

What the Future Has in Store

A New Paradigm for Water Storage

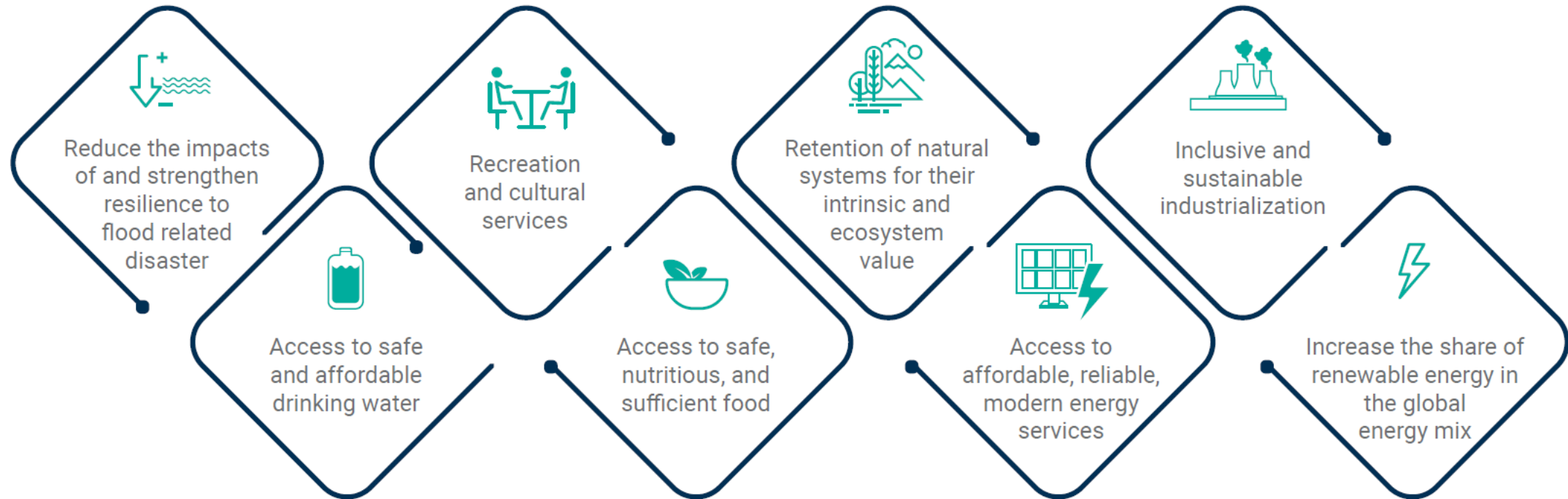
Eileen Burke
Global Lead for Water Resources

World Bank



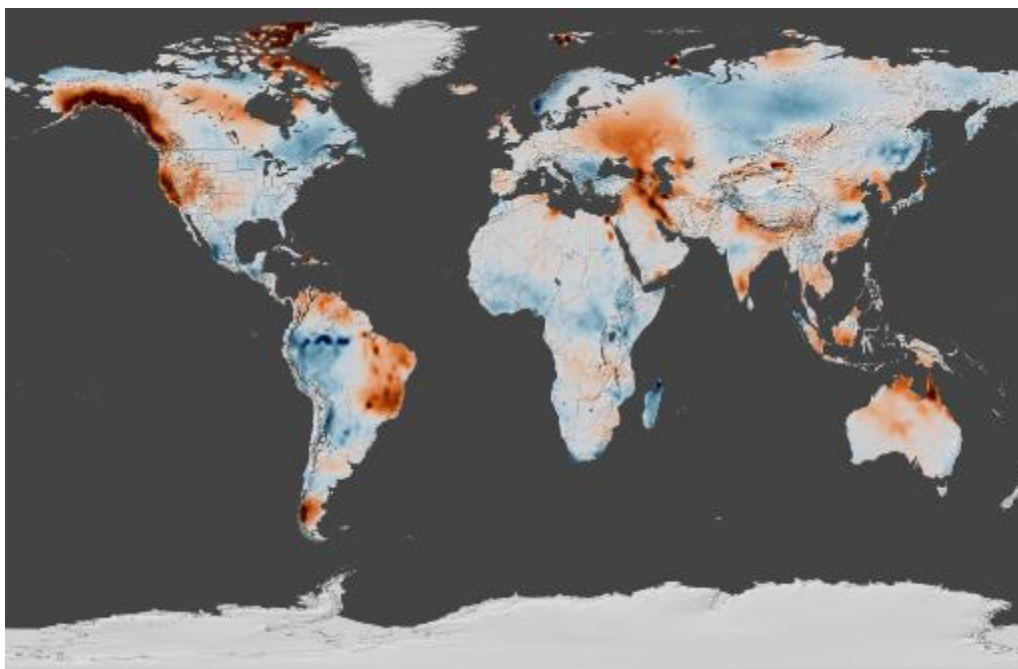
We rely on water storage to deal with water variability and to fuel development

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But water storage is decreasing globally....

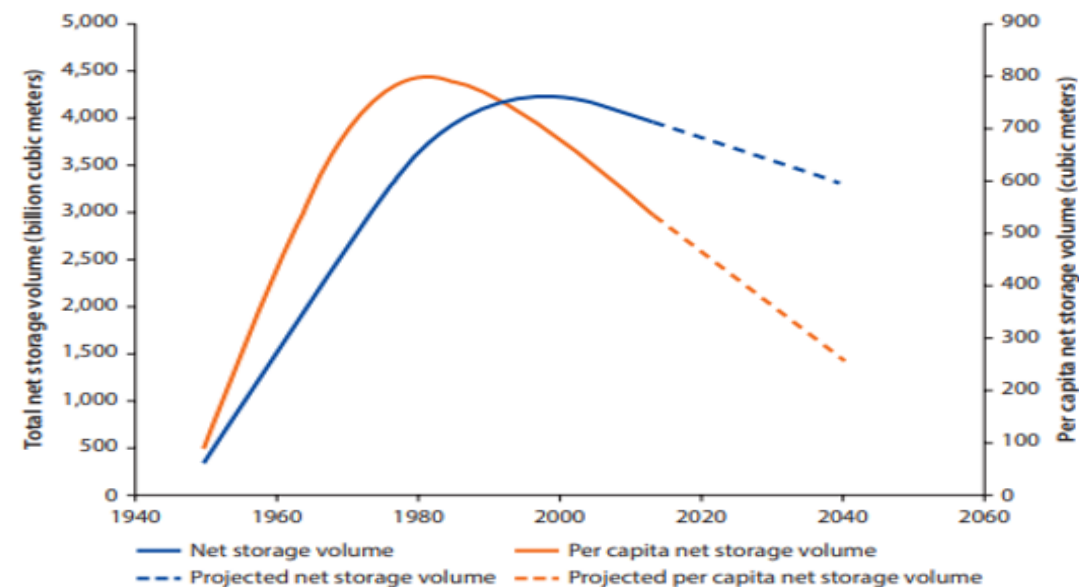
Reduction in Natural Water Storage



Source: Rodell, M et al. 2018.

Decline in Built Water Storage

Figure 3.15 Net Global Reservoir Storage Volume, Accounting for Storage Loss from Reservoir Sedimentation



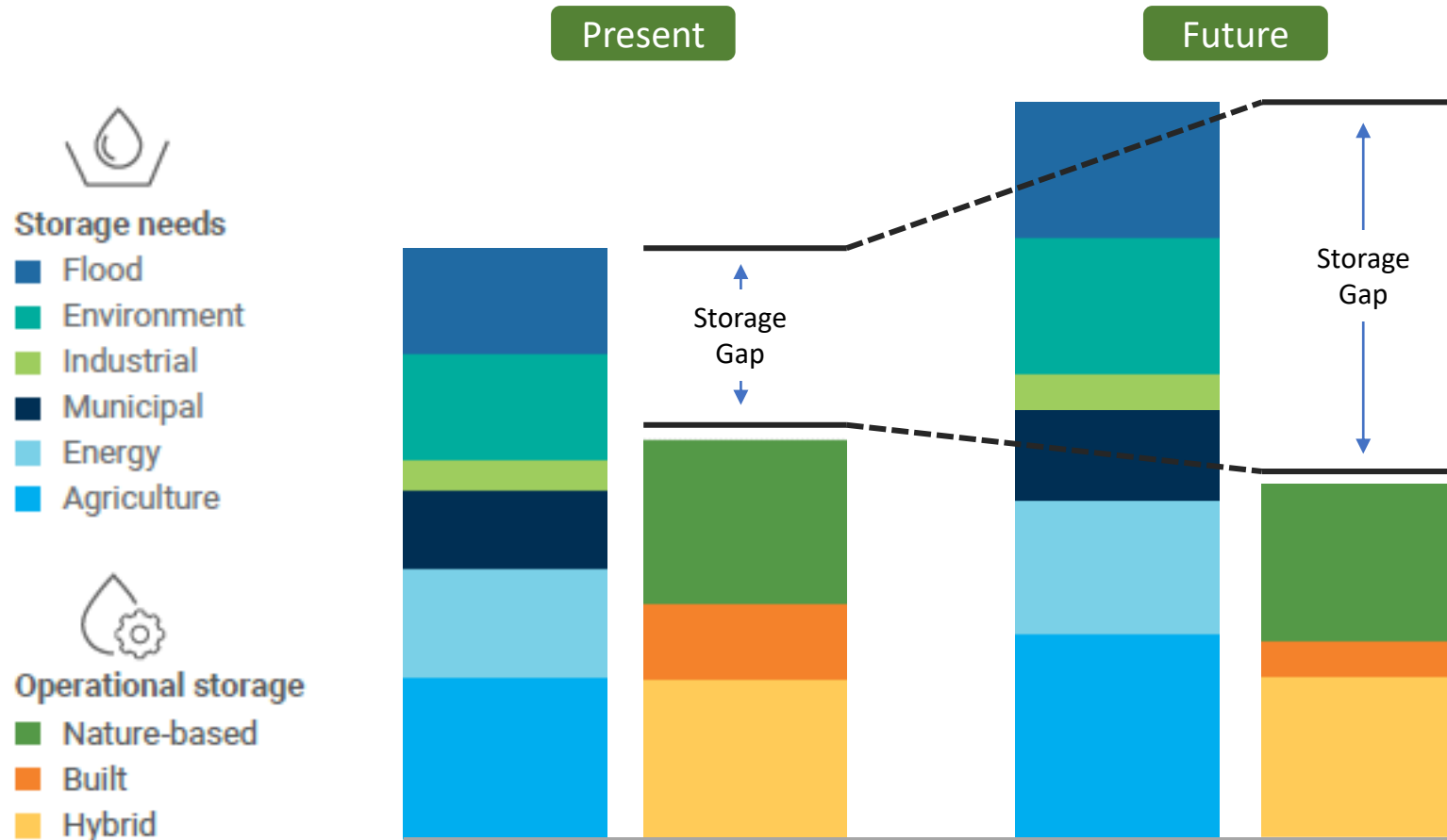
Source: Annandale 2013.

...while the demand for water storage is increasing...

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...leading to a growing global water storage gap

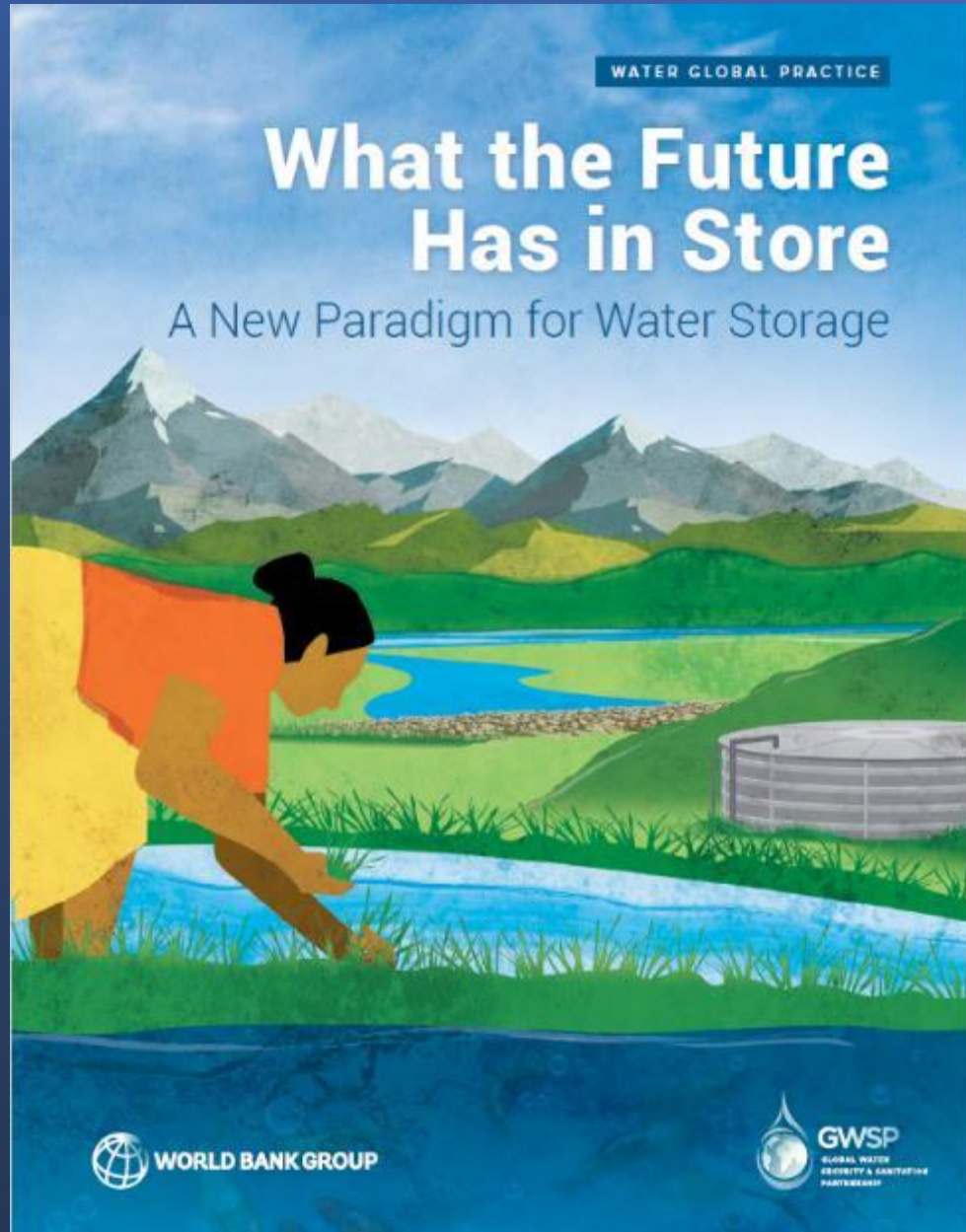


Source: Adapted from GWP and IWMI 2021.

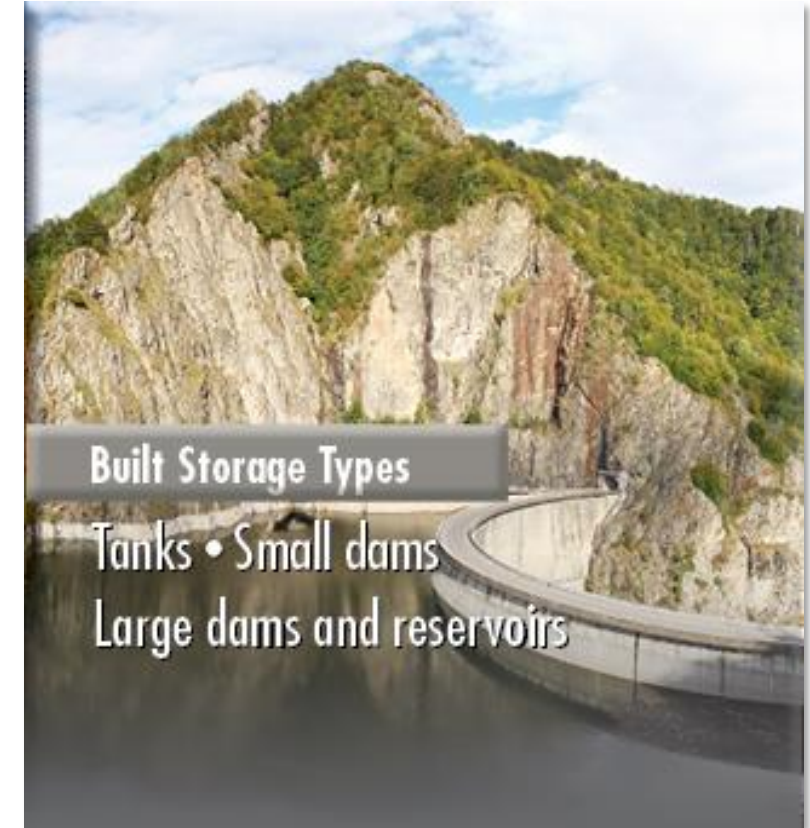
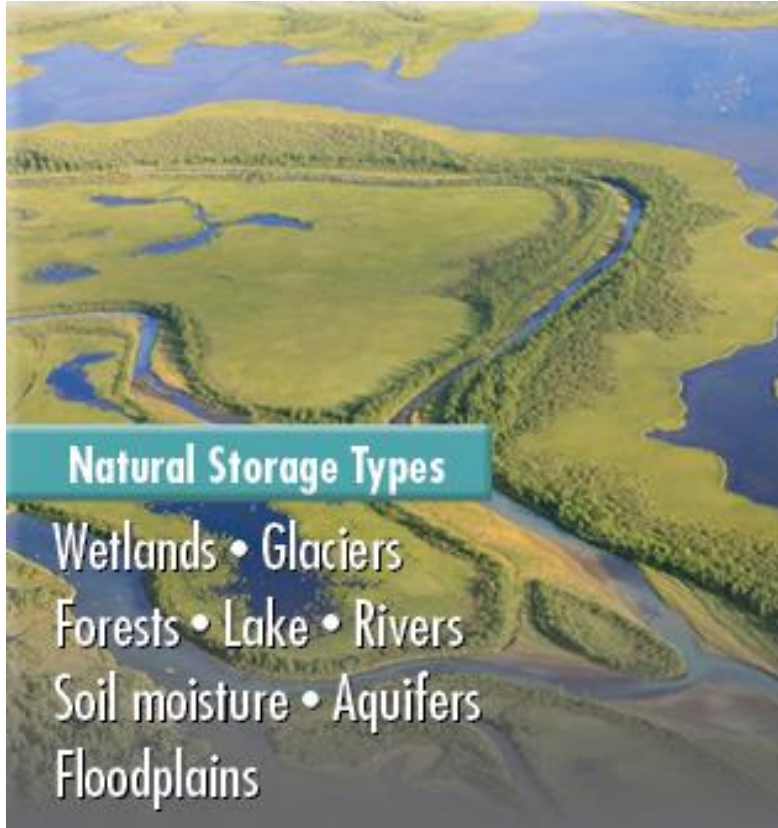
WATER GLOBAL PRACTICE

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1 - Recognize and manage all types of storage



2 - Take a systems approach



Three Core Services of Water Storage



IMPROVES
WATER
AVAILABILITY



REDUCES
FLOOD
IMPACTS

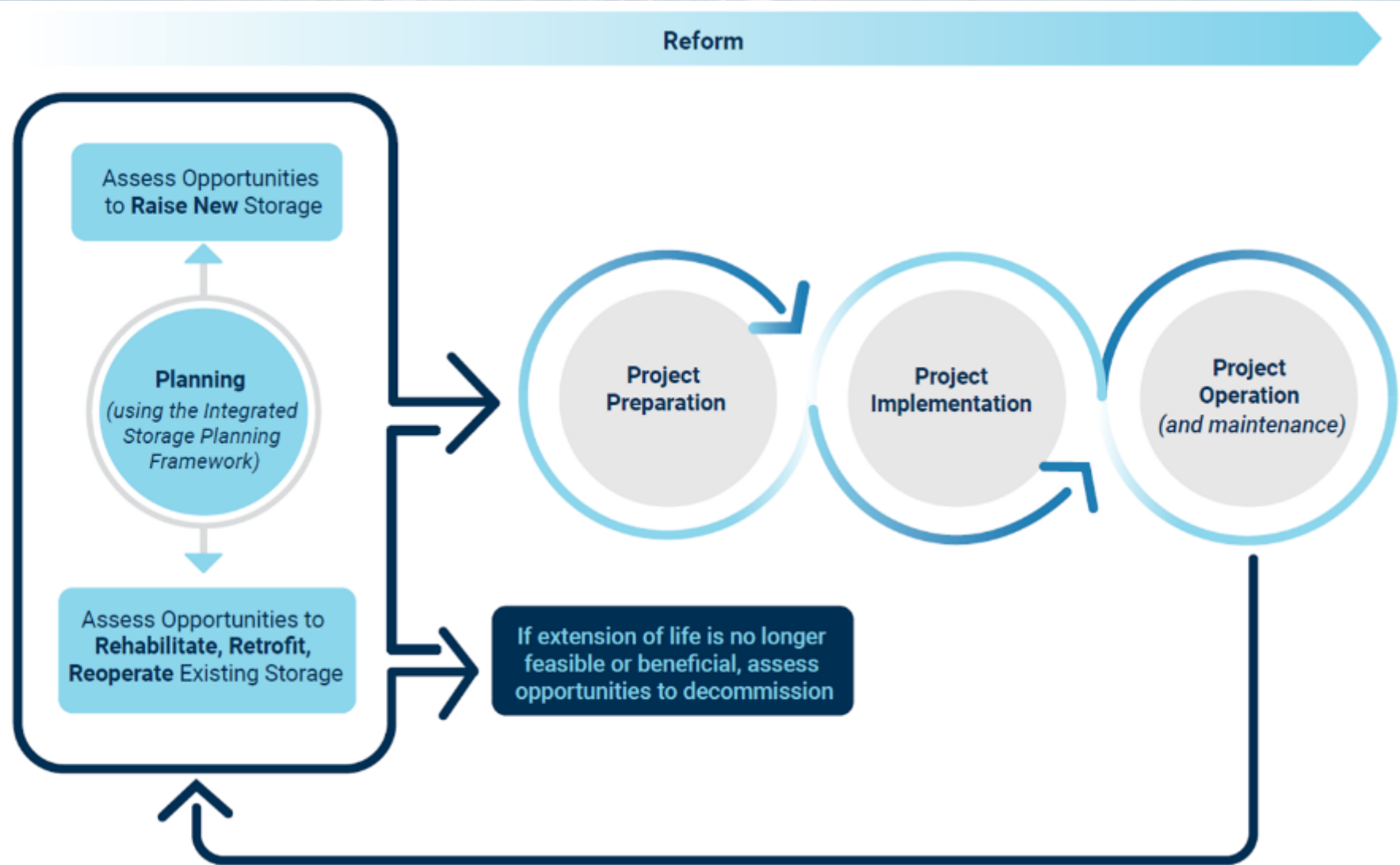


REGULATES
WATER
FLOWS



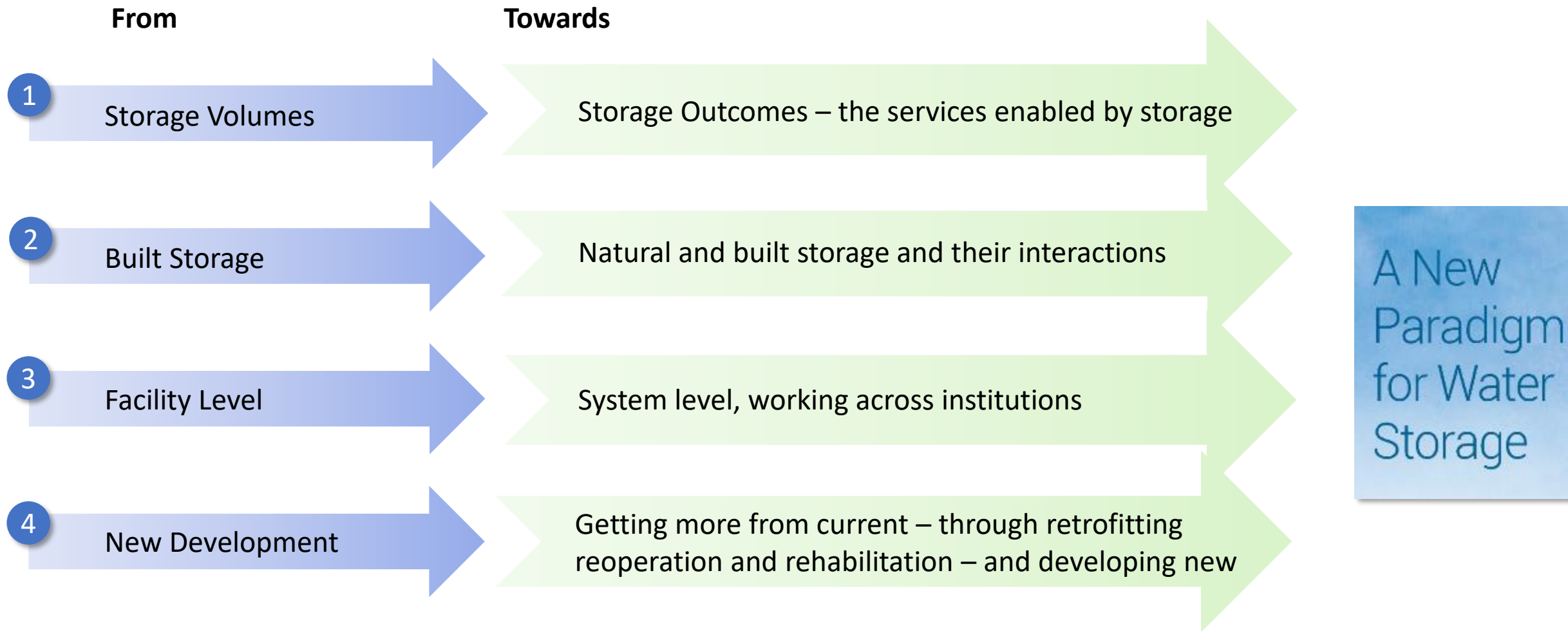
4 – Use Existing Storage More Strategically

- ✓ Reoperate
- ✓ Rehabilitate
- ✓ Retrofit
- ✓ Raise new
- ✓ Reform



A Call to Action Around a New Paradigm for Water Storage

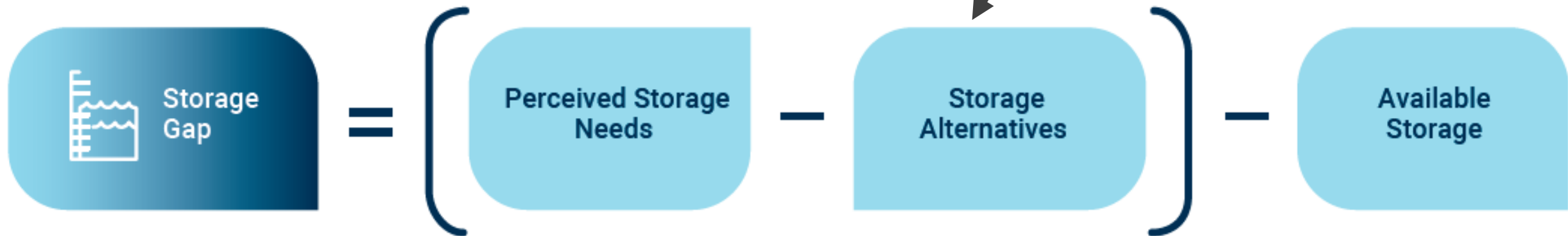
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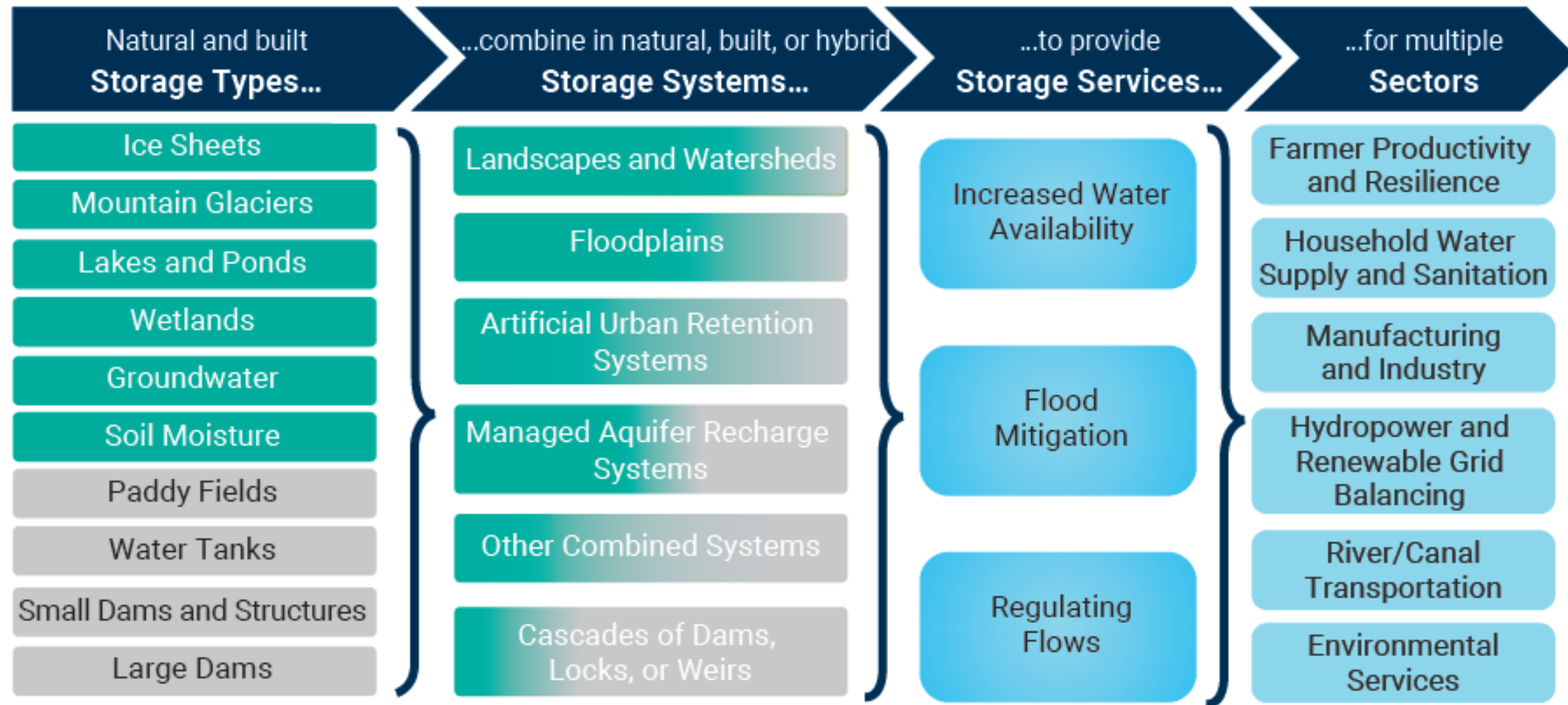
The gap is not only about storage – it is also about the alternatives to storage.....

The gap is not only about storage – it is also about the alternatives to storage, including demand management, alternate supply augmentation (re-use, desal, inter-basin transfers, etc.)

Integrated storage management is IWRM applied to storage

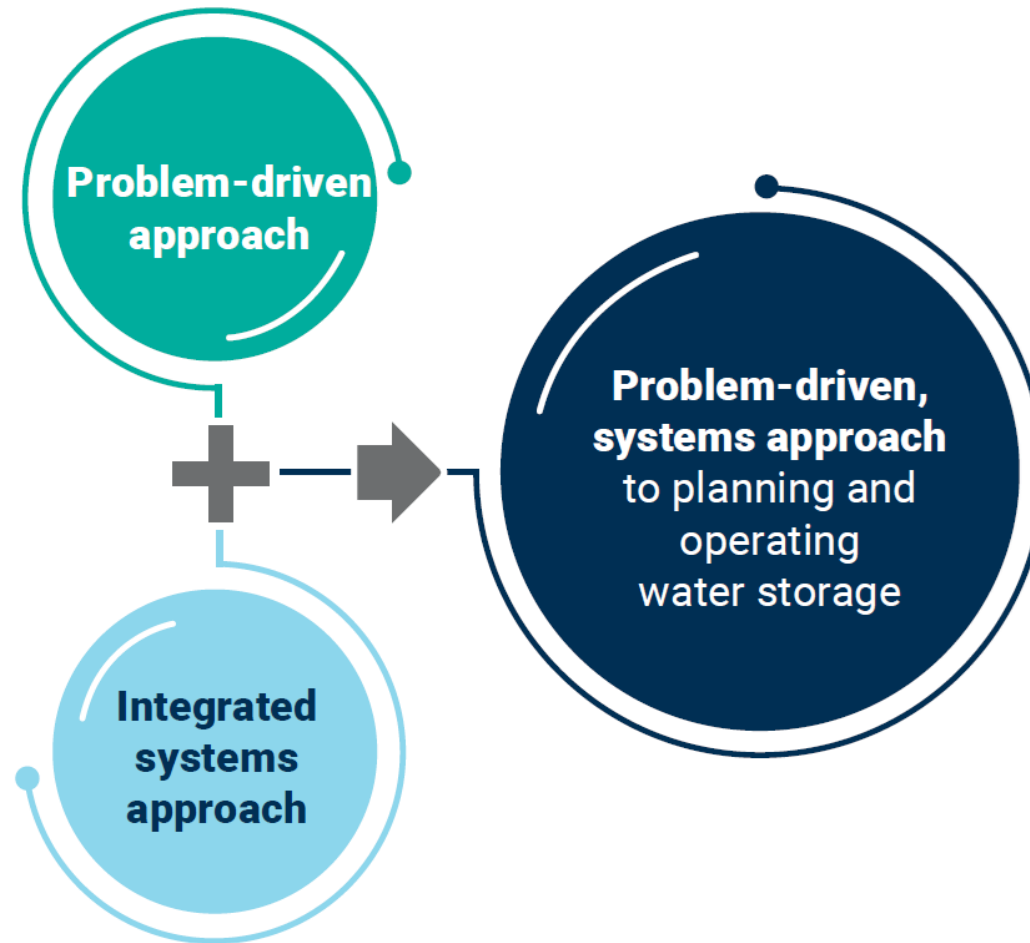


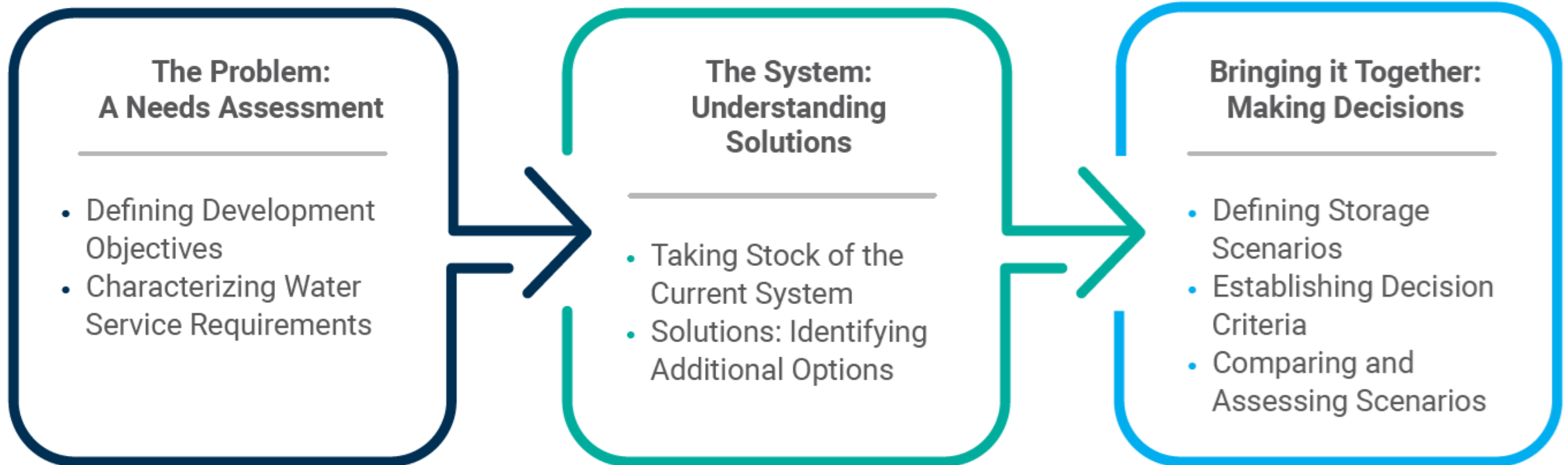
Different types of storage combine in systems to provide vital services for multiple sectors



The Integrated Storage Framework

A PROBLEM-DRIVEN, SYSTEMS APPROACH





Green and grey storage

Case studies:
California, USA
Monterrey, Mexico

Conjunctive management

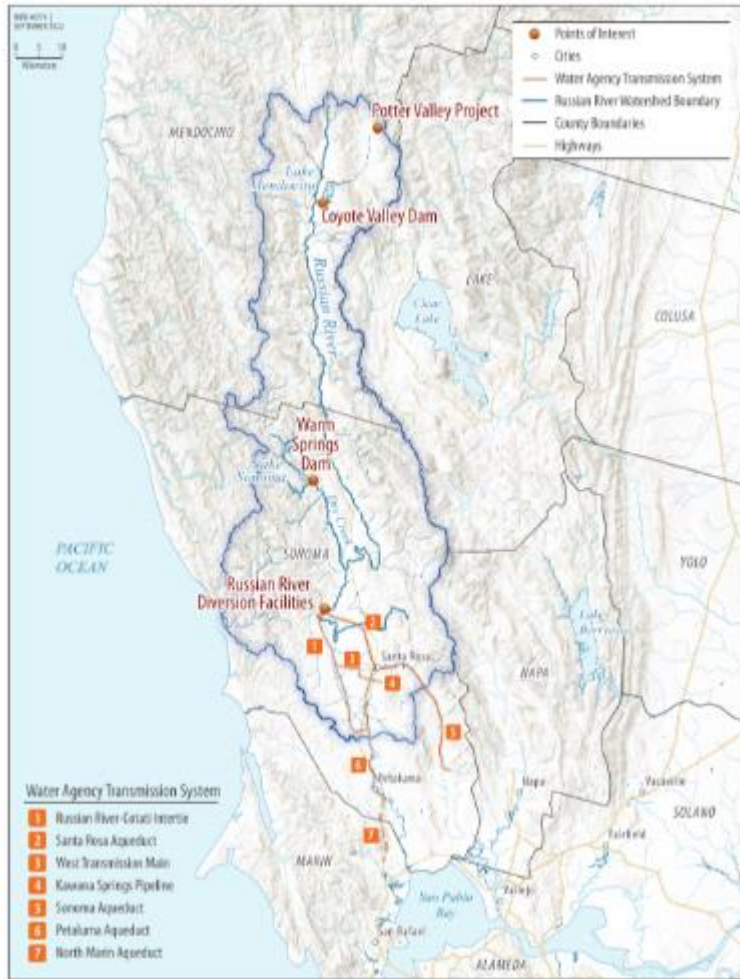
Case studies:
Cape Town, South Africa
Windhoek, Namibia

Optimization / governance / policy

Case studies:
Sri Lanka
Indonesia

CALIFORNIA FORECAST-INFORMED RESERVOIR OPERATION TO ENHANCE WATER STORAGE EFFICIENCY

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Type of water storage used

- › Large reservoirs

Water services of storage provided

- › Flood mitigation
- › Increased water availability
- › Flow regulation

Water requirements of storage met

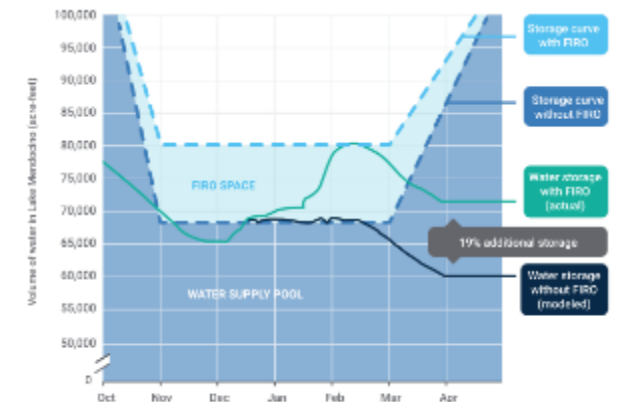
- › Prediction and attenuation of excess water for risk reduction
- › Water provision for ecosystem preservation and restoration
- › Water provision for domestic needs and industrial processes
- › Water provision to meet crop/livestock requirements in seasons/locations without precipitation

Background

Meteorological conditions are challenging – a lot of water in a short time and long dry spells – reservoirs face multiple even competing demands for water management

Approach

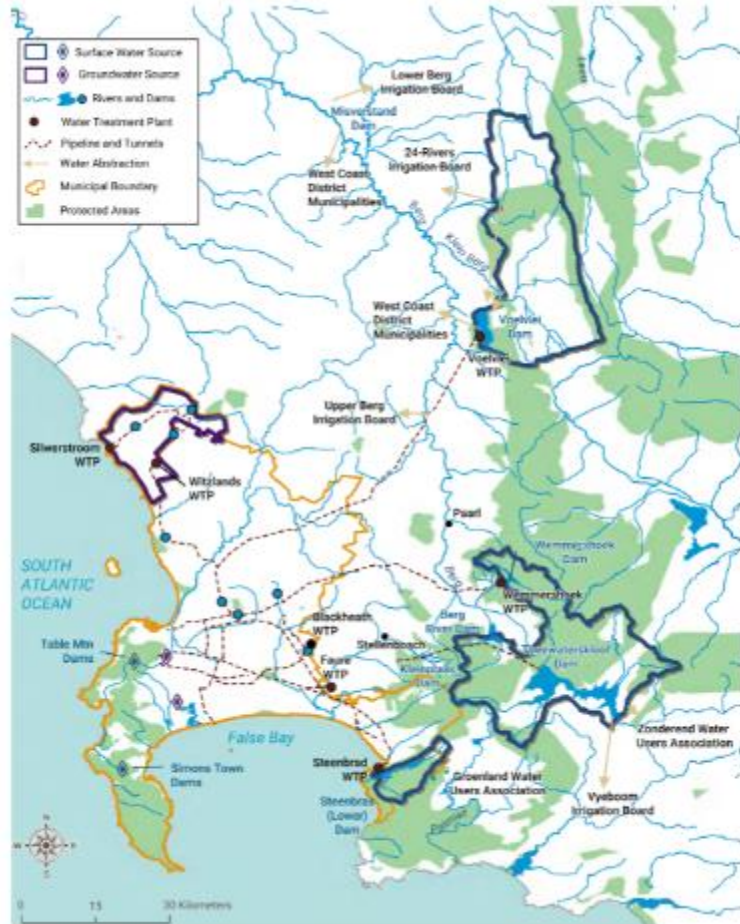
Piloting implementation of FIRO at lake Mendocino to inform decisions and operation rules/policies



Source: Sonoma Water. Note: Comparison between the actual release curve with FIRO and the modeled release curve without FIRO, showing an increase of 19 percent in the water storage.

Source: Adapted from FIRO SC 2015

CAPE TOWN RESILIENCE THROUGH DIVERSIFICATION OF WATER SOURCES AND INCREASED STORAGE



Source: Stafford et al. 2010.

Type of water storage used

- › Large reservoirs
- › Aquifers

Water services of storage provided

- › Increased water availability
- › Flow regulation

Water requirements of storage met

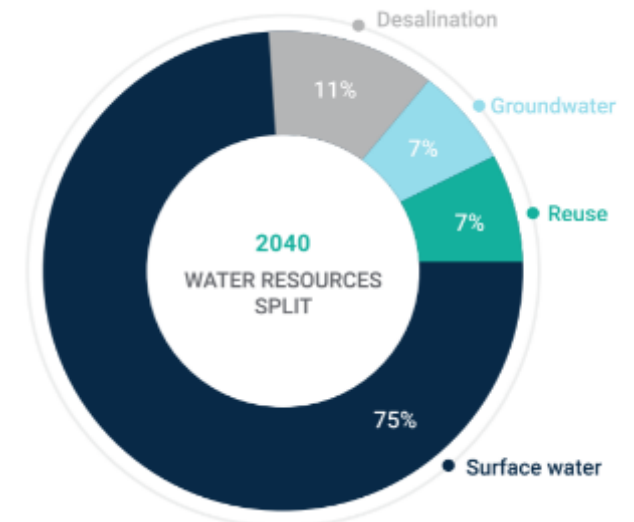
- › Water provision for domestic needs and industrial processes
- › Water provision to meet crop/livestock requirements in seasons/locations without precipitation
- › Water controlled for electricity generation

Background

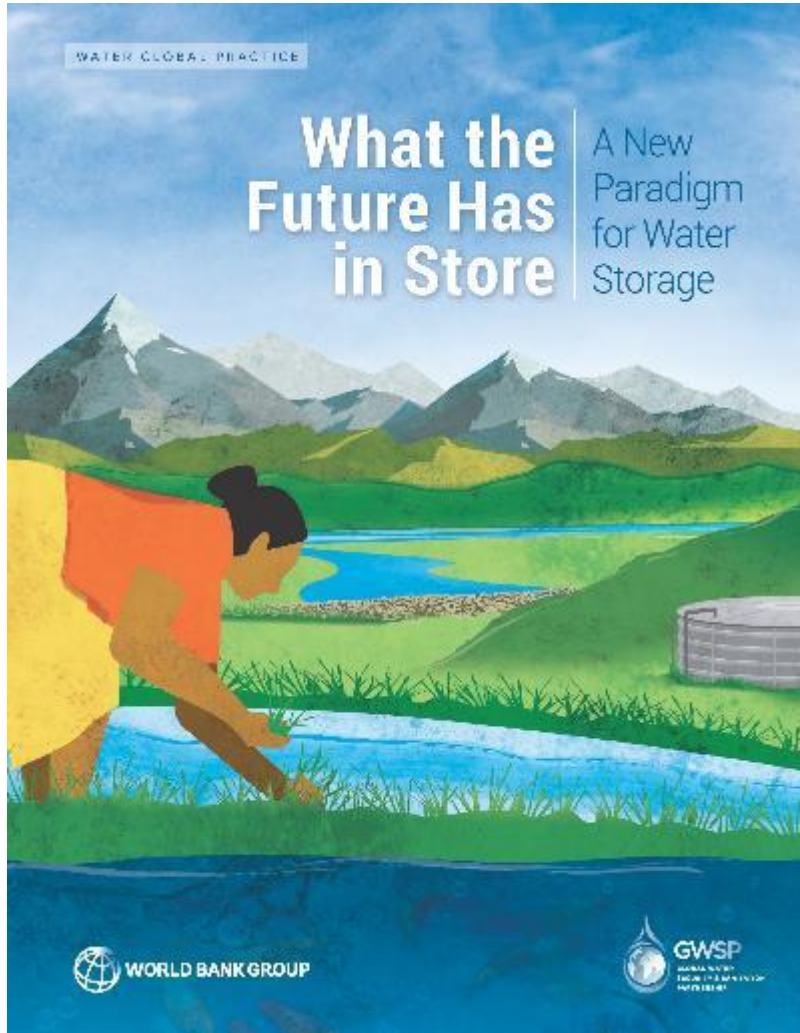
Cape Town depended on regional surface water storage for 95% of its water. The drought of 2015-2018 led to Water Strategy with the goal of water diversification.

Approach

Increasing resilience of regional water storage system – analysis of hydro-economy, planning of optimal conjunctive management of ground- and surface water, updating water allocations.



Source: City of Cape Town, 2019



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