Thirsty Rivers in Water-Scarce Regions: Experiences from the Colorado River

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Rehabilitation of the Lower Jordan River
International Conference
21 October 2014
A goal of this conference is to “provide a discussion platform to share our lessons and learn from the experiences of others”
Comparative analysis of water management and policy

Water scarcity
Rivers are highly- or over-allocated and shared
Growing populations and economies; Significant agricultural activity
Environmental degradation
Climate “hot spots”

A tale of two rivers: Pathways for improving water management in the Jordan and Colorado River basins
Assaf Chen a,*, Adam Abramson b, Nir Becker c, Sharon B. Megdal d

Fig. 3. Driving forces and their qualitative impact on policy outcomes.
Innovative Grey Water System in Jordan

Water 2012, 4, 580-596; doi:10.3390/w4030580

Article

Grey Water Reuse for Agricultural Purposes in the Jordan Valley: Household Survey Results in Deir Alla

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CLEAN Soil Air Water

Research Article

Performance of a Grey Water Pilot Plant Using a Multi-Layer Filter for Agricultural Purposes in the Jordan Valley
Complex Water Management Issues, Challenges, and Solutions

- Growth and the need for additional supplies (competition)
- Drought/climate variability
- Water-energy Nexus
- Water quantity assessments
- Water quality
- Desalination
- Use of recycled water for potable and other water needs
- Access to and utilization of renewable supplies
- Transboundary water issues
- The surface water/groundwater interface
- Riparian areas and other environmental considerations
- Water rights settlements
- Conservation programs
- Water storage and recovery (water banking)
- Groundwater replenishment
- Water cost/pricing
- Water Planning

Uncertainty!
Colorado River Basin (CRB)

Water Allocations
Upper Basin  9250 MCM
Lower Basin  9250 MCM
Mexico      1,850 MCM
Evaporation
Historical flows per
Tree ring analysis
~ 18,500 MCM
=> Structural Deficit
Hoover Dam on Colorado River between Arizona and Nevada

Complex water management system

Colorado River through Grand Canyon

Central Arizona Project
CAP System is vulnerable to climate change/variability
The supply-demand gap for the US portion of the Colorado River Basin
Management of the Colorado River

• Within the U.S., the Secretary of the Department of Interior is the manager of the River
  – U.S. Bureau of Reclamation is the responsible agency with the Department
• Reclamation works with the seven U.S. states, each of which has authority for in-state water management
• The 1944 Water Treaty for the "Utilization of the Waters of the Colorado and Tijuana Rivers and of the Rio Grande"
• International Boundary and Water Commission (IBWC) mission is to “provide binational solutions to issues that arise during the application of United States - Mexico treaties regarding boundary demarcation, national ownership of waters, sanitation, water quality, and flood control in the border region”.
• http://www.ibwc.gov/home.html
International Boundary and Water Commission (IBWC) and Minute 319

- One U.S. and one Mexican Commissioner
- Empowered to adopt “minutes” to the 1944 treaty
- Border water and wastewater issues flow through IBWC, regardless of the asymmetrical water governance frameworks of the two countries.
- IBWC established working groups, which gave NGOs a “seat at the discussion table”.
- Working with IBWC are the U.S. Bureau of Reclamation and CONAGUA as the lead federal water agencies, respectively
- **Minute 319** allowed for a Pulse Flow for restoration pilot program, sharing water surplus and shortage between U.S. and Mexico, allowing Mexico to store water in U.S. reservoirs, maintain salinity standards, and encourage binational water development and conservation projects.
Related Minutes

• 2010: Minutes 316, 317, and 318 laid the foundation for Minute 319.
• Minute 318 granted Mexico storage rights in Lake Mead after the 2010 earthquake.
• New way of managing the Colorado River water sharing.
Minute 319

“Interim International Cooperative Measures in the Colorado River Basin through 2017 and Extension of Minute 318 Cooperative Measures to Address the Continued Effects of the April 2010 Earthquake in the Mexicali Valley, Baja California”

- **5 Year Interim Agreement** (thru December 31, 2017)
- **Comprised of 7 Sections:**
  - Extension of Minute 318
  - Surplus Sharing
  - Shortage Sharing
  - Intentionally Created Mexican Allocation (ICMA)
  - Salinity Management
  - Water for the Environment & ICMA to ICS Exchange
  - International Projects

**Minute No. 319 Signing Ceremony – November 20, 2012**

Slide courtesy of IBWC
November 2013 Presentation
Colorado River in Mexico

United States
Mexico

Reach 1
Reach 2
Miguel Aleman
Reach 3
Reach 4
Laguna Grande
Reach 5
Reach 6
Reach 7

Legend
- Colorado River
- Bordo de protección
- Reach 1 - Upper Limitrophe
- Reach 2 - Middle Limitrophe
- Reach 3 - Dry Reach
- Reach 4 - Central Delta
- Reach 5 - Braided Reach
- Reach 6 - Rio Hardy
- Reach 7 - LCR and Upper Estuary

Gulf of California
Arizona
Mexico
Laguna Grande Restoration Area: Green represents the reforested area during 2013 (33 acres); orange represents the cleared and leveled area during 2014 (409 acres); violet represents the additional acres that are expected to be restored in the next project phases (338 acres).
2014 Pulse Flow

- Occurred March 23rd – May 18th, 2014.
- Designed to mimic, at a reduced scale, spring floods that affected the Colorado River Delta for years. Cottonwoods and willows were producing seeds during that time, and those seeds need to land on wet ground to germinate and support restoration goals of the Pulse Flow.
Founding Members - Raise the River Coalition

Environmental Defense Fund
National Fish and Wildlife Foundation
The Nature Conservancy
Pronatura Noroeste
Redford Center
Sonoran Institute
Renewal – A Reborn Colorado River Once Again Finds Her Path to the Sea
http://youtu.be/TODV7FW746s
Pulse Flow (photo from movie)

“Normal” flow: agricultural runoff
Water for the Pulse Flow

• Three equal water components totaling 195 MCM
  – 130 MCM were released in the Pulse Flow (65 MCM responsibility of each country)
  – The third 65 MCM is called base flow and is designed to support restoration projects in the Delta over the next four years. NGOs are responsible for obtaining this base flow.

• U.S. contributed $21 million to Mexico for infrastructure and environmental projects in Mexico, including lining the Reforma canal in Mexico.
Hydrologic and vegetative response monitored

CILA restoration site

Tamarisk returning in experimental plot

Willows sprouted during Pulse Flow

Photos courtesy of Nate Delano
Importance of drivers and enabling mechanisms

• IBWC Commissioner interaction, which is frequent, follows diplomatic protocols when official actions are contemplated.
• Groundwork for cooperation that included NGOs was established prior to the 2010 earthquake.
• Earthquake led to new level of cooperation. Seven US states involved, too.
• Funding for NGO efforts has been a positive factor.
Another important restoration effort: U.S. Lower Colorado River Multispecies Conservation Program (MSCP)

- Involves the Lower Basin States and the U.S. Bureau of Reclamation
- Driver: Compliance with the federal Endangered Species Act (Sections 7 and 10)

- Reach 6
  - Laguna Division Restoration Area
  - Yuma East Wetlands
Selected Facts about the MSCP
(Source: Central Arizona Project)

• The 50-year Program (authorized through 2055) includes fifty-seven participating agencies, states, tribes and non-governmental organizations.
• 2015 marks the 10-year implementation anniversary.
• The total Program cost in 2003 dollars is $626 million. Program costs are split 50/50 between the federal government and non-federal program parties. The non-federal cost-share is split between Arizona 25%, California 50% and Nevada 25%.
• The Program has established goals for the creation of habitats that meet the needs of covered species.
• The MSCP uses Adaptive Management to "learn by doing."
• Web site for more information: http://www.lcrmscp.gov/
Laguna Division Restoration Area

Yuma East Wetlands

Photos taken 10 October 2014
Another asset in MX of binational importance: Cienega de Santa Clara
The frog does not drink up the pond in which he lives. – *American Indian (Lakota) Proverb*

Thank you!

*Toda Raba*

*Shukran*