Finding the Balance:
Managing water for people and nature

Poudre River Forum
Greeley, Colorado

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From the film *Ten Canoes*
Water on Mars
Photos from NASA’s Mars Reconnaissance Orbiter
“Water Holes and Rivers” painting by Farren Furber Jamptjinpa
Water depletion for agricultural irrigation
Water shortages are occurring in 1/3 of the planet’s watersheds and aquifers. 1/2 of the world’s population is affected. 3/4 of the world’s irrigated acreage is affected.
Half of Western rivers have lost half of their water
One quarter have lost more than 75%

Based on 2005 water use

Water Flow Depletion in Summer
Water shortage impacts

Impact Occurrences per Unit Area (Impacts per million km²)

<table>
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<tr>
<th></th>
<th>&lt;5%</th>
<th>5-25%</th>
<th>Dry-Year</th>
<th>Seasonal</th>
<th>&gt;75%</th>
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<td>2</td>
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Imperilment of species

Fish

<75%
Seasonal
Dry-Year
5-25%
<5%

Average % Imperilment

Dragonflies and Damselflies

<75%
Seasonal
Dry-Year
5-25%
<5%

Average % Imperilment

Water shortages
Building water importation pipelines
Map by Major John Wesley Powell, Director of US Geological Survey
Eleventh Annual Report of the US Geological Survey, 1890
Recipe for a sustainable water future

1. Set sustainable limit on water extractions
   a) based on community visioning
   b) based on reliable water availability
   c) based on ecological needs
   d) hedge against climate change

2. Reduce consumption to sustainable level

3. Quantify rights to use available water

4. Enable trade among water rights holders
   a) Water purchases by those that need/value it most
   b) Water purchases to restore freshwater ecosystems
   c) Incentivizes water-saving
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Big Solution #1: Create water

(each gallon we don’t consume is a gallon available for other users or nature)
Water sustainability in cities
Outdoor landscaping

Los Angeles, California

Sydney, Australia
Water sustainability on farms
“Opportunities for Saving and Reallocating Agricultural Water to Alleviate Water Scarcity” (Water Policy, Richter et al, 2017)
Improvements in water application
34-57% savings in consumptive use

Flood irrigation

Drip irrigation
Cotton

Vegetables

Saving water by crop shifting
54-87% savings in consumptive use
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Big Solution #2: Sharing water
Helping farmers make the transitions

Imperial Irrigation District

Transfer of saved water = 1/3 of city’s water supply

$60M per year to farmers

San Diego

Improved water use

Imperial Irrigation District

Helping farmers make the transitions
Brian Richter

A Guide for Moving from Scarcity to Sustainability

CHASING WATER