# Managing Water for the Future

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EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

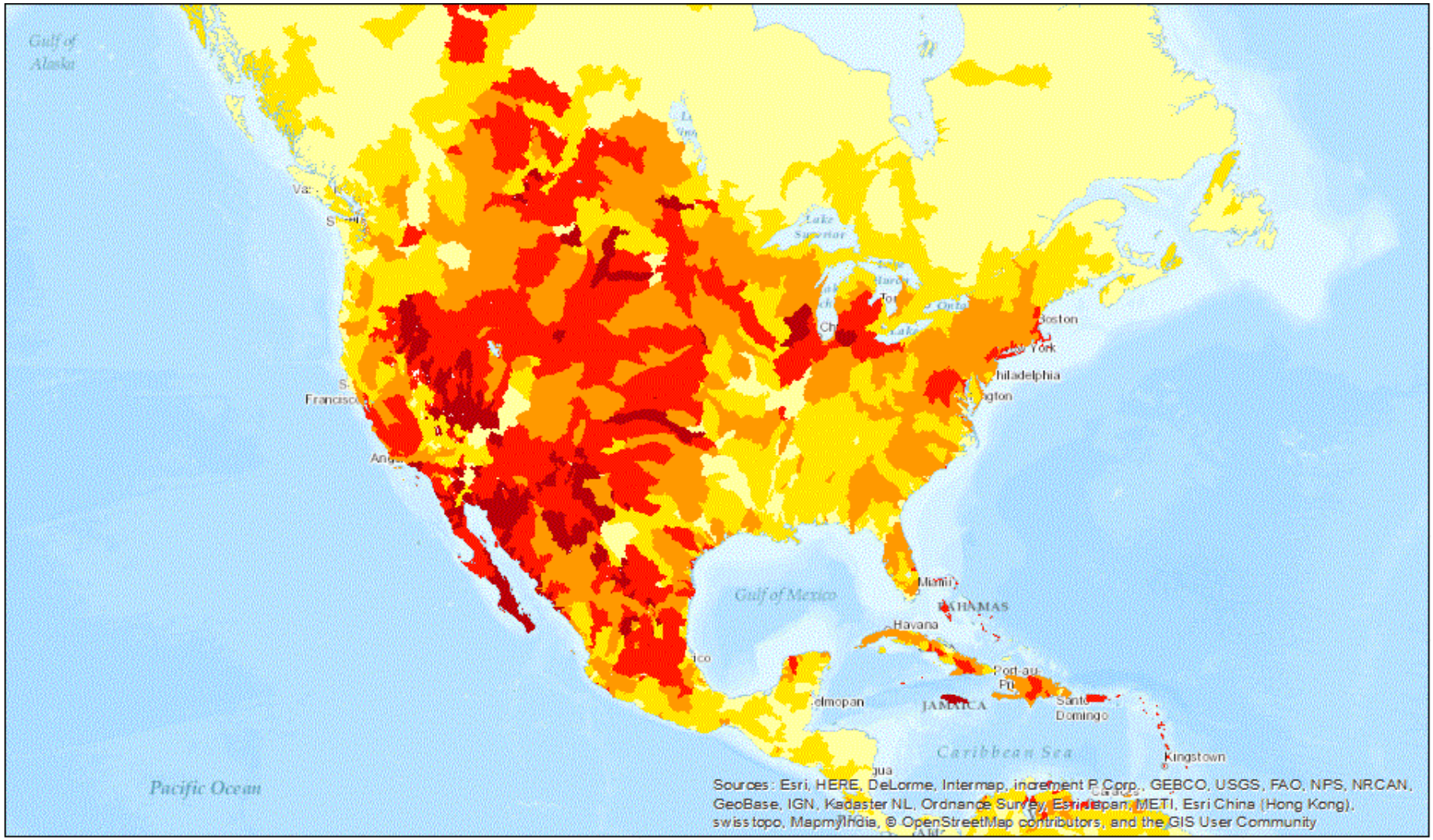
# “Finding the Ways that Work”

- Our goal is efficiency (i.e., better outcomes for society as a whole)
- Often partner with market participants to correct market failures
- We work on ecosystems (nitrogen fertilizer, habitat exchange, offsets) and now water, oceans (catch shares), regional air pollution (SO2), and global climate (GHG)

# Outline

- Growing demand for scarce water
- The upshot of a changing climate
- Market successes and failures
- Building efficiency and resiliency into our institutions

# Water is already a scarce resource




**Physical Risk Quantity**

**Legend:**

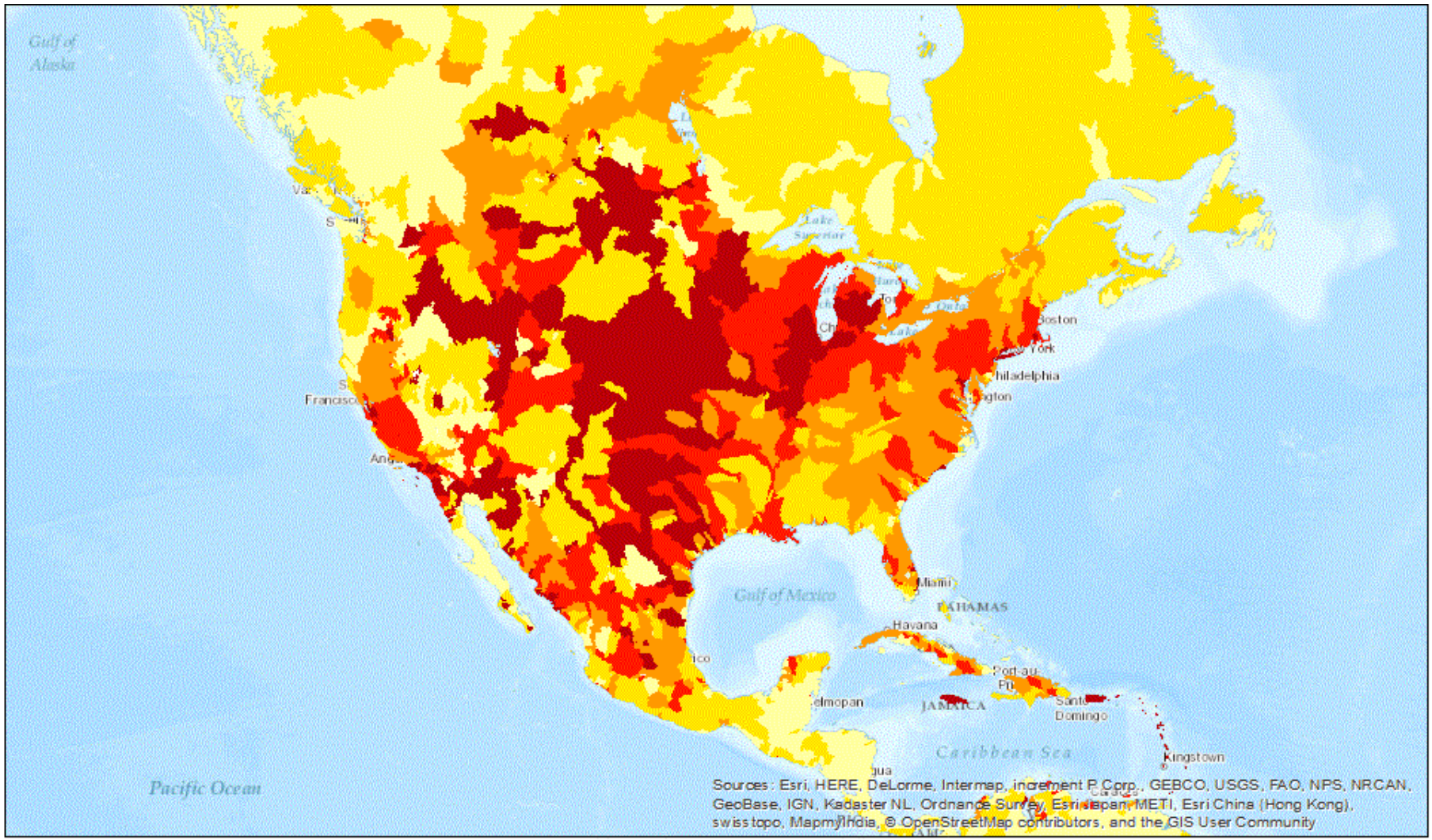
Low — High

AQUEDUCT

0 360 720 1,080 miles

0 690 1,380 2,070 km

# Water quality is an issue (too)




**Physical Risk Quality**
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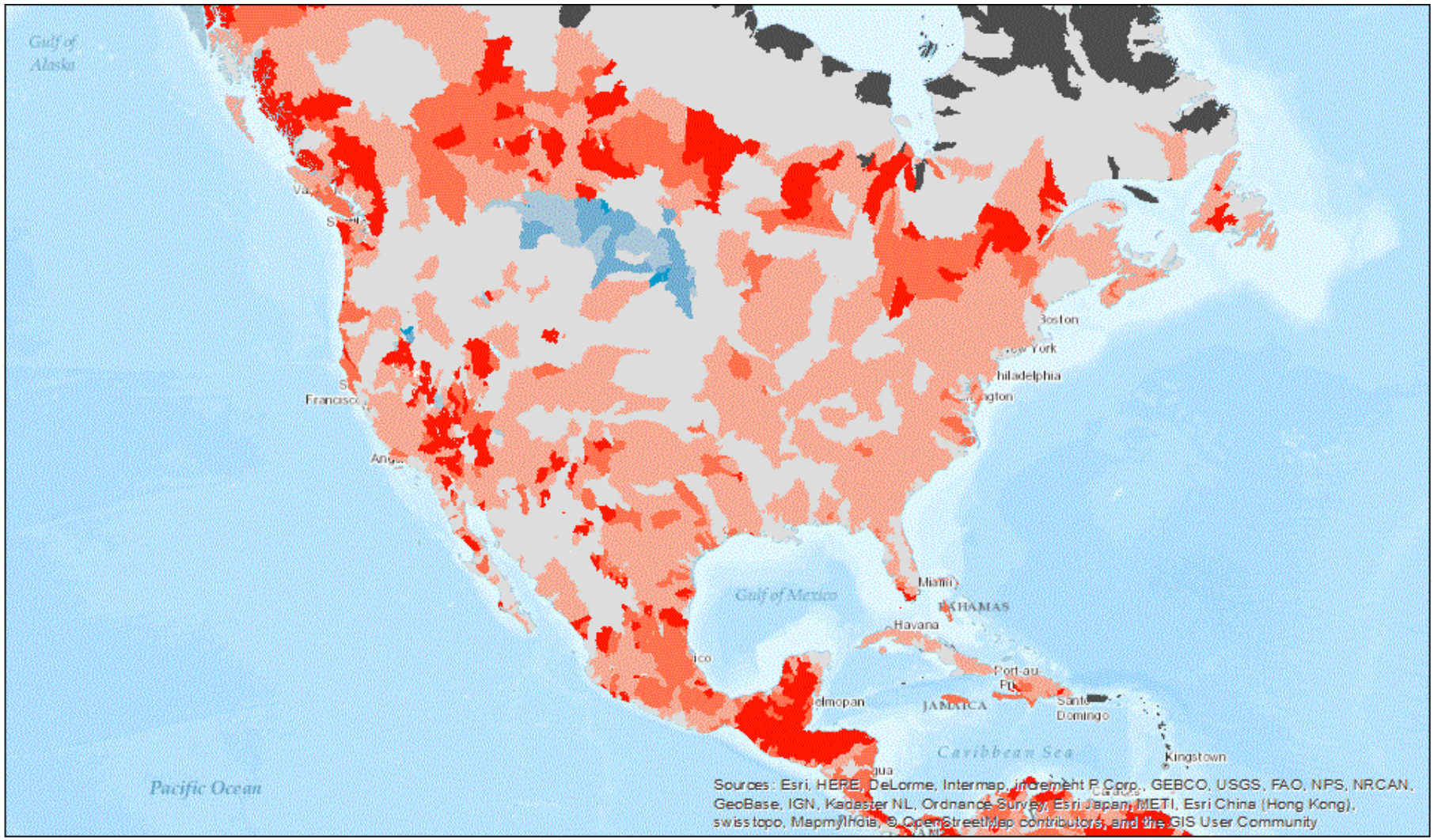
# Demand is growing and changing




**Projected change in water demand (Change from baseline to 2030 business as usual )**

**Legend:**

**ut3028cl**

- 1.7x or greater decrease
- 1.2x decrease
- Near normal
- 1.4x increase
- 1.7x or greater increase

0 360 720 1,080 miles

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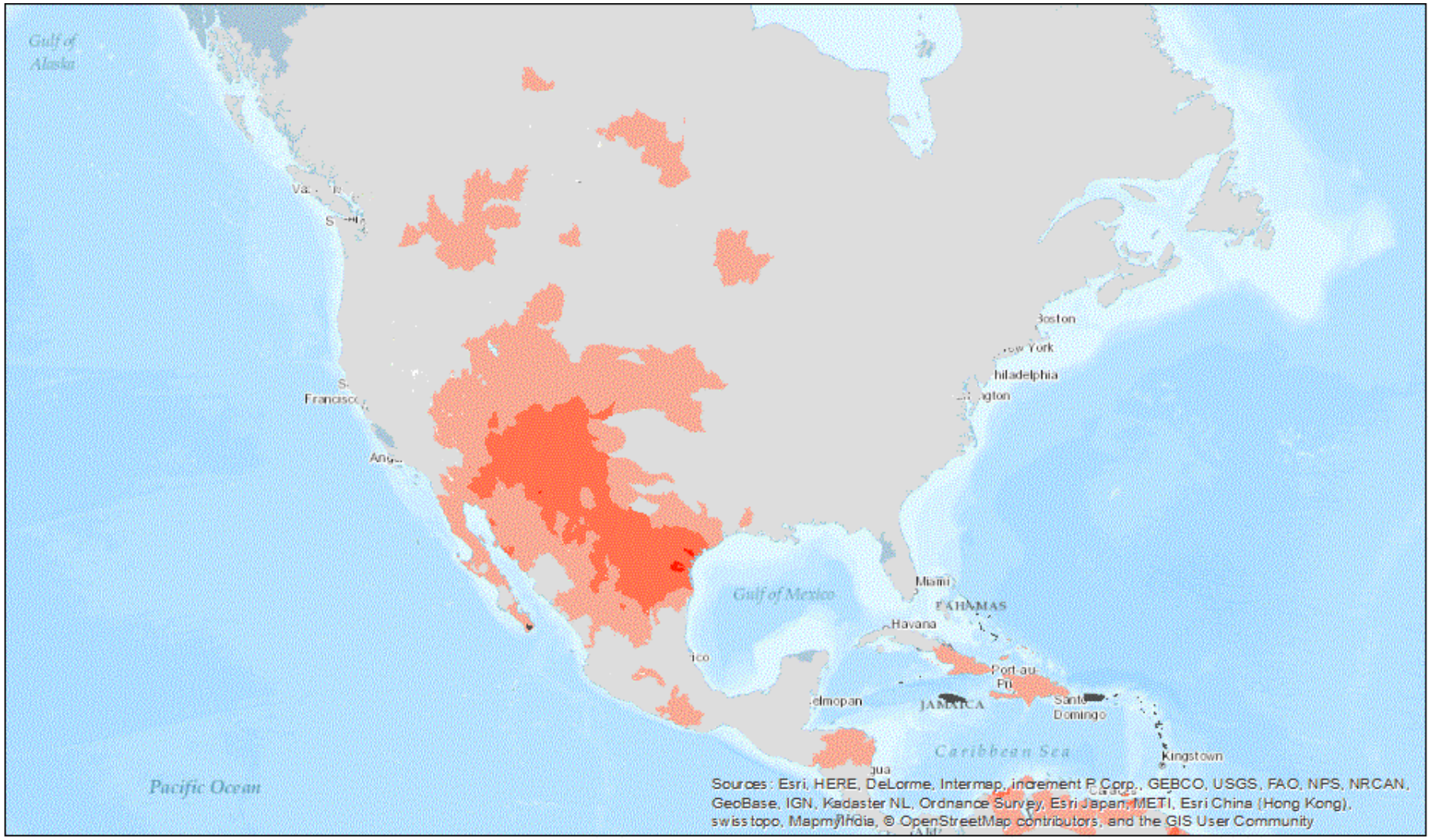
# Precipitation patterns are changing




**Projected change in water supply (Change from baseline to 2030 business as usual )**

**Legend:**

bt3028cl

- 1.7x or greater
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- Near normal
- 1.4x increase
- 1.7x or greater

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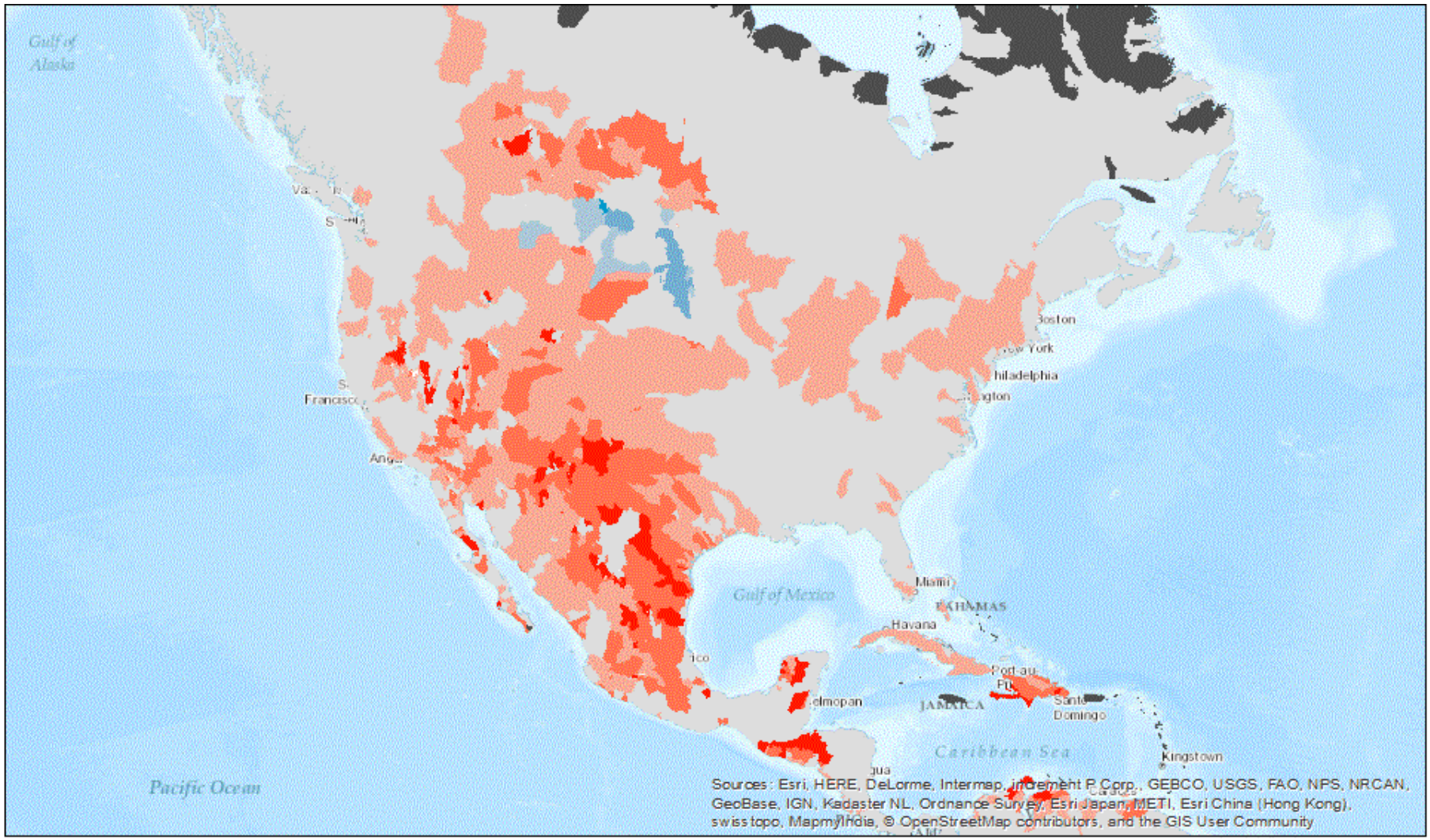
# Change stresses people, systems




**Projected change in water stress (Change from baseline to 2040 business as usual )**

**Legend:**

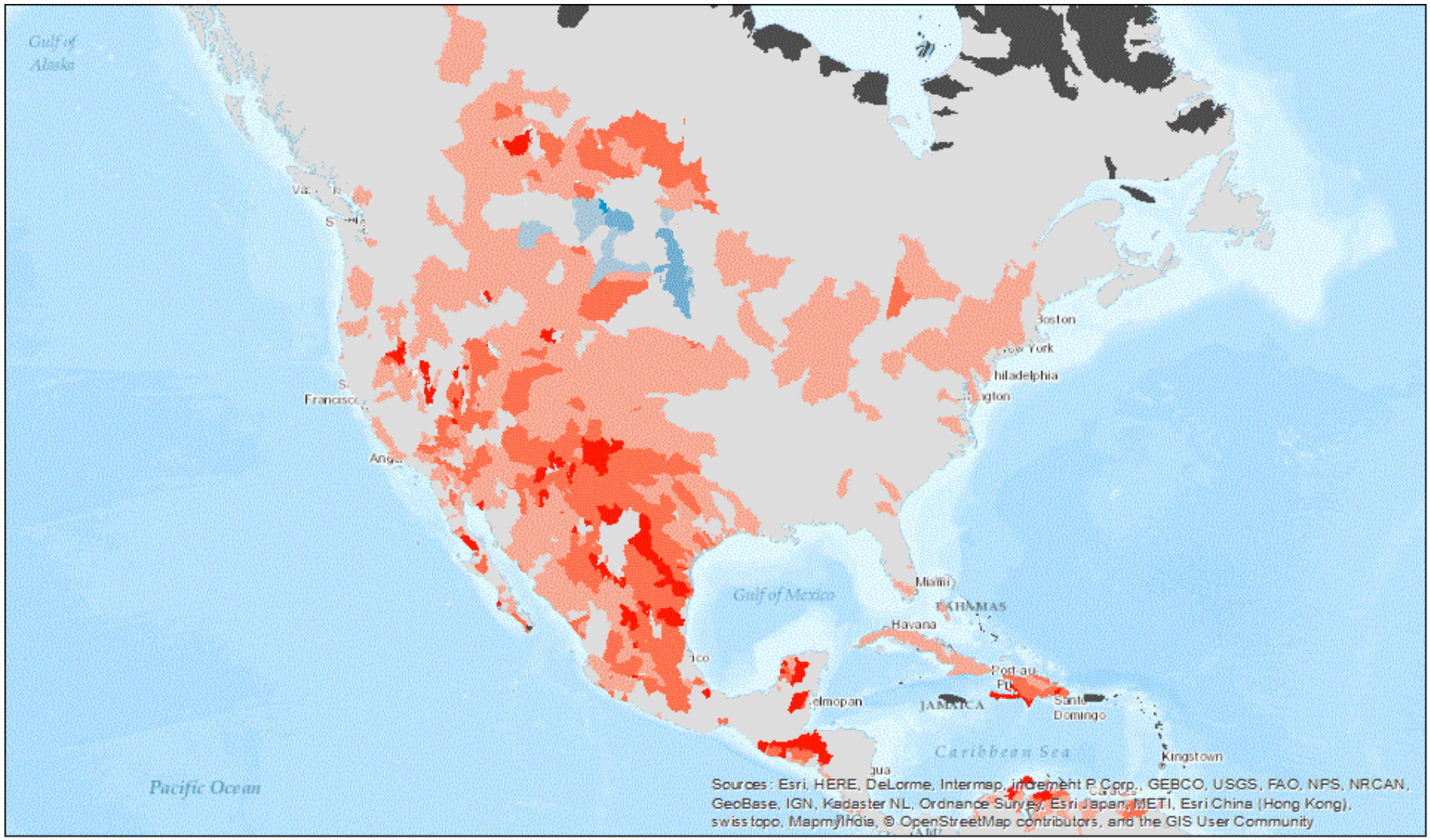
ws4028cl

- 2.8x or greater decrease
- 1.4x decrease
- Near normal
- 2x increase
- 2.8x or greater

0 360 720 1,080 miles

0 690 1,380 2,070 km

# The upshot of a changing climate

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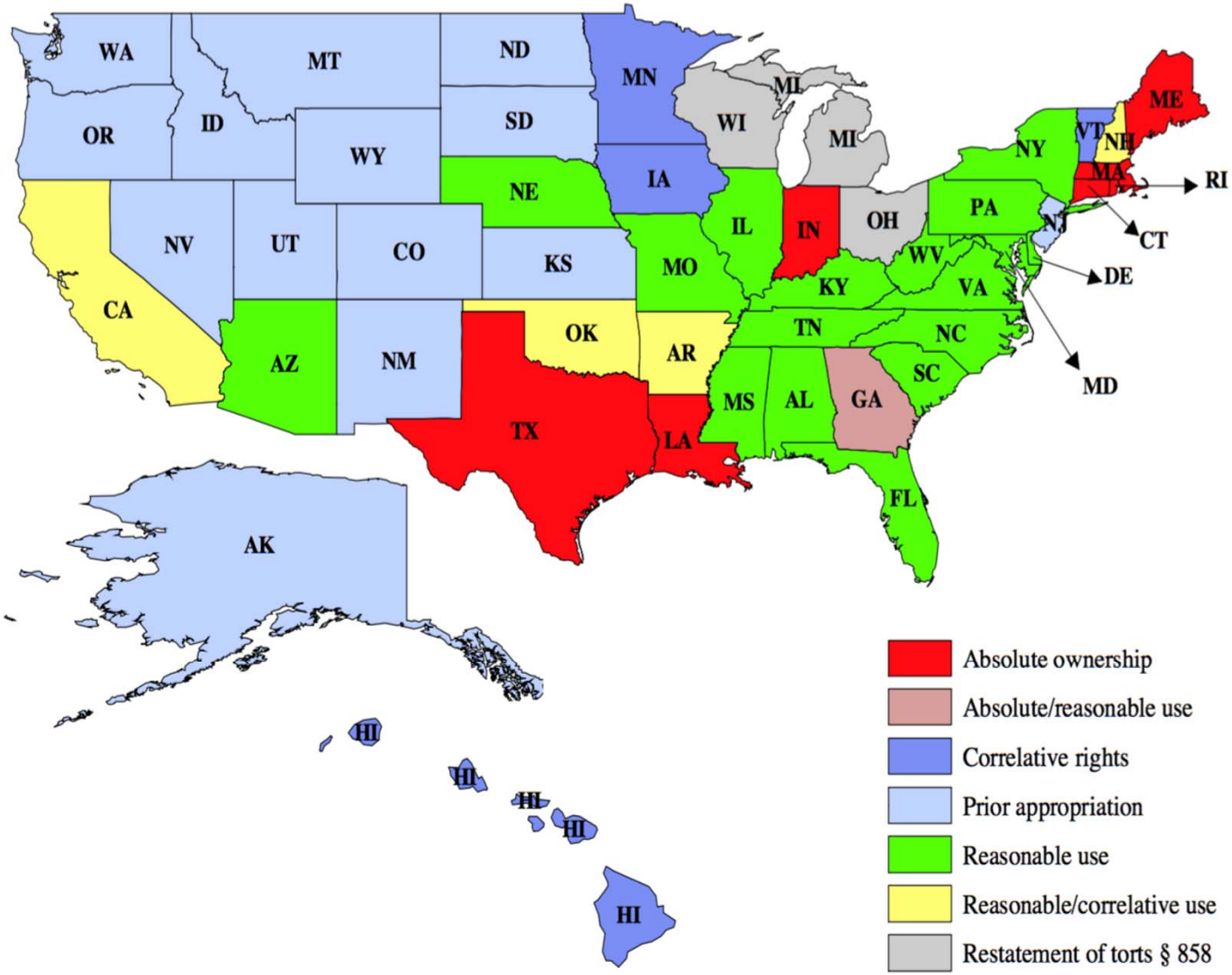
# Market successes and failures



# How economists think – the centrality of self-interest

**Adam Smith:** *It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest. We address ourselves not to their humanity but* ***their self-love****, and never talk to them of our necessities but of* ***their advantages*** (Wealth of Nations, 1776)

# The centrality of prices and property rights in well-functioning markets

Prices:

- Reflect scarcity – send signals to potential market participants about the value of goods
- Clear the market – there is always supply available at the market price
- Support innovation – high prices encourage and reward new technologies that reduce waste and lower costs

Property rights:

- Establish ownership – rights to control the asset are guaranteed by the rule of law

# What do I mean by market failure?

- It's when a market creates a bad outcome from a societal perspective
- *External Costs* often plan a role – key values are not reflected in markets, e.g. the life supporting services of wetlands
- Groundwater: open-access and external costs
- Surface-water: Transactions costs, incomplete property rights, and missing markets

# The costs of inefficient markets, incorrect prices, and market failures

Costs include:

- Inefficient use of resources (e.g., water)
- Reduced economic activity
- Reduced innovation and new enterprise
- Environmental losses

# California – improving governance to make markets more efficient

- EDF is working with the Association of California Water Agencies to reform rules governing trade
- Provide the correct incentive to use or conserve water, and invest in efficient irrigation technology
- Include externalities of trading water
  - Third-party impacts
  - Environmental externalities
- Equitable distribution of value

# California – using property rights to correct groundwater externalities

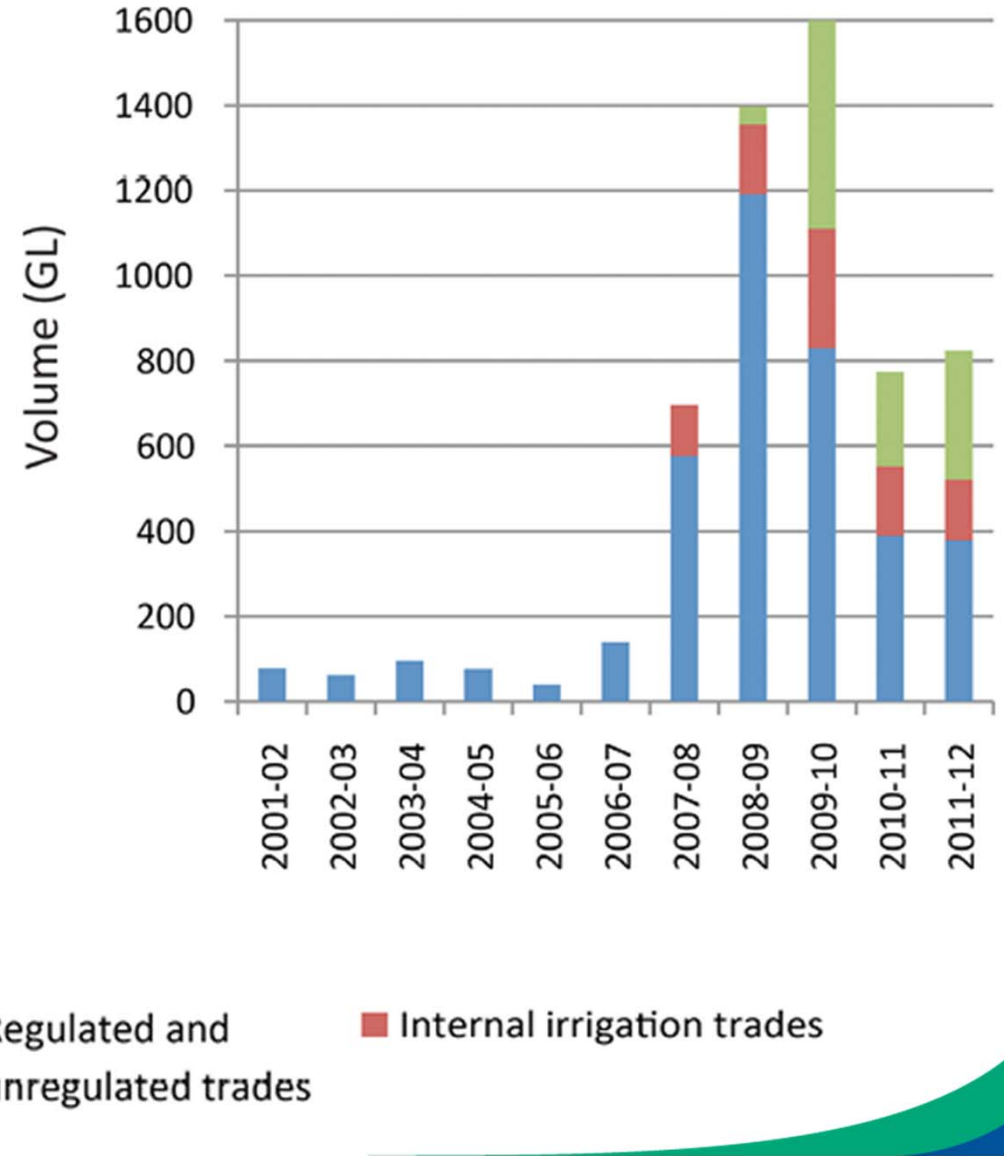

- Sustainable Groundwater Management Act (2014)
- Critically over-drafted basins must develop Groundwater Sustainability Plans by 2020
- EDF is working with pilot basins to develop models for managing groundwater through tradable property-rights systems

# Australia – reforming surface water

- The Murray and Darling rivers were chronically over-drafted
- Government reforms (1980's-2000's):
  - Set aggregate cap
  - Unbundle property rights
  - Introduce trading platform
- Outcomes:
  - Value of water grew
  - Sellers made whole
  - Ag more productive
  - Technology deployed

# Australia – environmental stewardship

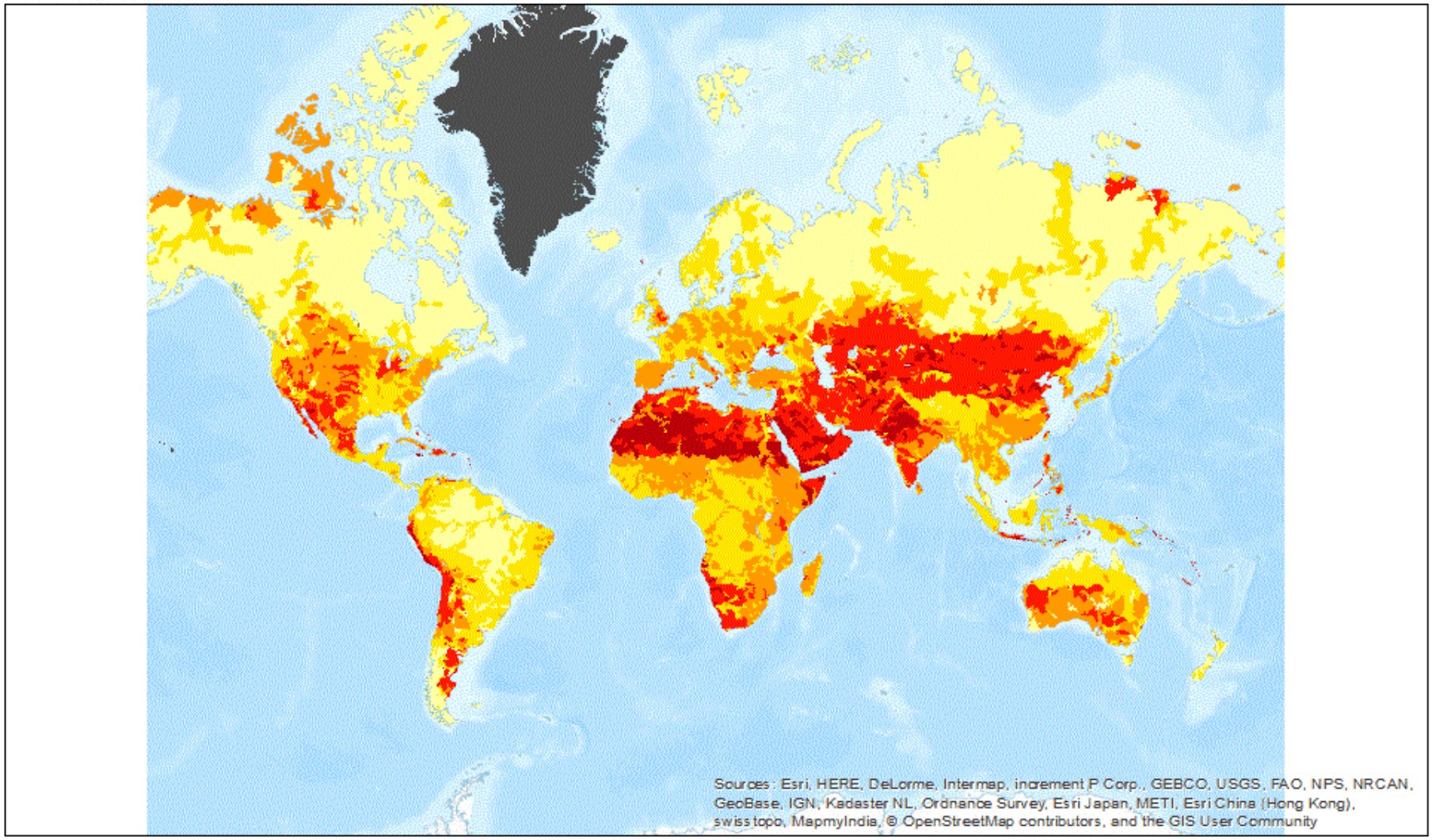
- Steward purchases water allocations for environmental flows
- Manages allocations to sustain healthy rivers, economic prosperity
- Invests revenues from selling allocation in efficiency projects
- Uses conserved water for environmental flows



# Summing up…

- Demand for water is growing and changing
- Our access to water, the quality of water we have access, and the ability of the current system to manage that water is degrading
- To avoid the most severe impacts of climate change we must adapt our practices and systems
- By correcting pre-existing market failures, we can fully harness the power of markets
- It’s the American way!

# Growing Demand for Scare Water




**Overall Water Risk**
**Legend:**

Low High

AQUEDUCT

0 1,500 3,000 4,500 miles
0 2,800 5,600 8,400 km