Water Security: In Search of the Optimal Balance

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**Water Security: In Search of the Optimal Balance**

**Water Security:**

**Threats and Opportunities**

1. **Water & Development**: water both hampers & promotes economic and social growth

2. **Water Security & Optimal Balance**: the water hardware vs. software conundrum

3. **Water & Measured Development**: keying deliberate decision-making to responsible policy and practical implementation
Water: the **good**, the **bad** & the **ugly**

**A basis of production, growth & socio-political stability**

**A basis of infrastructure devastation, perpetuating poverty & inciting conflict**

**Threats to Global Water Security**

- World population explosion
- Rapid human shifts from rural to urban
- Major dietary change behavior
- Increasing pollution of water resources
- Over-abstraction of groundwater
- Issues created by climate change
Water: historically a source of economic devastation, stagnating poverty & political conflict

- Scarcity, Drought & Famine
- Flood & Inundation
- Landslides
- Desertification
- Contamination
- Disease & Epidemic
- Conflicts & Wars

Gujarat State, India  August 2008

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Bangkok, November 2011
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Western Nepal, August 2011
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Hrazdan River, Armenia 2010

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Indonesia, July 2005
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Global Water Flashpoints 2011

Water: historically a source of economic growth, basic requirements for survival, and production, growth & stability

- Robust communities
- Sustainable ecosystems
- Food production
- Energy generation
- Transportation
- Culture and Religion
- Socio-political Stability
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Water Security: Threats and Opportunities

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3. **Water & Responsible Growth**: keying deliberate decision-making to responsible policy and practical implementation

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**Water Security & the Optimal Balance**

**Countervailing forces**
- basis for production, health, growth & cooperation
- a cause of destruction, poverty & conflict

**Demand & risk management**
- dependable, predictable & adequate quantity & quality of water for agriculture, municipal services, industry and basic health
- manageable levels of risk of unanticipated water-related impacts

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**Water Security**: it’s all about balancing the pluses and the minuses
Water Security: the economic growth correlate
Most regions with high rainfall/runoff variability/unpredictability are poor; knowledge & capital deficits create high risk

Developing countries face more challenging climate conditions
Wealthy nations share a small window of favorable climate (low variability; moderate rainfall)

Water Security:
dependable, predictable & adequate quantity & quality of water for agriculture, municipal services, industry and basic health AND manageable levels of risk of unanticipated water-related impacts

Optimal Balance
investment needed to achieve Water Security
Water hardware vs. software: the elephant in the living room

COMMON CONFLICTING PERSPECTIVES

• To invest in small-scale water infrastructure
• To invest in large-scale water infrastructure
• To invest in water institutions & management

OR

• To blend all three, reflecting needs & situation

Countries prone to water insecurity must leverage all options & select & implement sensibly

To dam or not to dam, that is the question...

• Water security achieved with hydrological variability requires water storage & regulation
• Water storage: natural (aquifers, lakes, wetlands), small or large
• Water storage: artificial (aquifers, dams & reservoirs), small or large
• Industrial countries: water secure, invested in what they need (small/large, natural/artificial)

Water-insecure countries need to carefully assess sustainable storage options before investing scarce resources
Water Security & the Optimal Balance

• Developing countries: seriously limited by hydrology

• Intermediate countries: constrained by hydrology

• Industrial countries: in command of hydrology
Water Security & the Optimal Balance

- **Developing countries:** *seriously limited by hydrology*
- **Intermediate countries:** *constrained by hydrology*
- **Industrial countries:** *in command of hydrology*

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Japan Case Study
(Japan Water Forum 2006)

- WSS coverage: UP
- Morbid/mortality: DOWN

- Paddy efficiency: UP

- Hydropower: MATURE
  - Thermal: UP

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Source: Production, Marketing and Consumption Division, Ministry of Agriculture, Forestry and Fisheries. "Statistics on Crops"

Planning Division, Ministry of Agriculture, Forestry and Fisheries. "Annual Statistics of Foods in Japan"

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Source: Office of Gas and Electricity Markets, Agency for Natural Resources and Energy. "Handbook of electric power industry"

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Water Security & the Optimal Balance
(Japan Water Forum 2005)

**Case study of Japan**

- "Establishment of water resource development system (1961) as well as stable supply of industrial and urban water"
- "Environment-friendly water infrastructure investment"
- "Greater Gains 21st century"

**Investment in Infrastructure & Institutions**

"Initial Investment" in 1960-1961

"MIP" (Minimum Infrastructure & Institutional Platform)

- "Frequent flood damages"
- "Spread of infectious diseases"
- "Lack of electric power"
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Water: Importance of Scientific and Social Research in Maintaining Optimal Balance

- Very often scientific research on water resources and management is compartmentalized into convenient sectors: engineering, policy, economic, social, political, hydro-meteorological.

- To achieve significant efficiencies in water security, water solutions should be considered in context of entire water system from:
  - spatial inclusiveness: “cloud to coast”
  - upstream downstream dynamics
  - multiple sources and types of water characterized and assessed (free river flows, green water, grey water, brown water, etc.)
  - options for water storage and access during dry seasons
  - river basin and watershed management to be considered in context of livelihood growth
Water: Importance of Scientific and Social Research in Maintaining Optimal Balance

Research needed identifying new and sustainable technologies in:
- Storage of excess flows during floods & surface water storage
- Sustainable groundwater use & better understanding of aquifers
- Holistic crop production: OFWM efficiency (irrigation & drainage alongside innovative crop science research)
- Improvements in plant breeding to reduce irrigation demand
- More efficient industrial production processes
- Improved desalination techniques & management of brine waste
- Better modeling of water systems
- Transparent water data management & cadastral information systems shared between countries

Matching Incentives to Improve Water Governance

- Incentive compatibility makes certain that innovations and reforms are supported by adequate and appropriate incentives
- Complex situations with multiple stakeholders require a complex solution based on incentives tailored to each stakeholder category need, otherwise water governance will be dysfunctional
- IC index entails four essential stages:
  - Specifying Water Security goals and objectives
  - Setting stakeholder essential services & relations
  - Identifying applied mechanisms
  - Assessing efficacy of the existing and new mechanisms for incentive creation
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<th>Governance to Empower Consumers to Manage Water Resources</th>
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<td>• Restructure government-dominated organizational structure assigning water governance to end users</td>
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<td>• Require transparent environment of support, opportunities and investment from government</td>
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<td>• User empowerment to: 1) ensure equitable distribution of water supplies and services, 2) maintain infrastructure performance integrity, 3) ensure local government technical and political support after authority devolution</td>
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<td><strong>Main tool elements – strengthen ability to:</strong></td>
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<td>• Develop consultative decision-making process</td>
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<td>• Undertake participatory infrastructure O&amp;M</td>
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<td>• Position consumers to directly oversee service providers</td>
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<td>• Develop multi-level management systems</td>
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<td>• Ensure compatibility of local cultural norms, traditional values, gender mainstreaming, and allocation and distribution</td>
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<td>• Inculcate self-assessment capability to manage within local water management organizations to continue growth and evolution</td>
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Water Security, Optimal Balance, Logical and Rational Growth....

- **Water security**: reducing destructive, increasing productive impacts of water (underpinning not undermining growth)
- Achieving **water security** essential for growth & development
- **Optimal balance** of infrastructure & institutions to achieve water security
- All industrial countries above **optimal balance** (often low: a reason for early growth)
- Most poor countries below **optimal balance** (often high: a reason for constrained growth)
- **Major investment** needed for growth in many poor countries
- **Balanced investment** in water infrastructure & institutions
- **Adaptive investment** to minimize social & environmental costs
- **Inclusive investment** to maximize stakeholder values

In a globally challenged economic environment, closing that gap is a major challenge.

Thank you