AGWA and the DSS

Integrating Climate Adaptation into Water Management Decisions through the AGWA Decision Support System (DSS)

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AGWA: A Brief Overview

• The **Alliance for Global Water Adaptation** is a group of regional and global development banks, aid agencies and governments, a diverse set of non-governmental organizations (NGOs), and the private sector focused on how to **manage water resources** in a way that is **sustainable** even as **climate change** alters the global hydrological cycle.

• Focused on how to help practitioners, investors, and water planners and managers make systematic, consistent, and resilient decisions.
What’s vulnerable?

• Not all parts of the water cycle are equally vulnerable to climate shifts

• Long-lived entities are extremely vulnerable: infrastructure, ecosystems, and institutions

• They represent a balance between risks and optimizing between options

• AGWA has targeted the decision-making process for water management as the key vulnerability to focus our efforts
The AGWA Decision Support System (DSS)

- The DSS is a “meta-tool” that incorporates existing tools, research, and data-products into decision-making processes
- Currently in active development — methodology being tested at seven sights globally
- Current projects include urban management, ecosystems, hydropower, extractive industries
- Expert feedback process at World Water Week (September 2013); full launch in 2014

“tools need process & context”
The DSS process

Three linked teams:
1. Decision content
2. Software development
3. Implementing partners/pilots

Decision content itself has four teams:
– Hydrology and Climate Science
– Economics and Finance
– Engineering and Ecology
– Governance
The current standard of adaptive WRM

- Use one or more climate models (GCMs)
- Generally use more than one scenario
- A few key air temperature, precipitation variables
- “Test” for vulnerability based on the constraints of the original GCMs

Surprise!

*Climate scientists are not eco-hydrologists, farmers, or water managers*

Weaver et al., 2012, WIREs Climate Change
Does it work?

- “Not ready for primetime” for water managers: Kundzewicz & Stakhiv (2010)
- Low confidence, especially for quantitative purposes
- Little agreement across models, scenarios
- Models not developed for adaptation purposes but mitigation, climate science hypotheses
- Climate itself is defined very narrowly — direct impacts from a handful of variables
- Often result in a series of “no regret” options


traditional approaches to assessing risk and developing robust strategies amplify or hide uncertainty

Source: AGWA, “Caveat Adaptor,” 2013
bottom-up vs top-down approaches

**Top-down approaches to risk assessment**

1. Downscale climate model projections
2. Estimate shifts in water supply
3. Determine system responses to changes in these variables

**Decision-scaling risk assessment**

1. Define your system’s breaking points
2. Assemble multiple climate data sources and link to breaking points
3. Assess plausibility and test vulnerability

Weaver et al., 2012, *WIREs Climate Change*
Decision makers need confidence to manage water over long timescales. Confidence is accrued and built as uncertainty is constrained.

- Engineering: accurate, precise, quantitative, predictive
- Ecology: accurate, quantitative/qualitative, explanatory

Evaluate confidence

- GCMs
- Paleo data
- Trend analysis
- Spatial, hydro models

Small engineering gap: more permanent solutions
Large engineering gap: staged, multiple operating regimes
Ecology: typically large gaps

Confidence expected vs. confidence supported
## New contexts for Engineered Resilience

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<th>20\textsuperscript{th} century approaches</th>
<th>Resilient approaches</th>
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<tbody>
<tr>
<td><strong>Design lifetime</strong></td>
<td>100 – 500 years</td>
<td>10 – 50 years?</td>
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<td><strong>Design constraints</strong></td>
<td>hard-wired for a single climate future</td>
<td>robust to multiple futures</td>
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<tr>
<td><strong>Management style</strong></td>
<td>Rigid, limited flexibility</td>
<td>Modular, extensible, multiple operating regimes</td>
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<td><strong>Environmental focus</strong></td>
<td>Mitigate, restore, retrospective data</td>
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<td><strong>Siting considerations</strong></td>
<td>Single site</td>
<td>Single site, basin, network, portfolio</td>
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*Mekong, Qinghai, China*
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Okavango Delta, Botswana