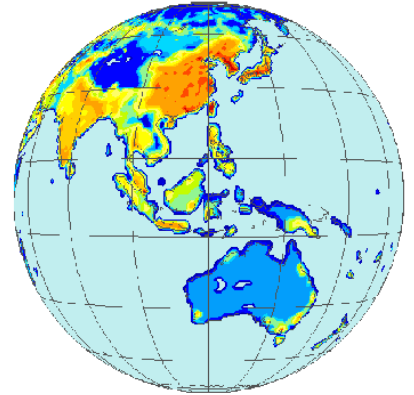


Development of water management model



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National Institute for Environmental Studies

**11th AIM International Workshop, Tsukuba, NIES,
19-20 February 2006**

Objectives of Water Management Model Development

- Reinforcement of water demand part in the water resource model
 - Key issue: Water demand
 - ✓ Sectoral assessment: Domestic, Industry, Agriculture
 - ✓ Water savings: Technology, System, Institution, Behavior

- Assessment of possibility of MDG achievement
 - Key issue: Access to improved water supply and sanitation
 - ✓ Millennium Development Goals 7, Target 10: Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation
 - ✓ VISION 21: By 2025 to provide water, sanitation, and hygiene for all

- Linking water supply and demand processes to economic activity in CGE model
 - Key issue: Water availability change impacts on economic activity
 - ✓ Climate change ▶ Water availability ▶ Water supply ◀▶ Water demand ◀▶ Economic activity

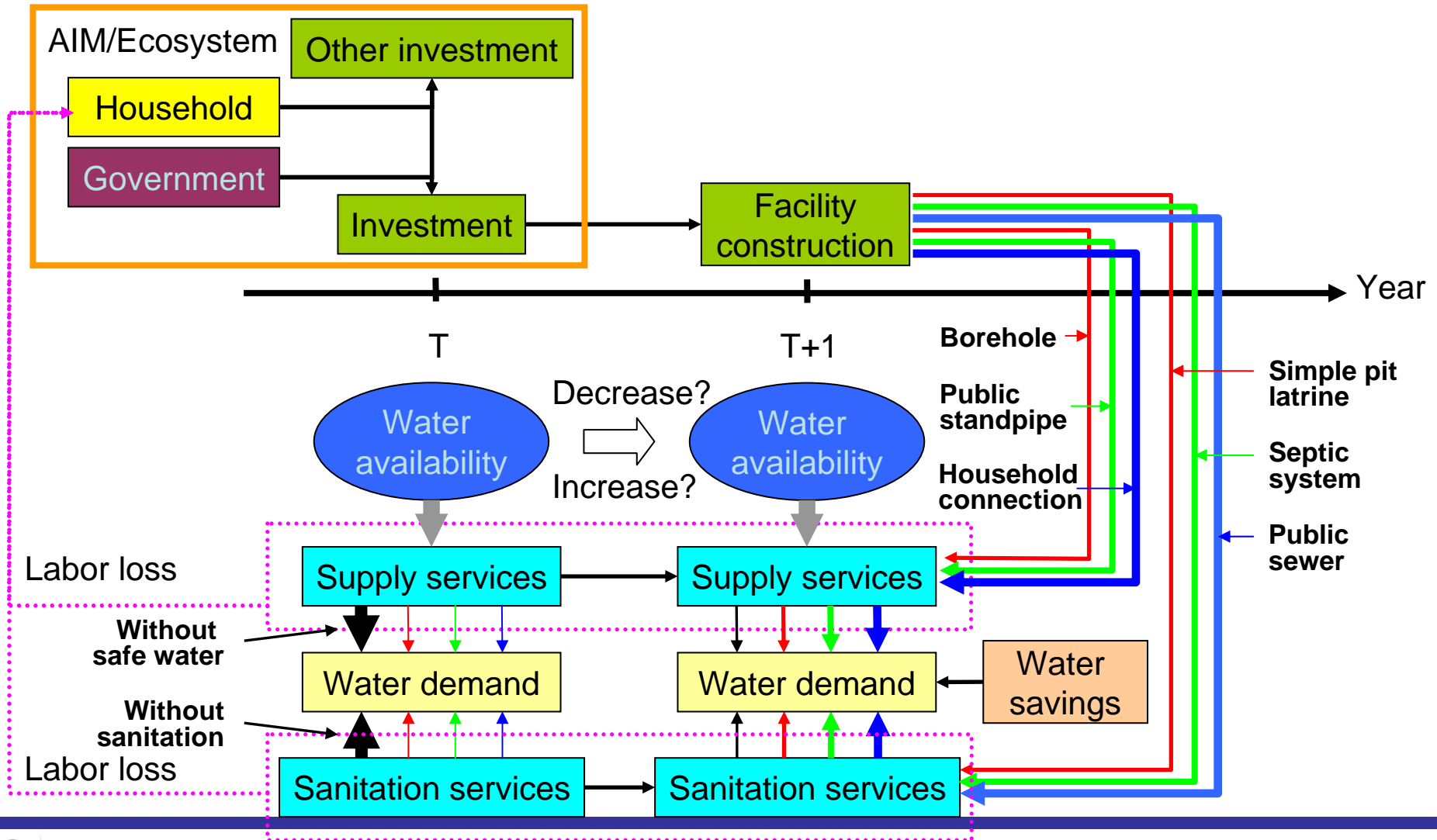


Overview of Water Management Model

- Target area: Global, Region, Country, County
- Unit area: Region, Country, County, City
- Basic concepts
 - Coupling process and statistical model
 - Separation of urban and rural area
 - Sector: Domestic, Industry, Agriculture, Electric power generation
 - Assessment of...
 - ✓ domestic water demand considering water supply and sanitation conditions
 - ✓ institutional, behavioral and technological water saving quantitative benefits
 - ✓ environmental investment to achieve the target of access to safe water and sanitation
 - ✓ water related impacts on economic activities



Structure of Water Management Model



Example of water management assessment

- Target:
 - Halve by 2015 the proportion of people without sustainable access to safe water and sanitation
 - By 2025 to provide water, sanitation, and hygiene for all
- Output: Country-wise projection
 - Coverage of water supply and sanitation technologies
 - Investment, operation and management cost
 - Water supply (Water volume for domestic use)
 - Health impacts: Diarrheal mortality
- Base year: 2000, Target year: 2015, 2025
- Data: GDP, Population, Improved water supply and sanitation data, etc (Coverage, Cost, Unit water use (L/person/day), Potential risk of diarrhoeal mortality based on access to improved water and sanitation)
- Case study
 - Access to conventional technologies
 - Access to advanced technologies



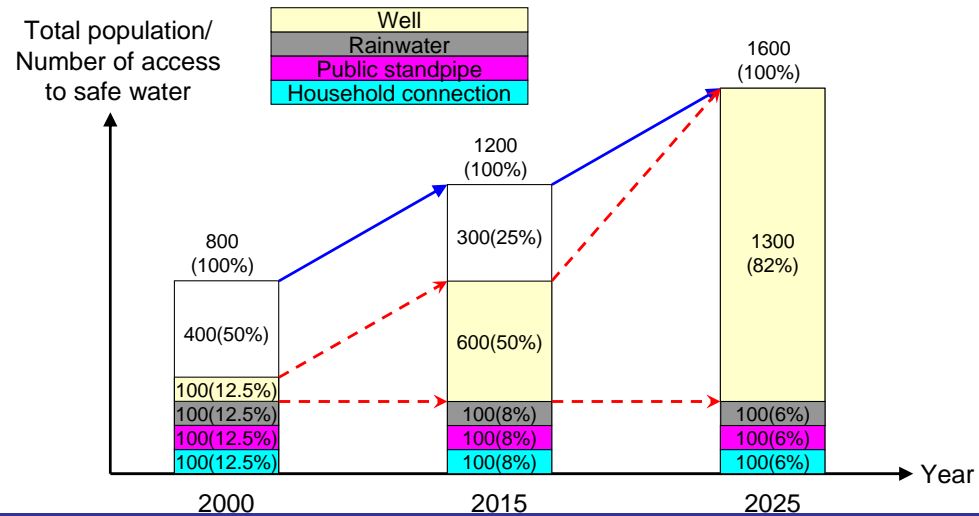
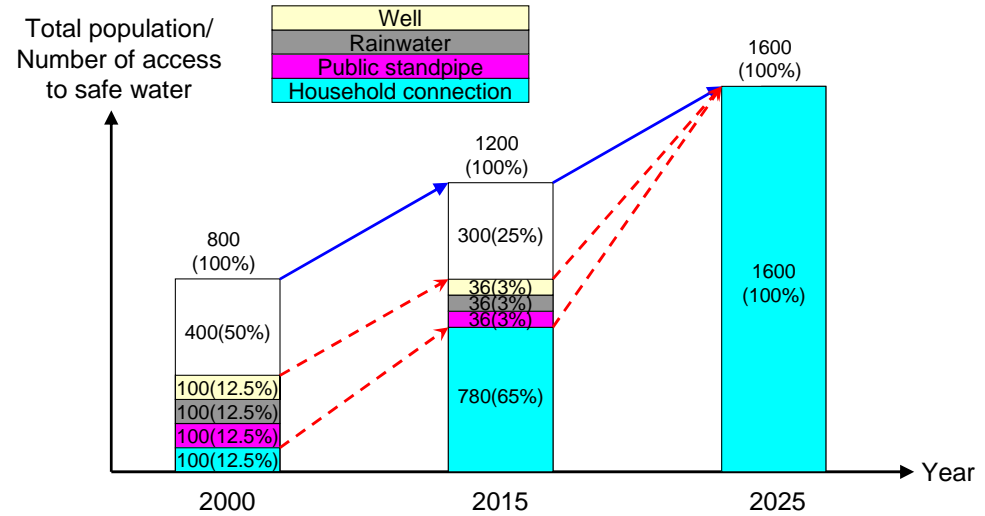
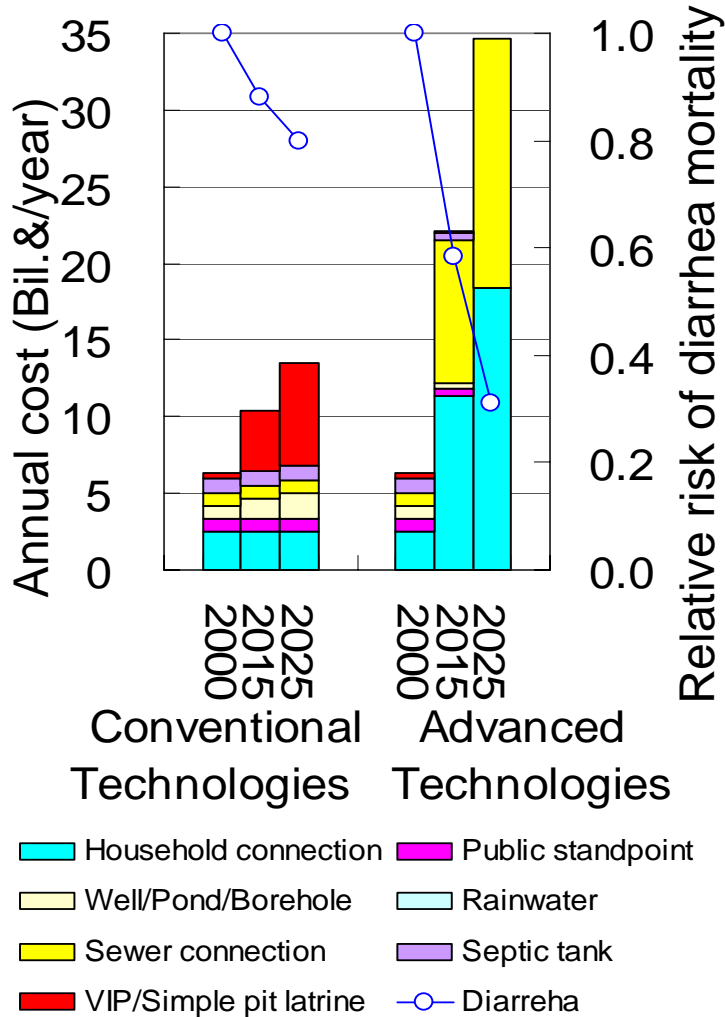
Household connection, Health impact

- Cost of Household connection (HC)
 - Total water use in HC = Residential water use
+ Commercial water use + Unaccounted for water (UfW)
 - Unit cost: \$/m³ ▶▶▶ assess benefits of UfW reduction
- Health impacts: Potential risk of diarrhoeal mortality
 - Assessment of potential risk based on access to safe water supply and sanitation excluding present condition and other related factors (medical, dietary, climate condition)

Category	Water supply	Sanitation	Diarrhoeal Risk
C1	HC	IS with SC	2.5
C2	IWS without HC	SC	4.5
C3	IWS without HC	IS without SC	6.9
C4	NIWS	IS with SC	6.9
C5	IWS with HC	NIS	8.7
C6	NIWS	NIS	11.0



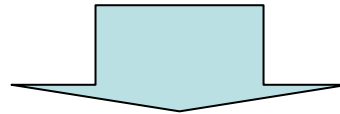
Example: Access to safe water and sanitation



Application of AIM Framework for GEO 4

- GEO-3

- ✓ Model: AIM/Trend, Simple econometric model for 42 Asian countries
- ✓ Target Year: 2032
- ✓ Indicators: air pollution and solid waste generation

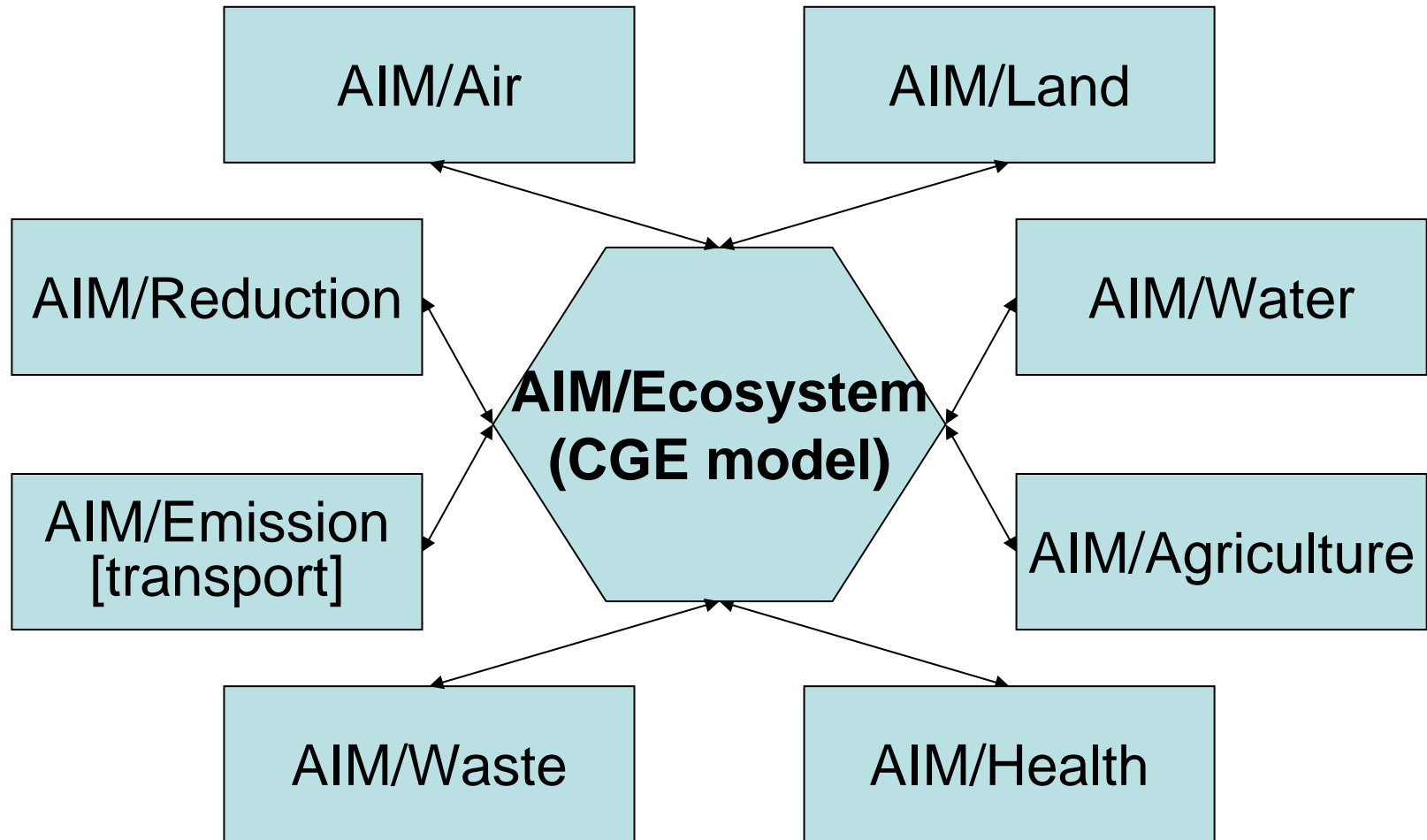


- GEO-4 (planned to be published in 2007)

- ✓ Model: AIM/Ecosystem and other AIM models, Global CGE model with disaggregated Asia region for assessing environmental damages and their feedback to economic activities
- ✓ Target Year: 2050
- ✓ Indicators: GHG and air pollutant emission, Municipal solid waste, GHG and air pollutant emissions from passenger transport Access to safe water and sanitation,

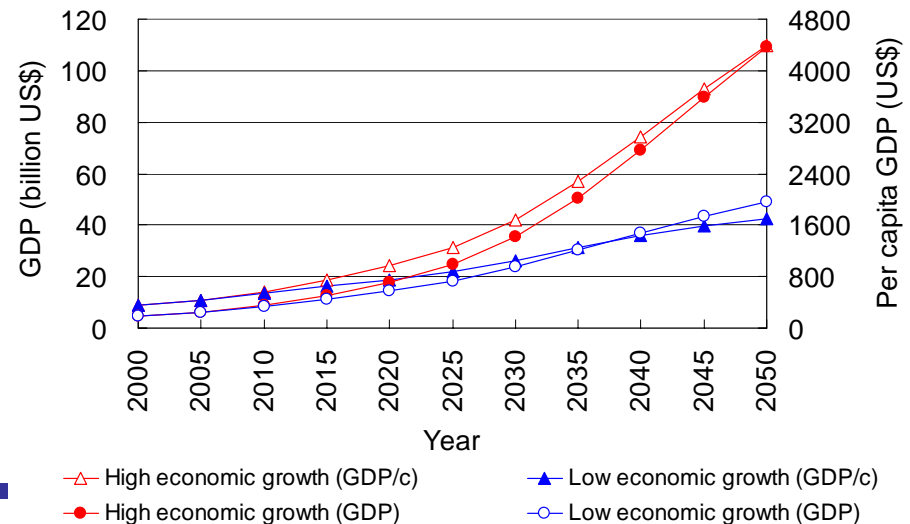


Structure of AIM/Ecosystem and linkage to other AIM modes

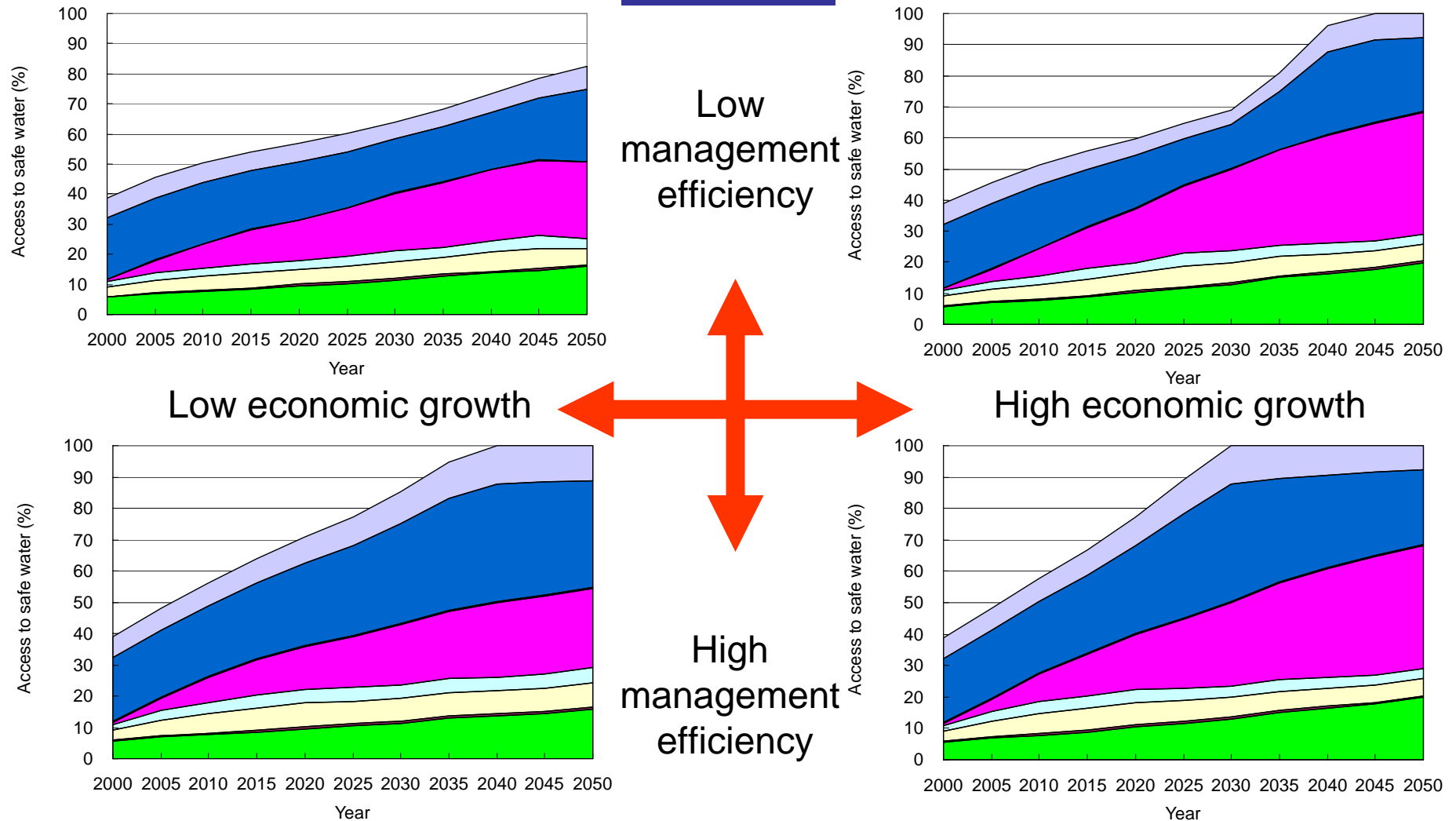


Preparation for scenario quantification in GEO 4

- Scenario: Four scenario (Markets First, Policy First, Security First, Sustainability First)
 - Population and GDP scenario are provided by IFs (International Futures developed by Professor Barry Hughes, University of Denver) model
- Water model parameters adjusted for each scenario
 - Ratio of investment cost to GDP (Safe water/sanitation, Urban, Rural)
 - Total safe water and sanitation coverage (expressed by per capita GDP)
 - Household connection and sewer connection (expressed by per capita GDP)
 - Parameters related to HC
 - ✓ UfW, Management efficiency
- Two preliminary results
 - High/Low economic growth under high/low management efficiency



Preliminary results for scenario quantification in GEO 4, Access to safe water



Future task

- Contribution of GEO-4 quantitative scenario development
- Development of Industrial and Agricultural water demand module
 - ✓ Coupling to Water resource model developed by Dr. Takahashi and Mr. Masutomi
- Incorporating water demand module to CGE model
 - ✓ Coupling to AIM/Ecosystem
- Development of water quality module

