Planning for the Future: Modernizing the Planning Process for Water Resources

ERIC HALPIN, ICOLD COMMITTEE F: *ENGINEERING ACTIVITIES IN THE PLANNING PROCESS FOR WATER RESOURCES PROJECTS*

JUNE 2022, MARSEILLE, FRANCE

Agenda

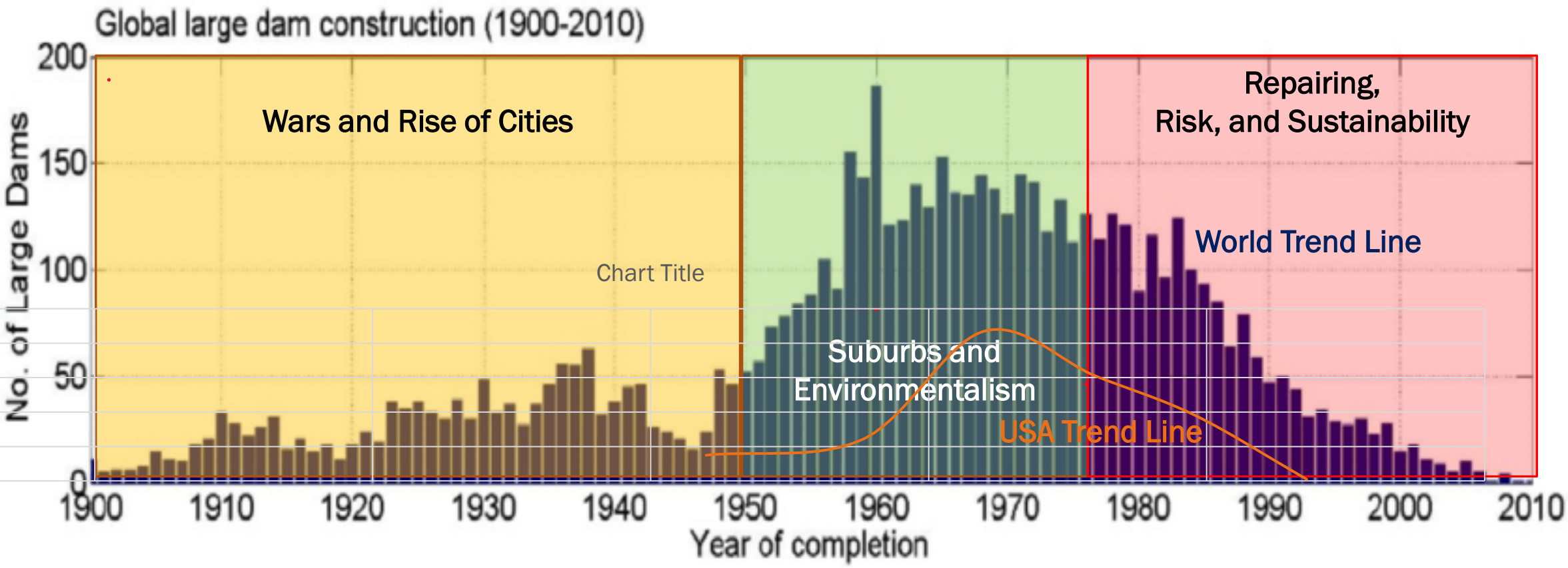
History of Dam Planning

Why is Improved Planning for Dam Safety Projects More Important Now Than Ever?

A Path Forward

History of Dam Planning

MODERNIZING THE PLANNING PROCESS FOR DAMS & LEVEES



Sources: Yang, January 2015 Journal of Geoscience and Environment Protection
And the US National Inventory of Dams

Timeline of the State of Art in Planning Decisions for Dam Construction

Practice Based

Standards and BCR Based

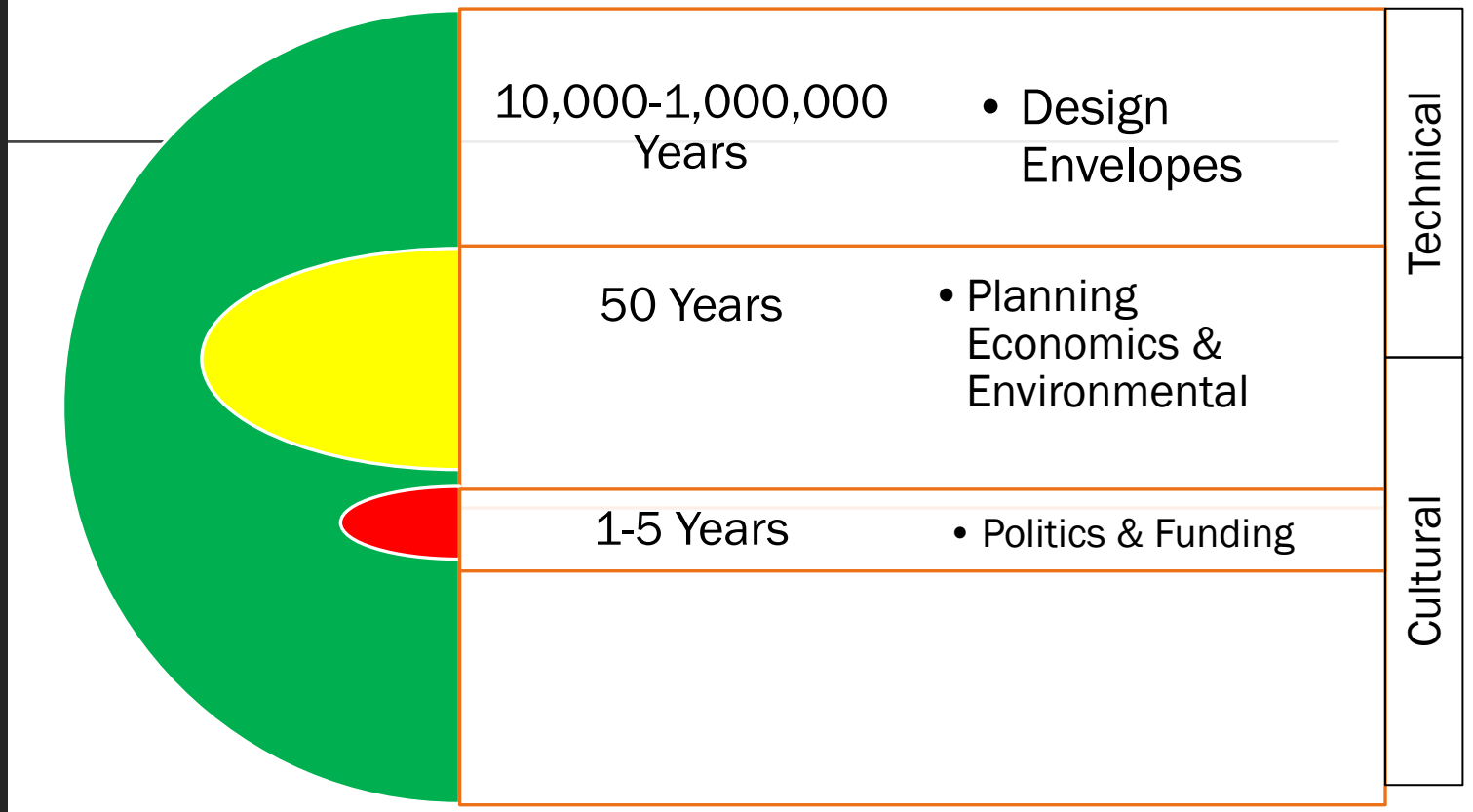
Improved Standards and BCRs

Semi Multi-Criteria Based

Risk Informed With TRG And Multi-Criteria

We Design For Extremes But Plan Around Near-Term Social and Political Timescales!

- Strategic Technical Approaches That Fully Embraces Risk, Uncertainty, & Extremes
- Comfortable Planning Horizons & Direct Effects Constrained by Knowledge Uncertainty
- Most Decisions Driven by Short Term Opportunism



Appreciating Other Perspectives and Time Scales

- Actual Age Earth: 4.6 Billion Years
- Scaled Age of Earth for Insight: 46 Years
  - Humans: 4 hours
  - Industrial Revolution: 1 minute
    - Destroyed over 50% of the world's forests…
    - 500 species extinct
    - 1 million threatened and endangered
    - Tipping Points in ocean acidification, plastics pollution, climate, deforestation, etc…

Why is Improved Planning for Dam Safety Projects More Important Now Than Ever?

MODERNIZING THE PLANNING PROCESS FOR DAMS & LEVEES

More Nuanced Debates…

Clean Power

Resilience

Clean Water

Commerce

Flood Control

Lessens Climate Impacts

Sustainability

Habitat Impacts

Invasive Species

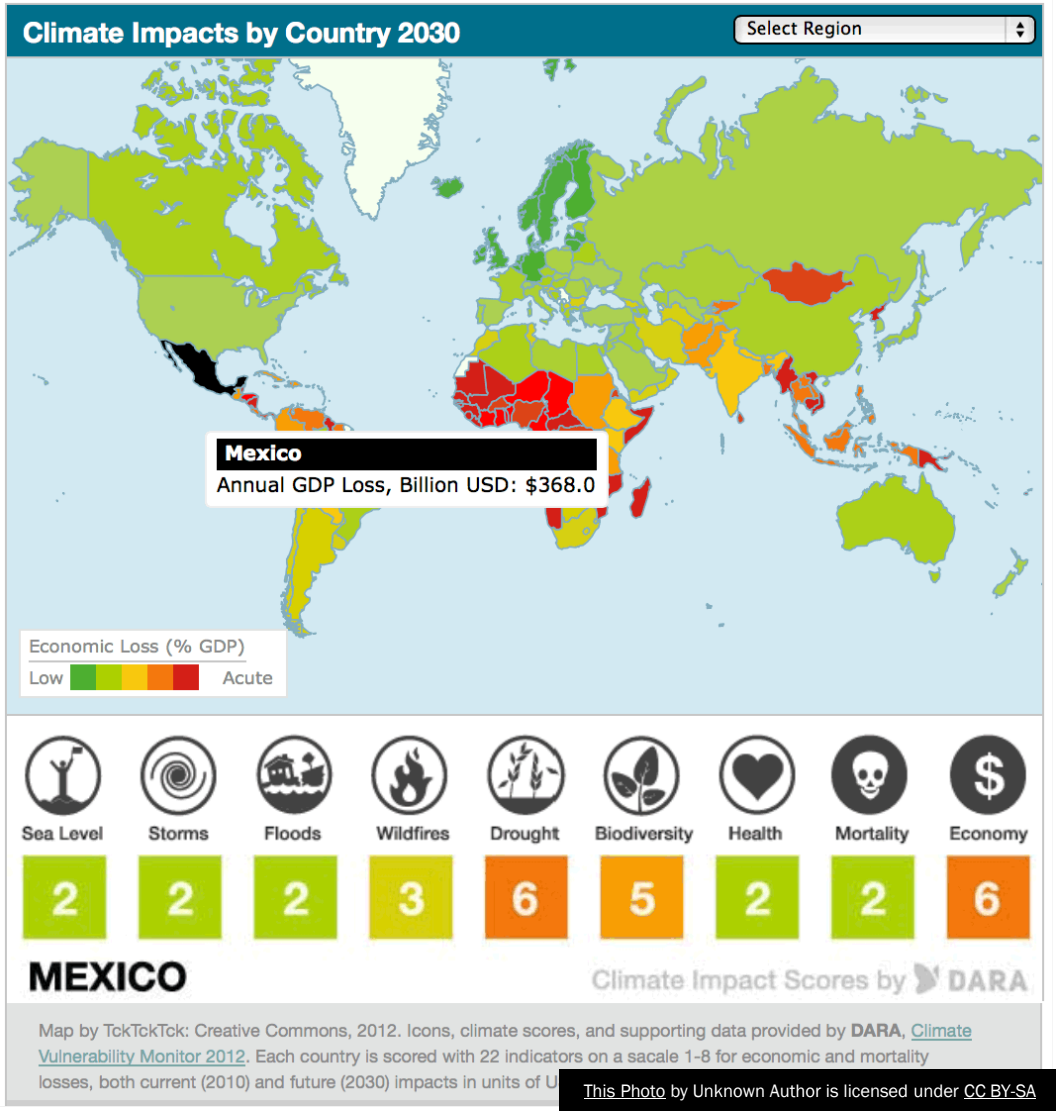
Sediment Management

Methane Release

Loss of Carbon Sinks

Worsens Climate Impacts

…Because Our Ethics are Changing

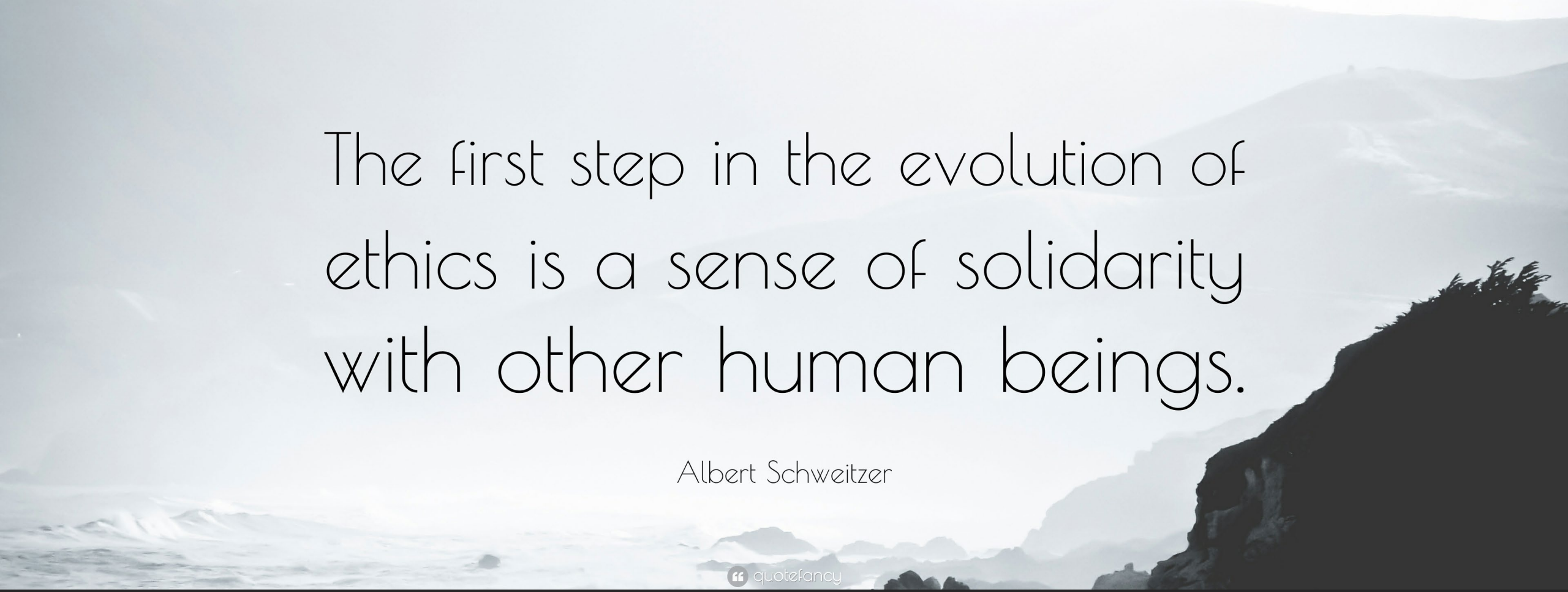


External Forcing Functions

- Food Crisis
- Energy Crisis
- Climate Change & Natural Disasters
- Pressure on the Environment from Economic, Social, Demographic, Technological and Government Change
- Perceptions on Cost & Time Growth

What is the Root Cause of the Challenge in Planning?

MODERNIZING THE PLANNING PROCESS FOR DAMS & LEVEES



The Problem to Understand, and Then Solve

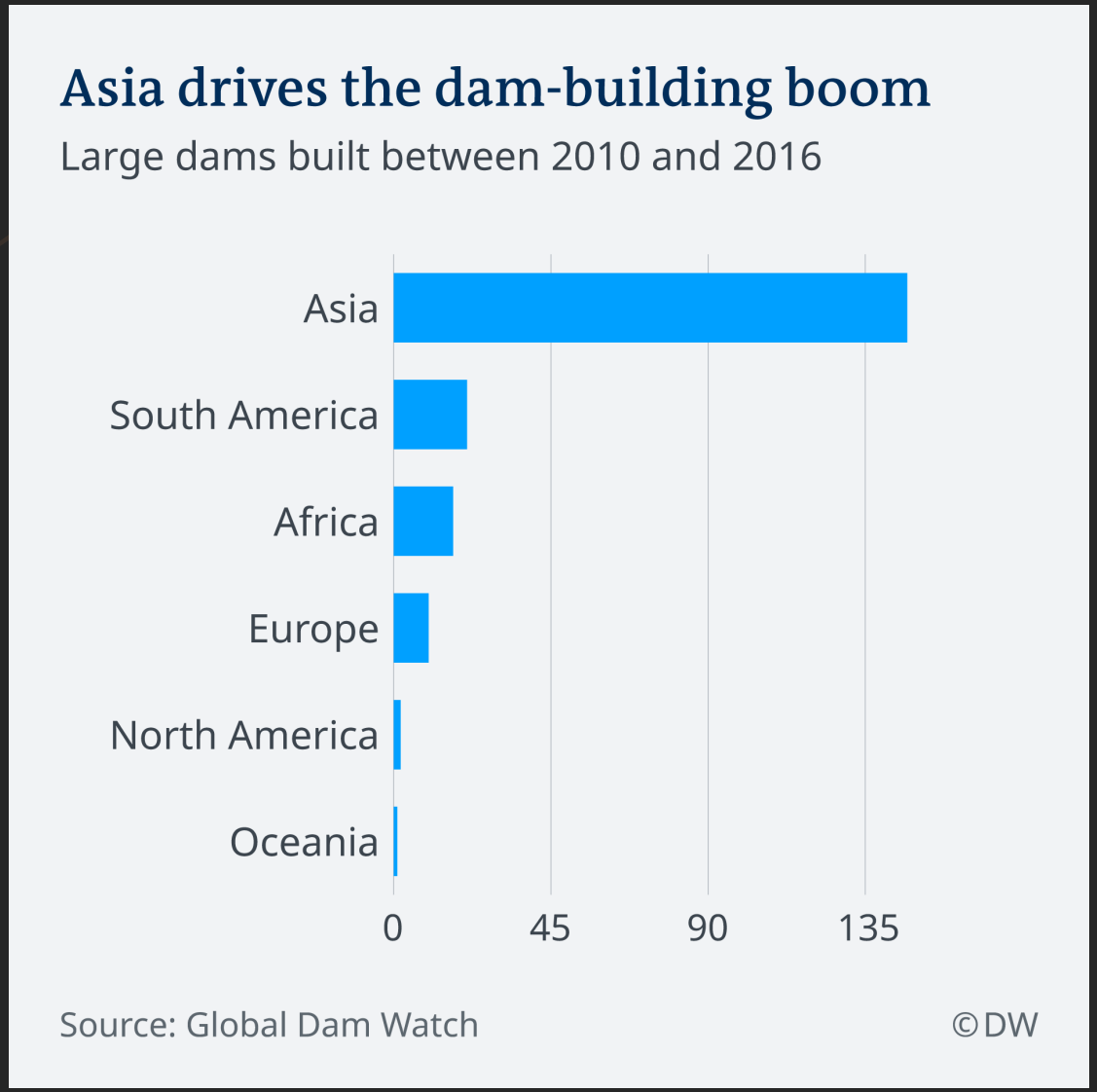
Update the planning process for dam and levee infrastructure construction by incorporating new and evolving ethics and decision-making techniques.

A Path Forward

MODERNIZING THE PLANNING PROCESS FOR DAMS & LEVEES

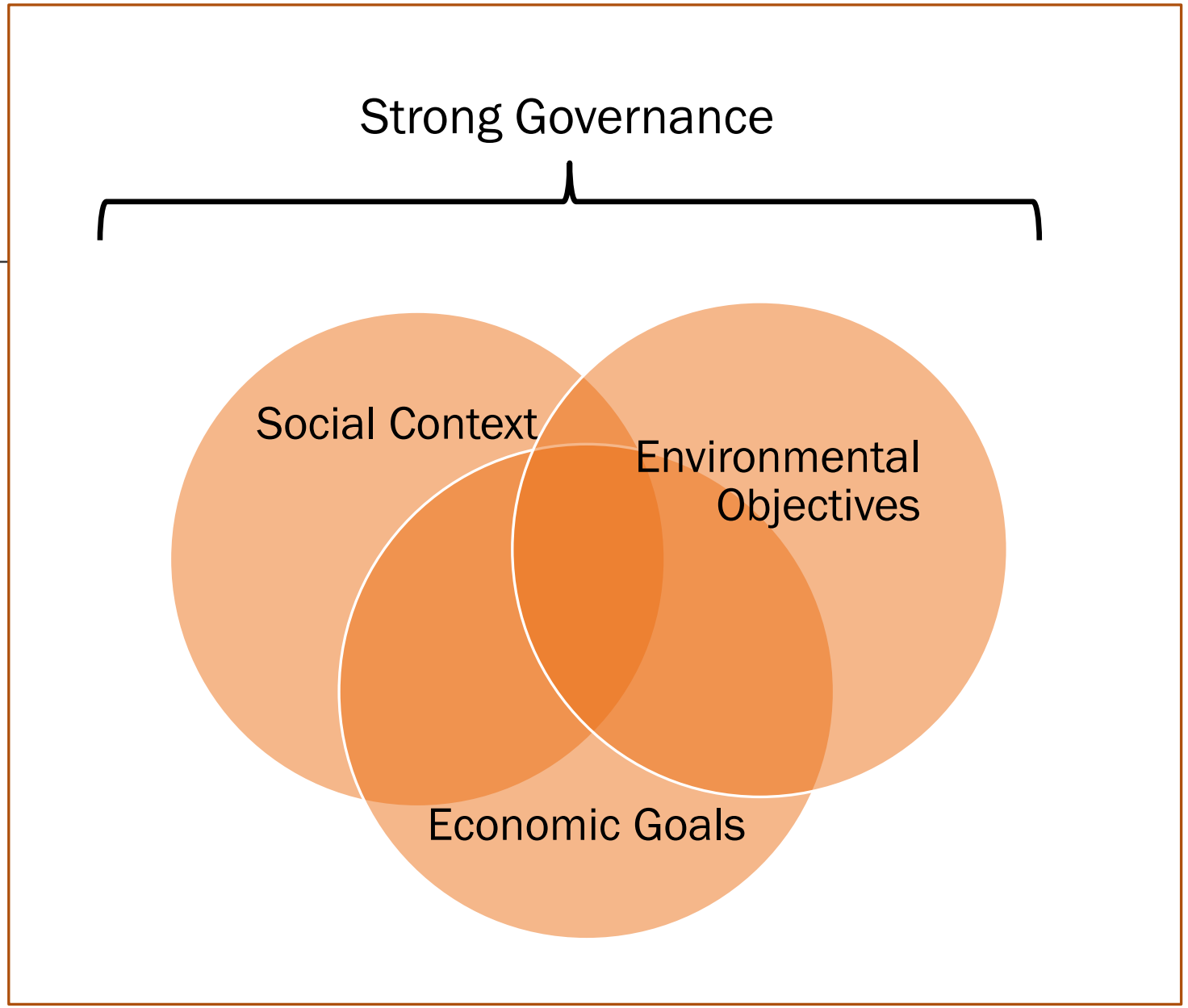
Update Regional Considerations

- Planning Process must address two related types of Decisions:
  - New Construction in Asia, South America, and Africa
  - Major Modifications in North America, Europe, and Australia
- Ethics, Cultures, and Roles of Government/Investment Can be Very Different by Region

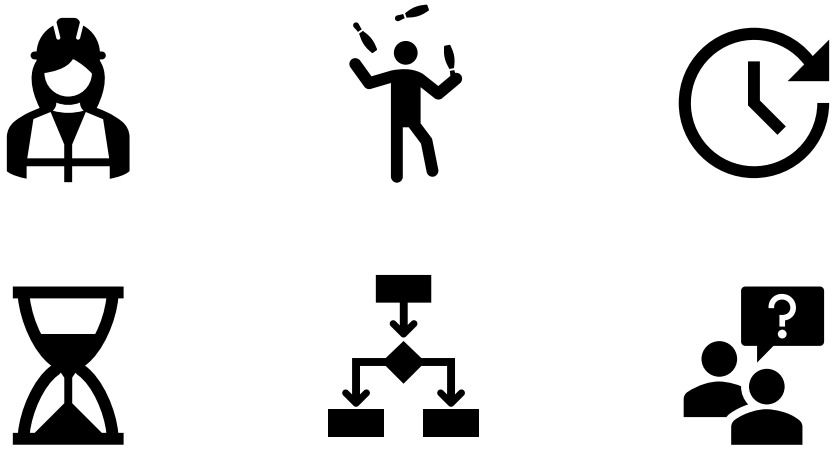


Update the Planning Framework

- Highly Emphasize Those Objectives that are Self Reinforcing and Common to All or Most Plans
- Consider the Regional Context
- Professionalize the Stakeholder Involvement and Governance
- Link Decision Trade-offs with Answer to “Who Pays?” Question
- Decrease Cost and Schedule Growth



Update Planning Principles



Do No Harm

Use Multi-Criteria, But…

- Not Everything Should or Can be Monetized or Quantified
- Understand the Limitations of BCRs

Consider Larger Timescales and Systems

Use Risk Informed Decision-Making, Recognize & Consider Uncertainties

Update the Planning Process/Steps

1. Scope the Study with Objectives & Constraints
2. Collaboratively Formulate Alternatives
3. Evaluate and Screen Alternatives
4. Compare Competing Alternatives
5. Review, Rank, and Select An Alternative
6. Update Costs and Schedules

Iterative Process that Utilizes Risk Analysis and Evaluation

Planning Scope of Work Specifics to Consider

Broaden the Planning Team:

Stakeholder Facilitation

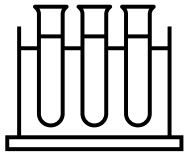
Risk and Consequence Experts

Construction Estimators and Schedulers

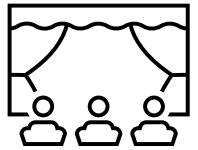
Environmental and Cultural Advocates

Improve Early Data Collection:

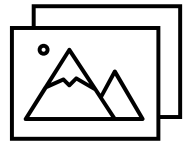
Find Data Gaps



Fill Data Gaps



Improve Data Portrayal



Historical Documents

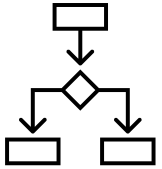
Plan Formulation Specifics to Consider

Expand the Planning Scenarios

Future Without Action Plan

Include Dam Removal Plans

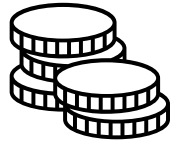
Include Non-Structural Plans



Formulate on Failure Modes

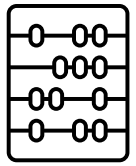
Update the Planning Basis

Environmental Constraints



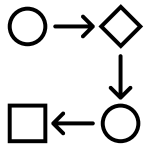
Cost Effectiveness

Tolerable Risk Guidelines

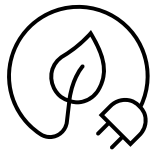


Informed By, But Not Based Solely on Numbers

Environmental Formulation Specifics to Consider…

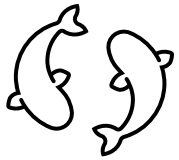


Revised Operational Procedures

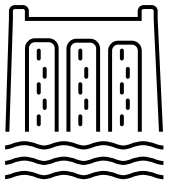


Minimize Greenhouse Gases

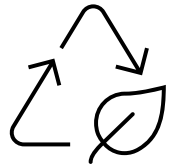
Restore Sediment Transport



Make Dams More Fish Friendly



In-Stream Hydropower

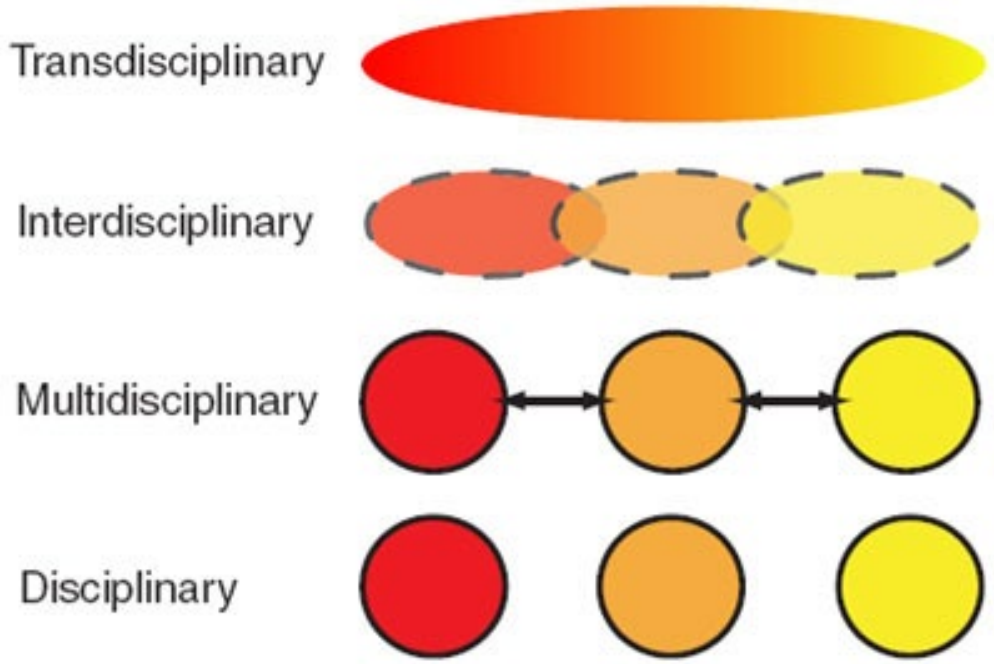


Environmental, Social, & Governance (ESG) Standards

Be Transdisciplinary = “across, over, and beyond” *Heather Morgan, RLA*

…defined as the emergence of a new discipline transcending the boundaries of disciplinary perspective. A transdisciplinary team relates all disciplines into a coherent whole (McGregor, 2004), based on interdisciplinary collaborations that create new knowledge synthesized from existing disciplines. A collective response to climate change requires this kind of approach.”

From *Remembering Heather Morgan*, from Charles Birnbaum, CEO of *The Cultural Landscape Foundation*



Produce Coordinated New Planning Guidance for Dams

- Expand Committee to Include Better Representation
- Build off the Original Position Paper (2009) Comprehensive Vision Based Planning and the Updated Terms of Reference (2014) to Create a New ICOLD Bulletin
- Incorporate:
  - Key Published References on Planning, MCDM and RIDM Now In Practice Internationally
  - Examples of Modern Planning Studies

Committee F of ICOLD

ENGINEERING ACTIVITIES IN THE PLANNING PROCESS FOR WATER RESOURCES PROJECTS

Richard Herweynen, (Australia)

Johanne Bibeau – Chair (Canada)

Eric Halpin (United States)

Thank You

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