1.25) reached

EXPANSION OF AGRICULTURAL WATER MANAGEMENT AREA



359% increase in AWM area

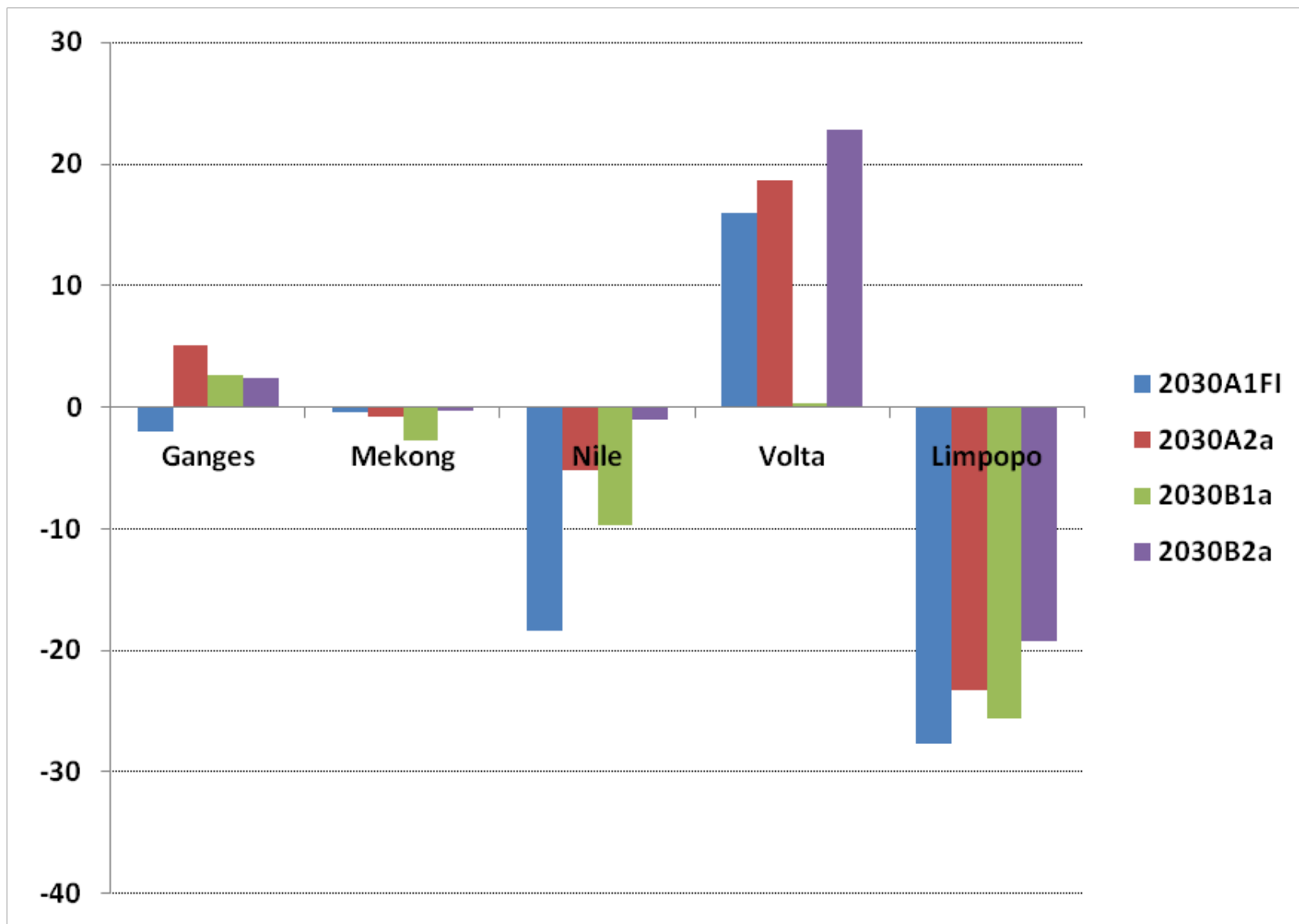
TOTAL WATER CONSUMPTION (INCLUDING EXPANDED AWM)



2.7 water ratio increase



Climate Change and Water Interactions--Changes of Annual Runoff by 2030 (%) (HadCM3)



Gendered Farming system map for Sub-Saharan Africa <http://gender.mappr.info/>



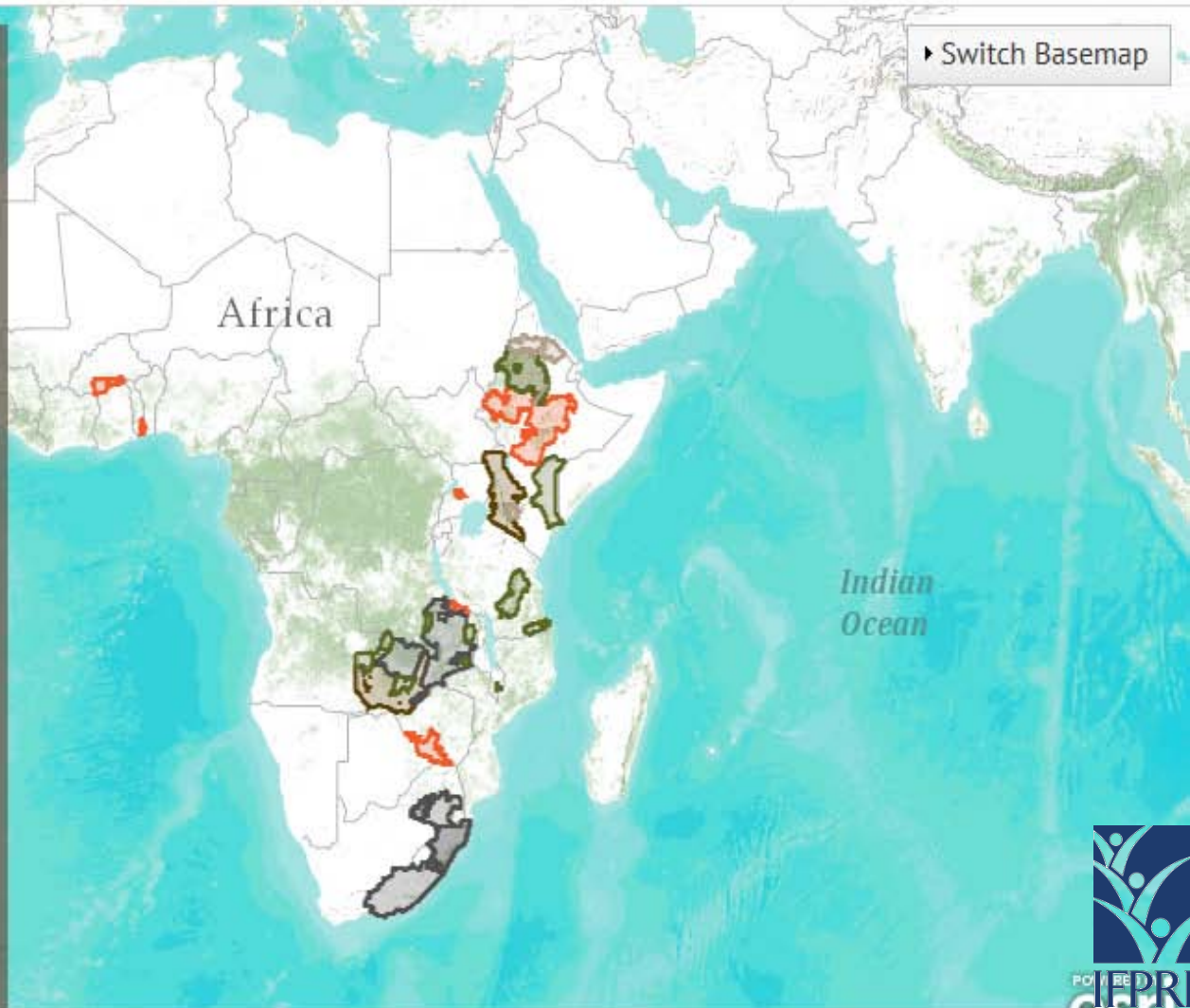
BROWSE ENTRIES

ENTER INFORMATION

WELCOME TO GENDER MAPPER

The International Food Policy Research Institute (IFPRI) and the International Water Management Institute (IWMI) are developing a "gender map" of agriculture in Sub-Saharan Africa in order to better understand how to target agricultural interventions to women and men farmers.

If you are knowledgeable about farming systems in a country, state or district in Sub-Saharan Africa, whether as extension worker, researcher or practitioner we encourage you to fill out the survey.



IFPRI Ongoing/Planned Work

- Assess the impact of N, P and BOD from crop, livestock, industrial production and domestic water use on water quality by country and large river basin
- Assess energy and water linkages (water implications of generating energy from HP versus biofuels use, f.ex.)
- Update of 2002 global water and food book
- Impact of CC on irrigation possibilities in Africa
- Climate-extreme events—impacts on water and food security



Research
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CGIAR Research Program on Water, Land and Ecosystems

Improved natural resources management
for food security and livelihoods

A vision for WLE

<http://wle.cgiar.org>

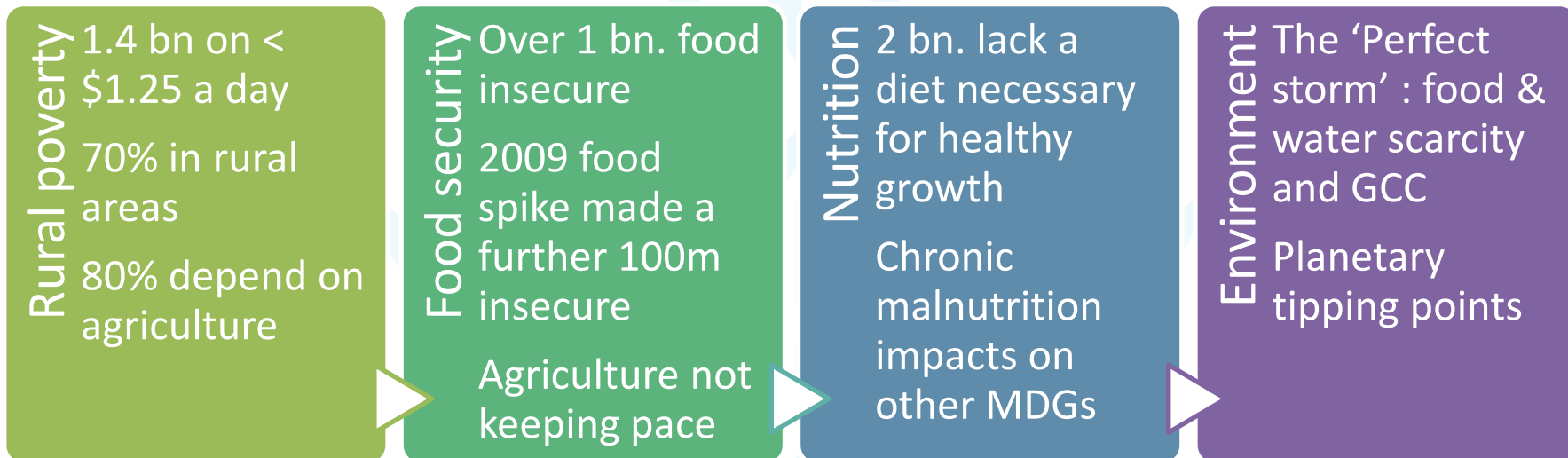
Lead: IWMI under Simon Cook
s.cook@cgiar.org



Photo: Prue Loney/IWMI



CGIAR re-visiting basic goals

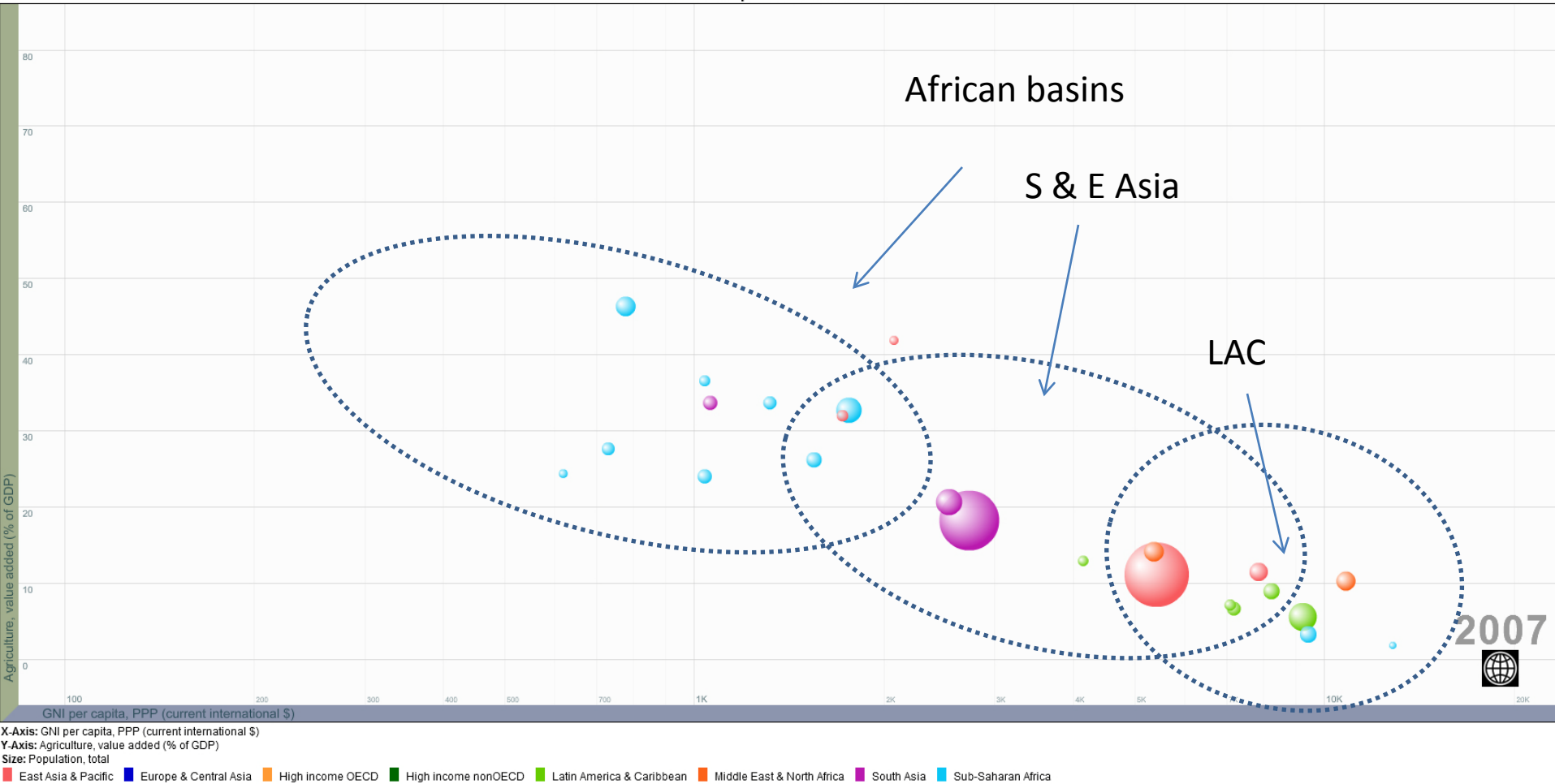


CGIAR

A development process...

Agriculture contribution to GDP (%)

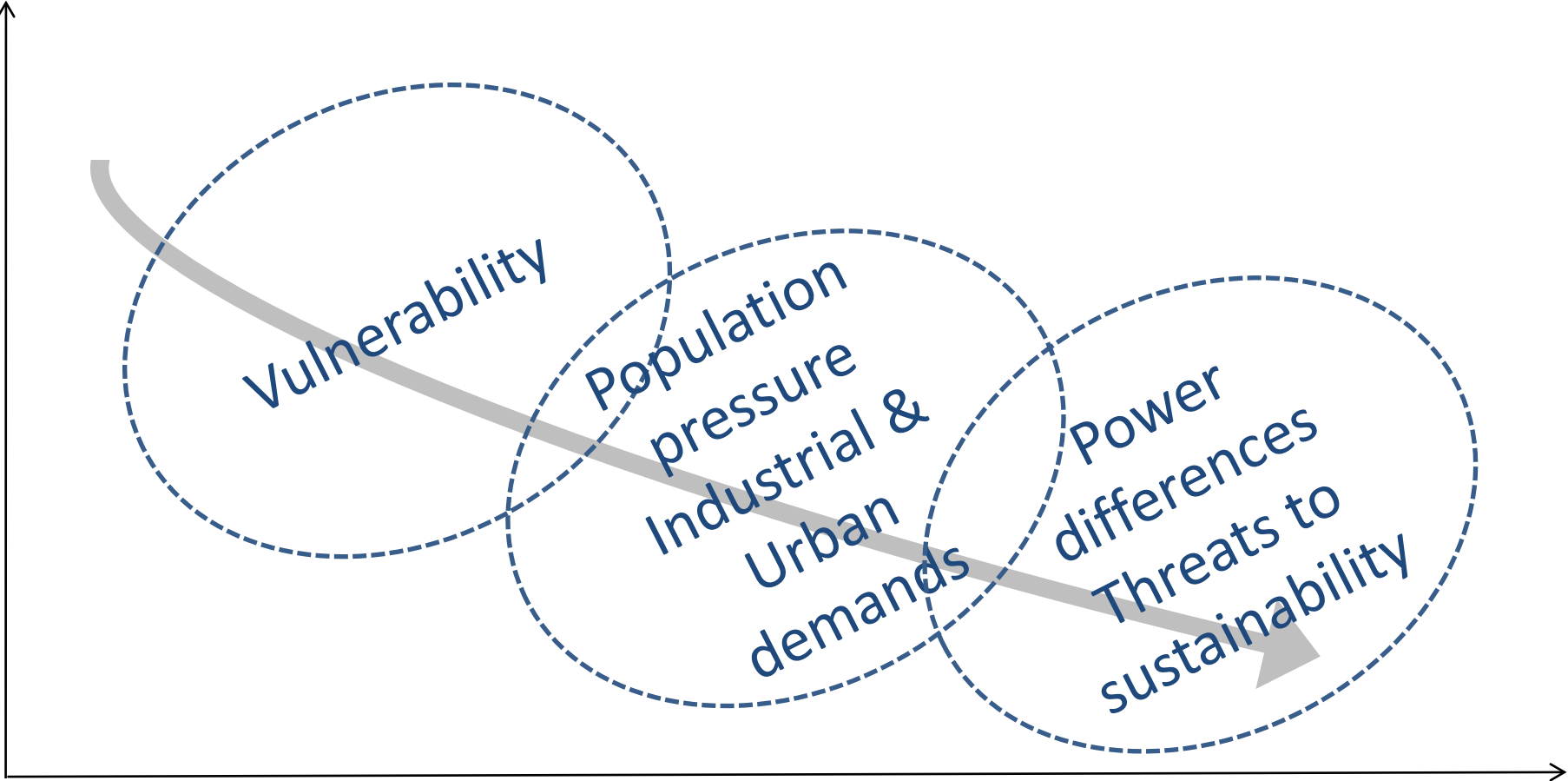
World Development Indicators 2009



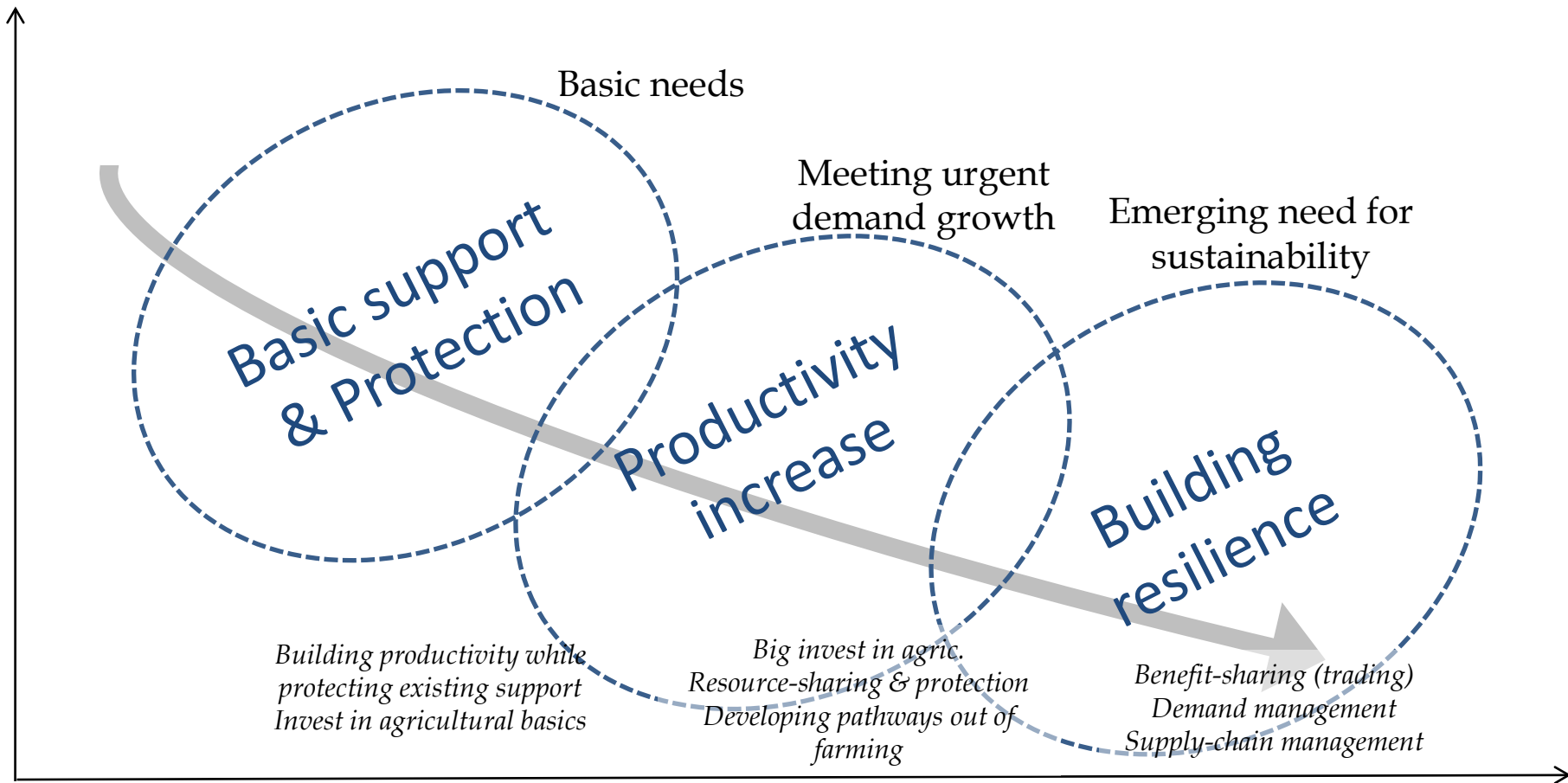
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Gross National Income

..that creates problems ...



...but also has the capacity to solve...

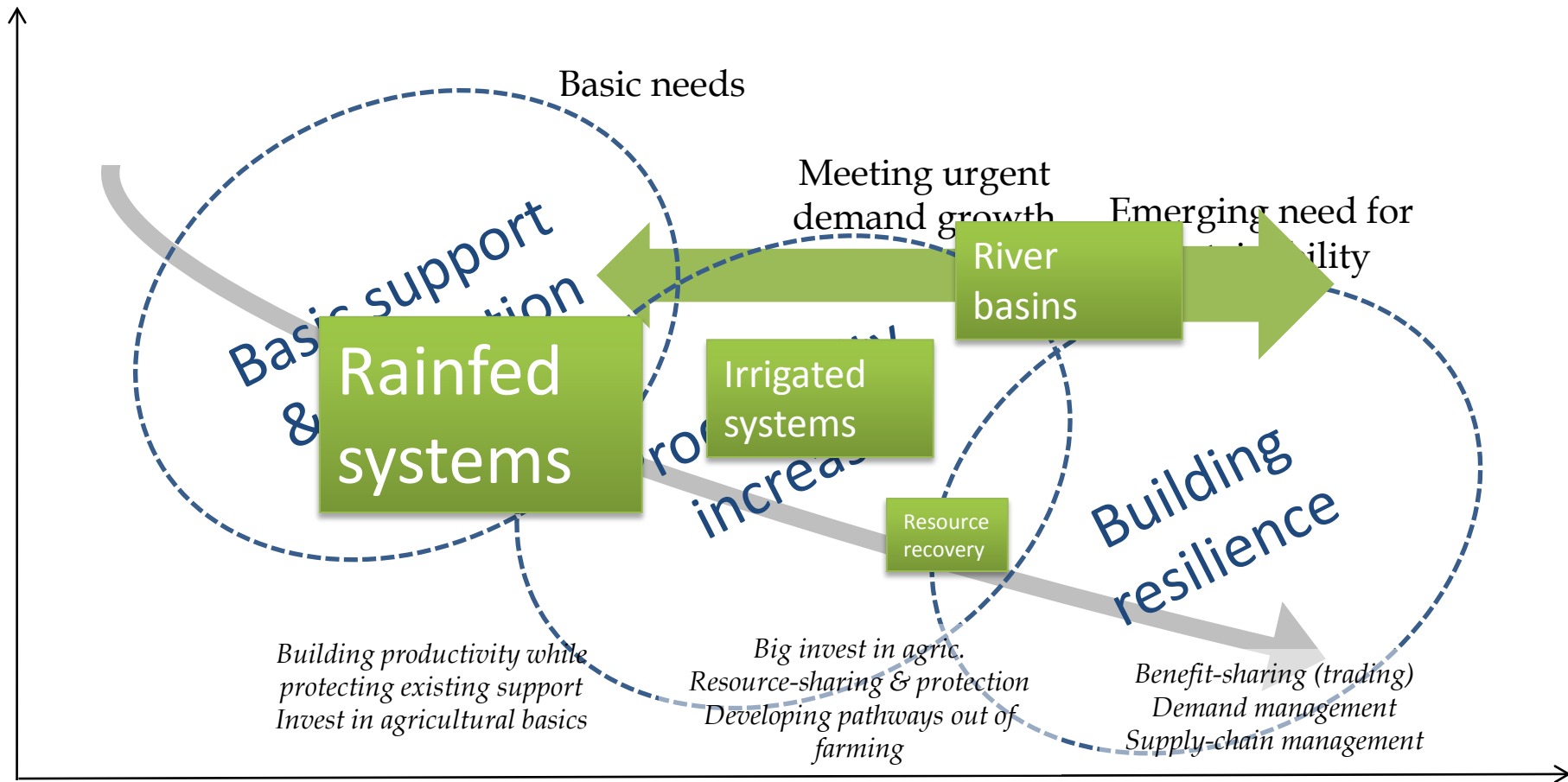


A program of Strategic Research Portfolios (SRPs)....

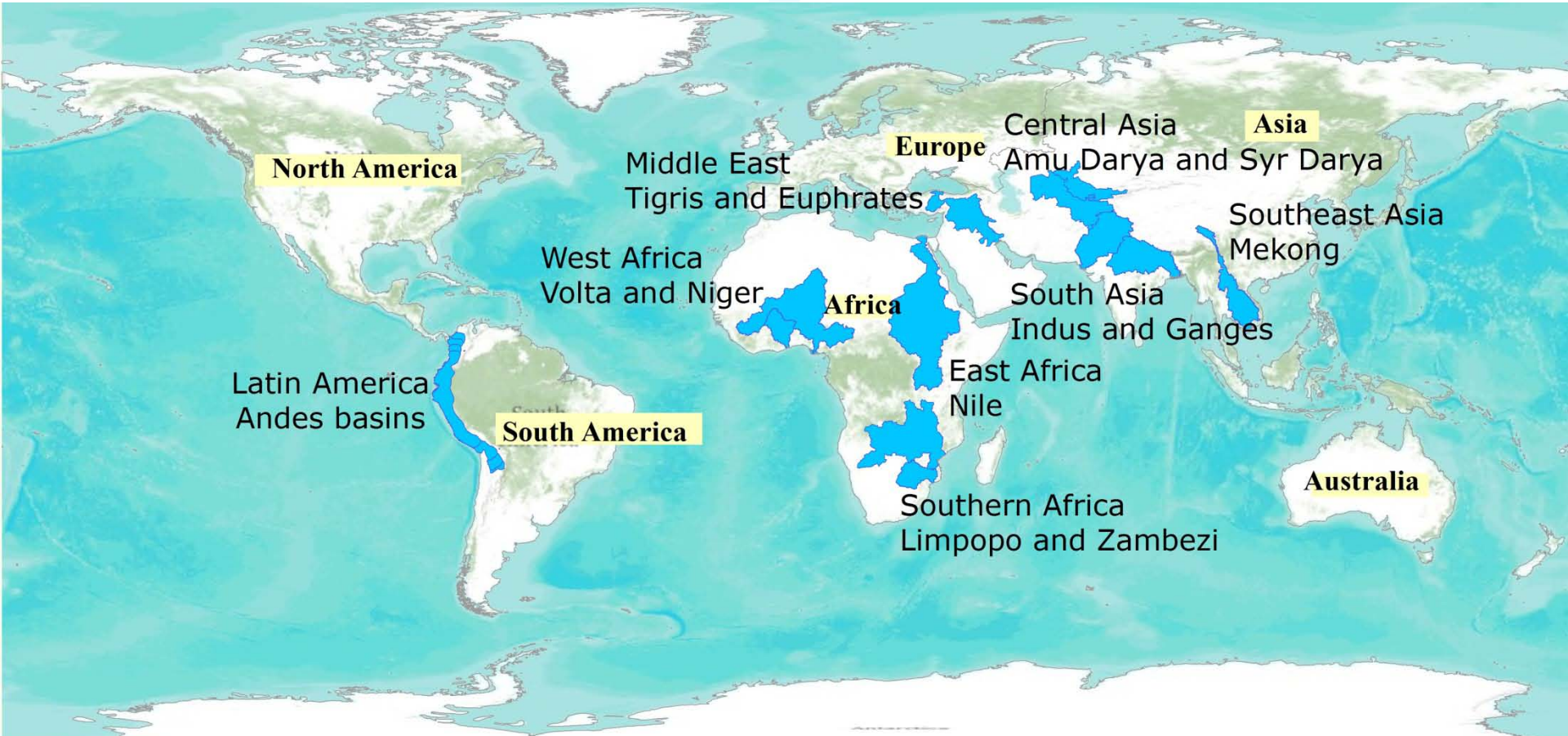
1. Irrigated Systems
2. Rainfed Systems
3. Resource Recovery and Reuse
4. River Basins
5. Information Systems



...mainstreamed into development processes



...focusing initially on 'known' areas



Research to support 3 broad types of change

Sustainable intensification

Greater sharing of benefits & risks

A new political discourse

CGIAR



Irrigated Systems SRP (Sanmugam Prathapar)



- Irrigation for Food, Financial, Environmental and Nutrition Security in Sub-Saharan Africa
- Improving adequacy, reliability and equity of water for food security and poverty alleviation in Asian canal systems
- Managing water resources to unleash the agricultural potential and alleviate poverty in the Eastern Gangetic Plains



Photo: Tom Van Cakenberghe/IWMI



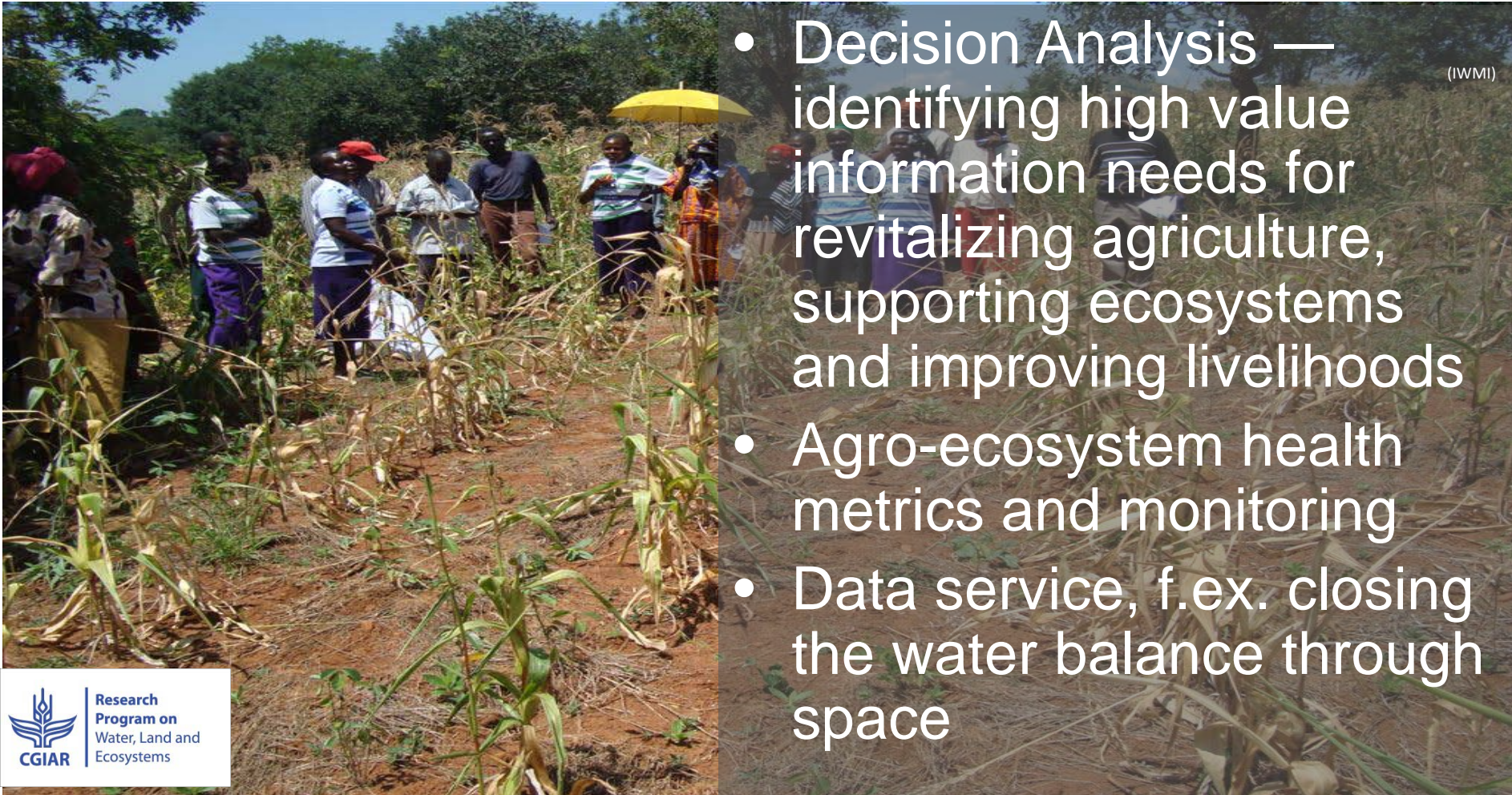
Basin SRP (Vladimir Smakhtin & Claudia Ringler)

- Managing water resources' variability and re-thinking storage in basins for enhanced food and livelihoods security
- Sustainable, efficient, and equitable allocation of water, land and energy resources and their benefits in river basins
- Water-energy-land-food nexus



 Research Program on Water, Land and Ecosystems

Information SRP (Keith Shepherd)



(IWMI)

- Decision Analysis — identifying high value information needs for revitalizing agriculture, supporting ecosystems and improving livelihoods
- Agro-ecosystem health metrics and monitoring
- Data service, f.ex. closing the water balance through space

