The Power of Rivers

The Nature Conservancy

Strategic Basin Planning

The Nature Conservancy

WHO IS THE NATURE CONSERVANCY?

GLOBAL REACH

THE LARGEST CONSERVATION NON-PROFIT IN THE WORLD

PLACE-BASED EXPERIENCE

AT WORK IN THE US AND IN MORE THAN 72 COUNTRIES

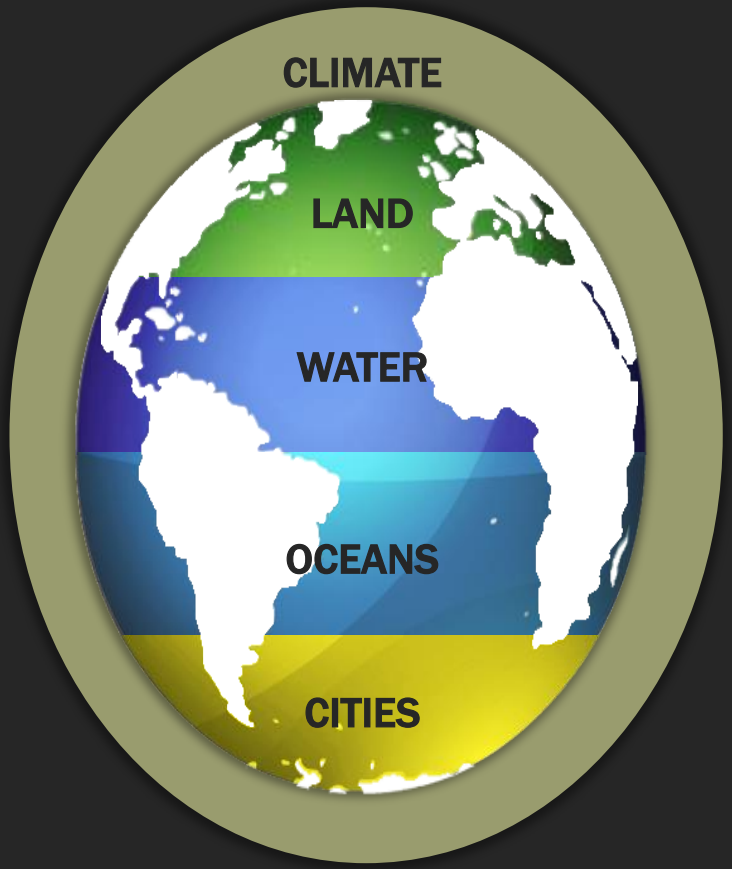
SCIENCE-BASED KNOW-HOW

HOME TO 600 SCIENTISTS

NETWORK OF RELATIONSHIPS

POWERED BY OUR PARTNERS, 1,350 TRUSTEES AND 1 MILLION MEMBERS

WHAT WE DO



Conserve Nature **and the value** it provides to people while meeting the **rapidly growing demand** for **food, water** and **energy**

HOW WE WORK

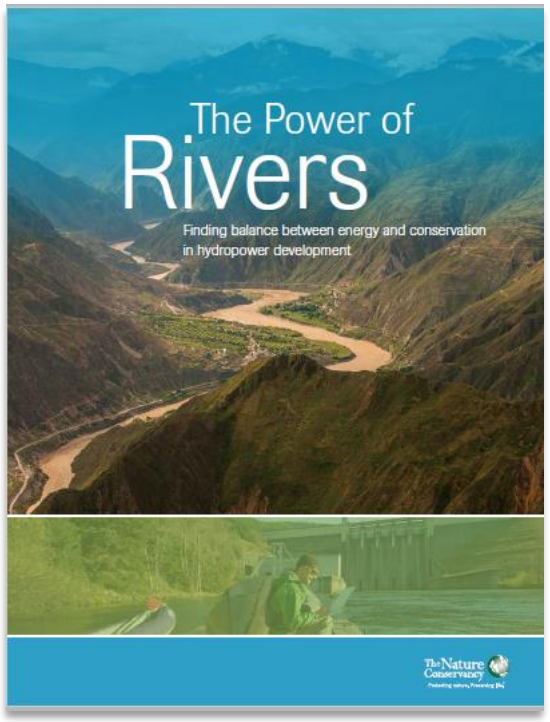
SCALING PROVEN SOLUTIONS

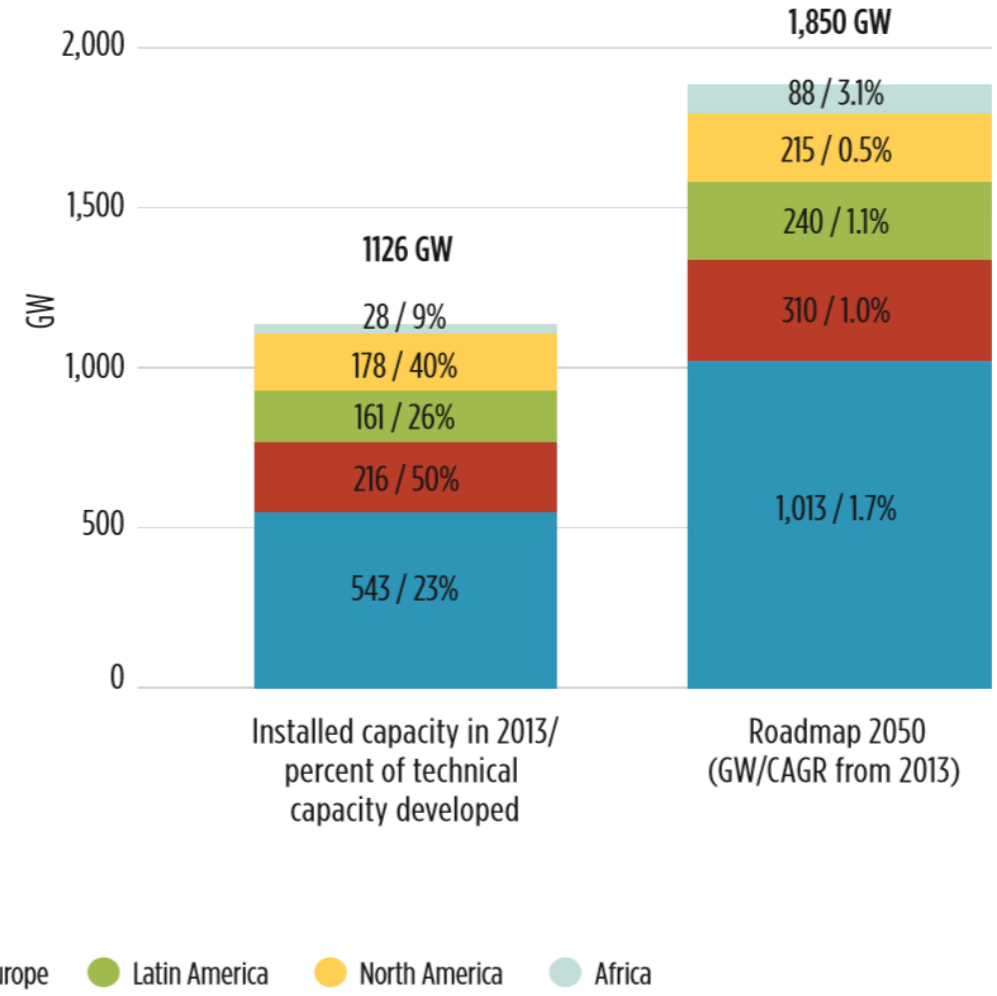
PROTECT Lands and Waters at an Unprecedented Scale

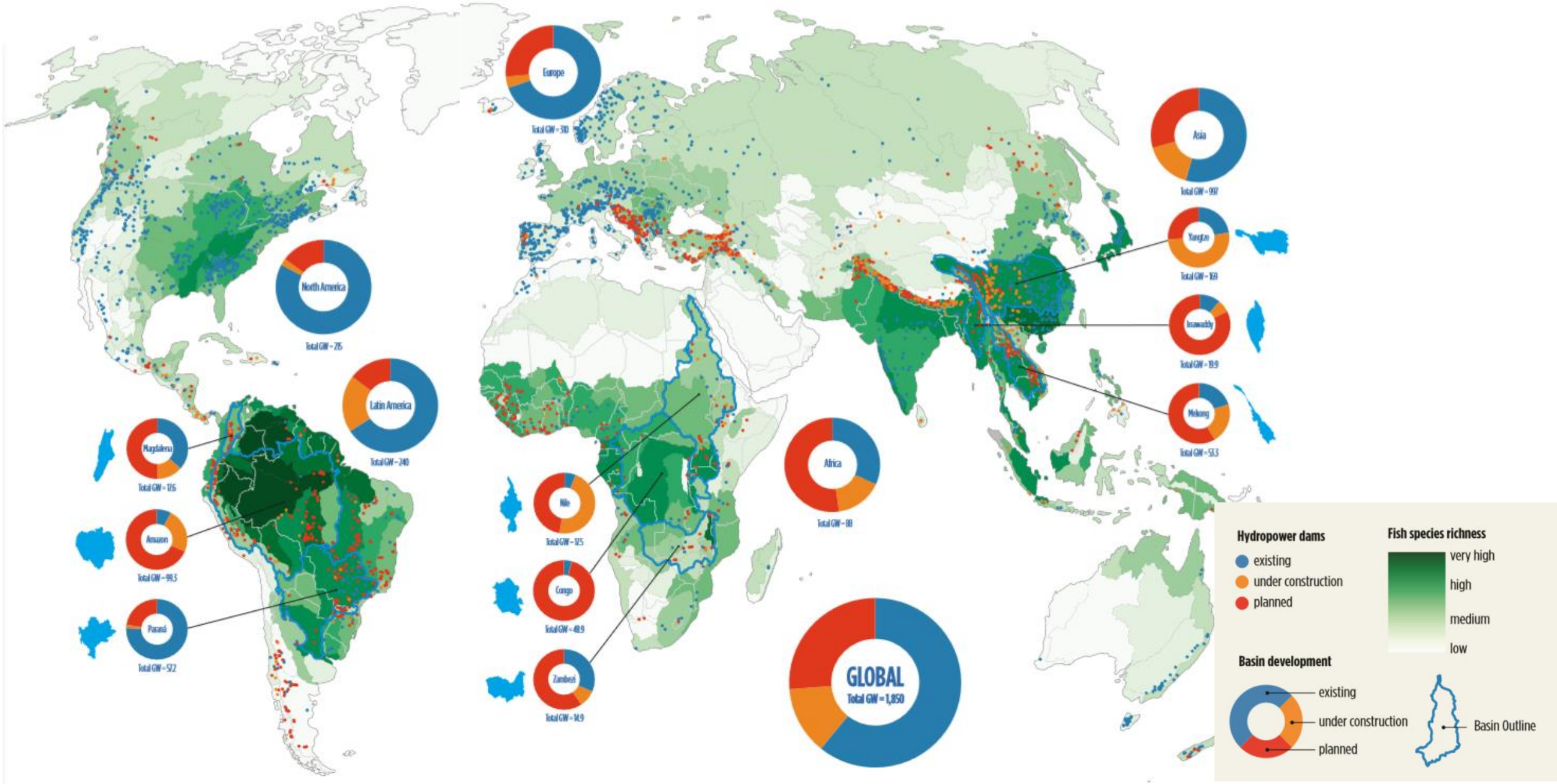
TRANSFORM Policy and Practice Guiding Development

INSPIRE Global Action

Global installed capacity (GW) projected to approximately double by 2050



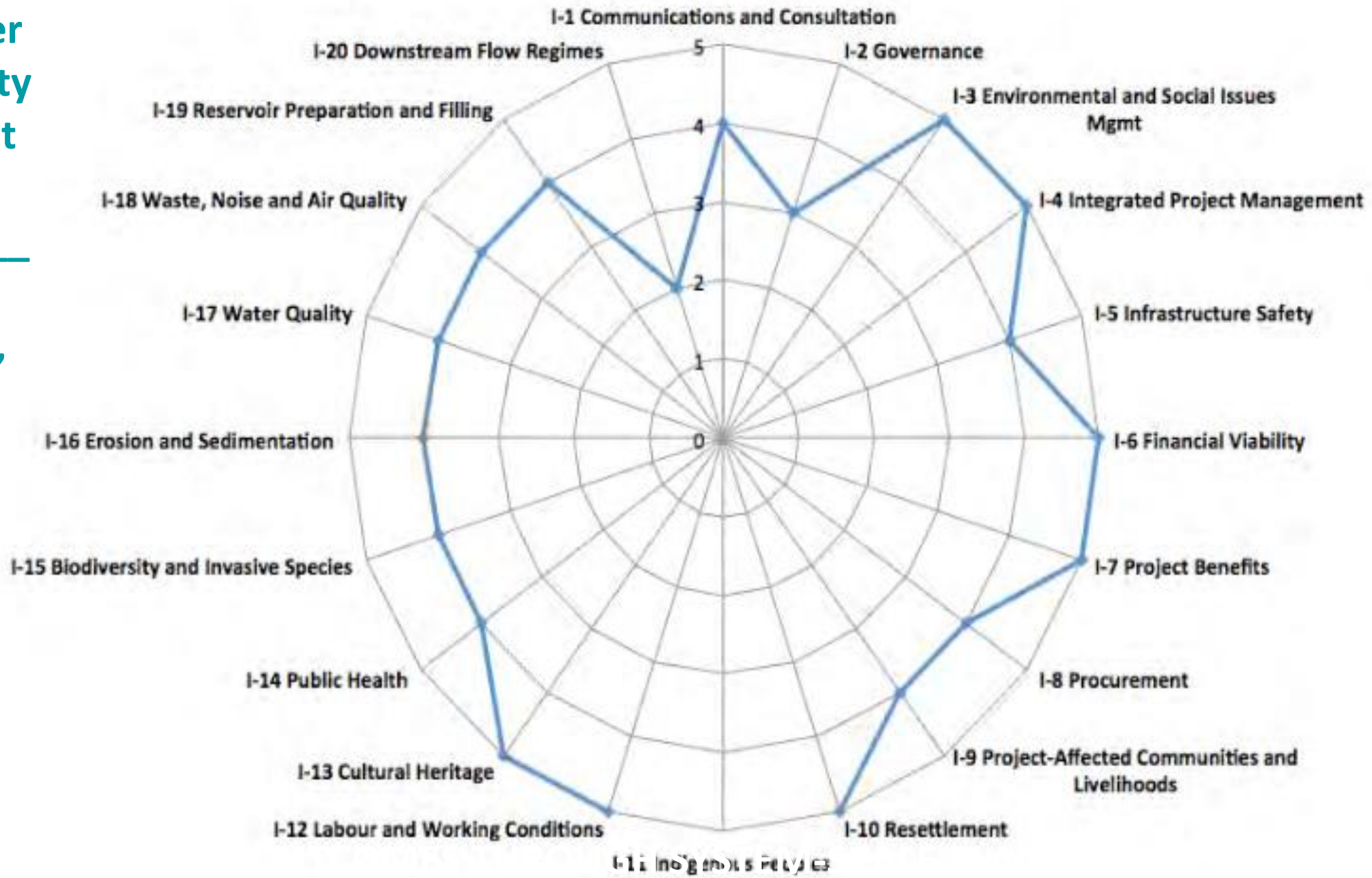




How do dams affect nature?

Hydropower Sustainability Assessment Protocol

20 criteria,
1 project



The Next Frontier – System Scale Planning

Cumulative impacts of projects depend on their location, design and operations, *and* on how they interact with other projects in the basin

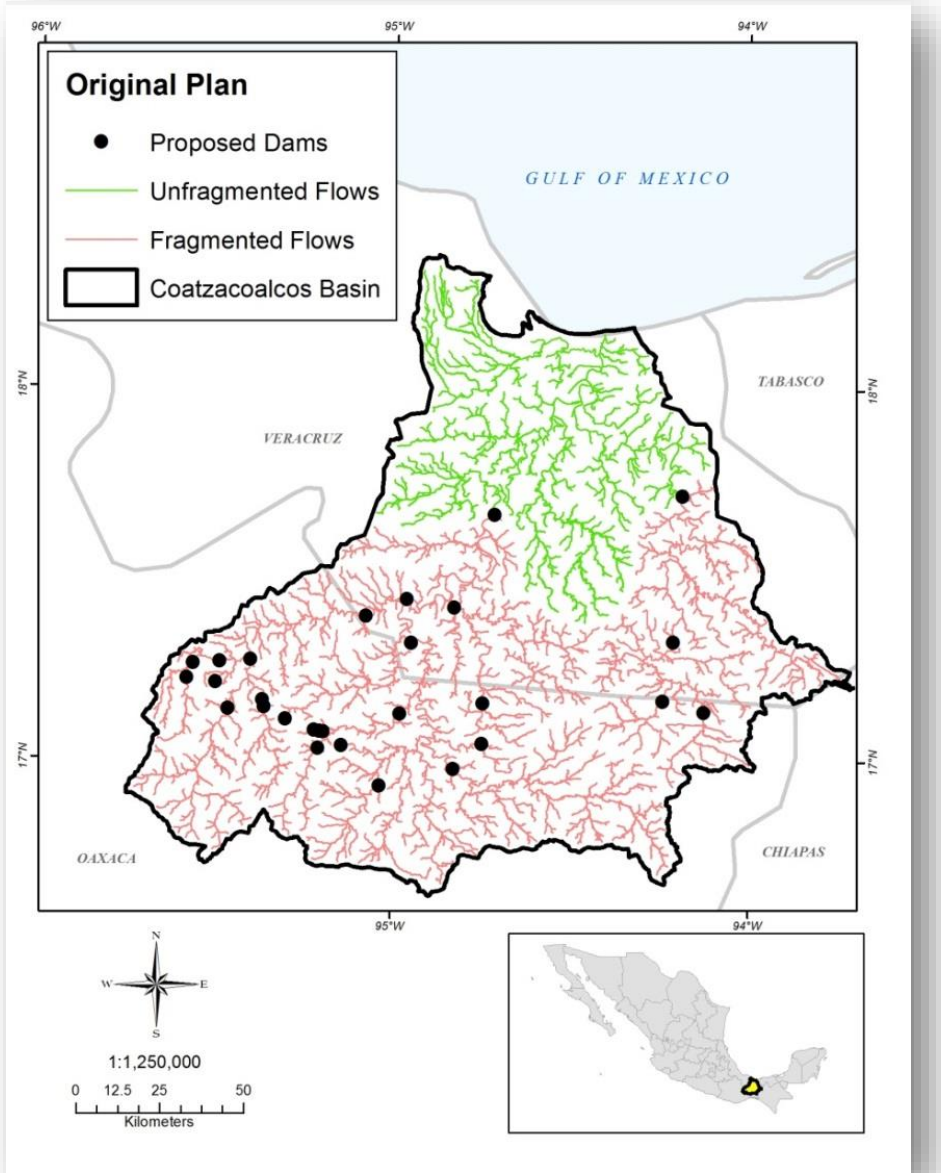
Benefits and drawbacks are site specific – Site selection is crucial

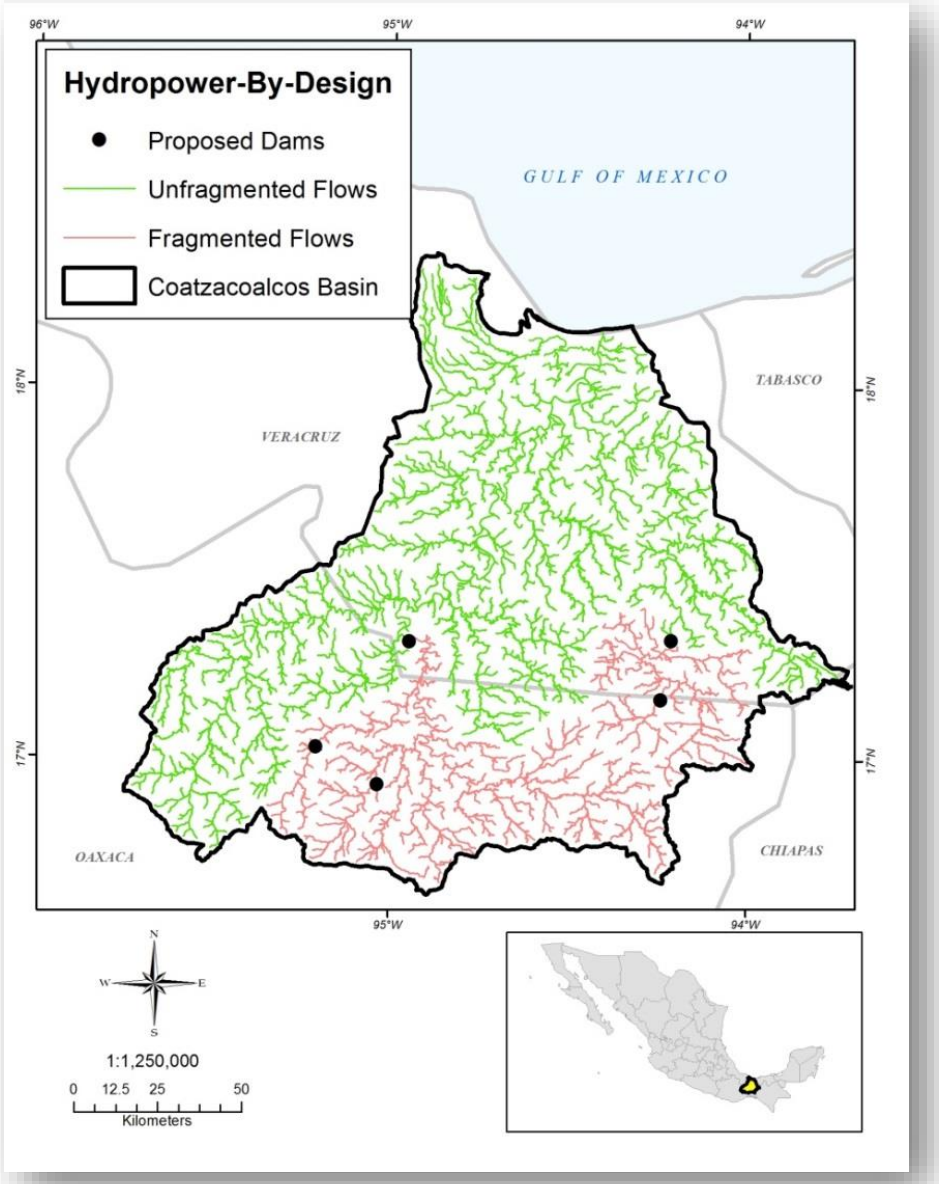
Multiple design and operational alternatives

Aims to improve, not replace, current practice and tools

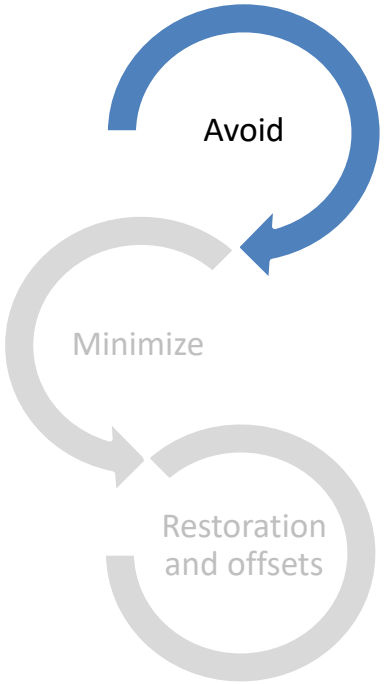
Hydropower-by-Design (HbD) is a quantitative, integrated, multi-criteria and multi-project, system-scale planning approach

Coatzacoalcos: Before & After Hydro by Design

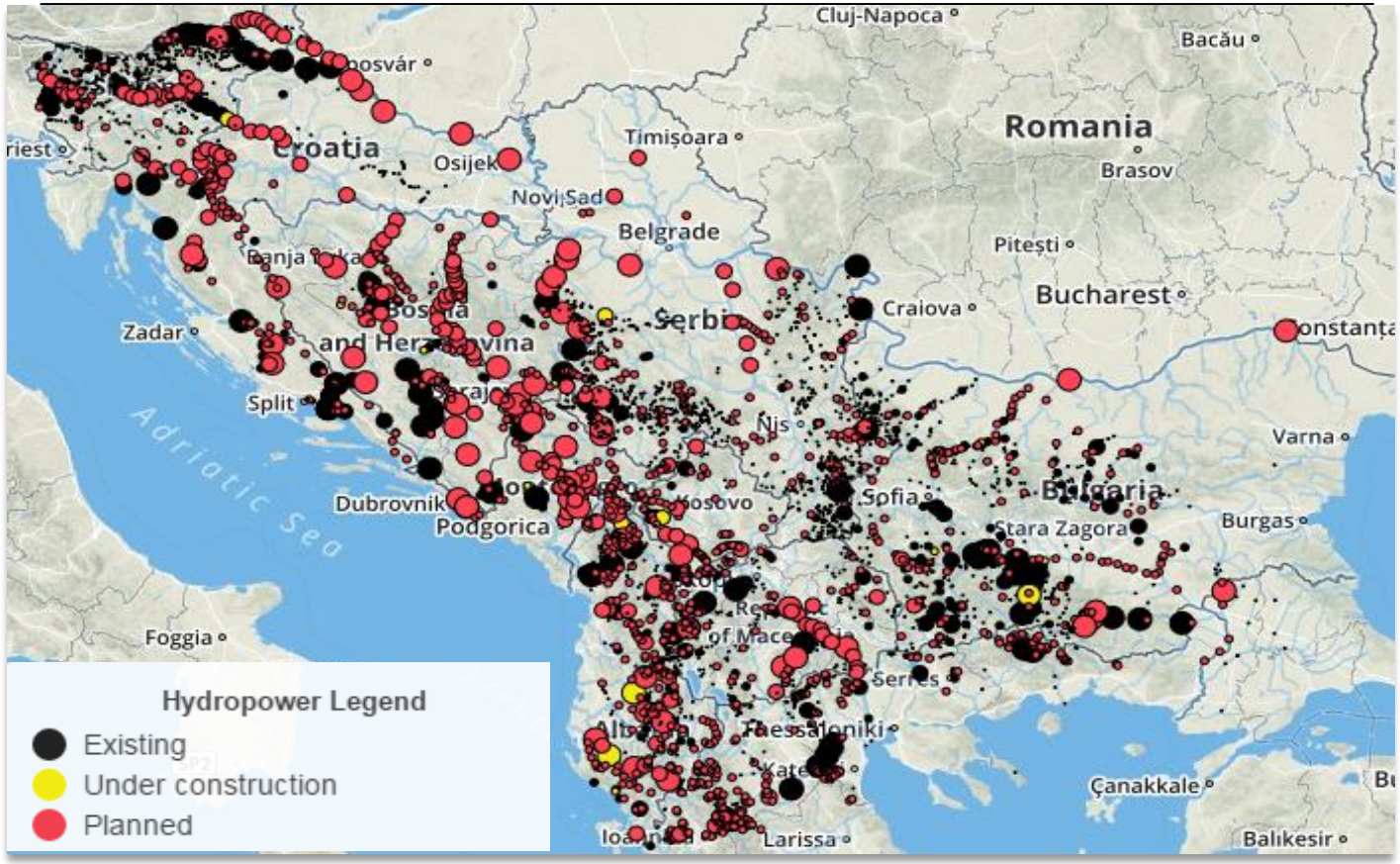




PROTECT rivers by integrating conservation and restoration into all stages of the dam cycle (planning, operations and removal).

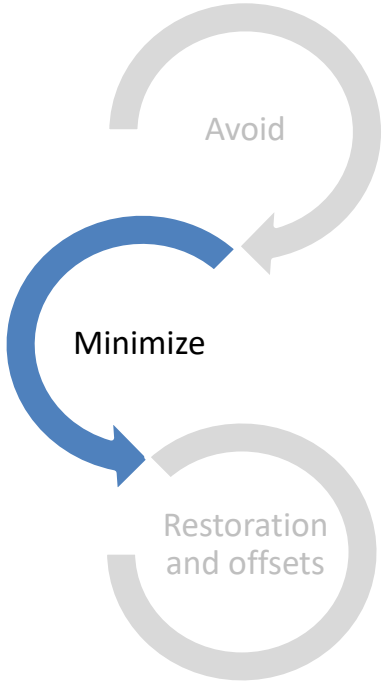


Balkans: The Blue Heart of Europe



Working with governments, companies and NGOs to deliver "**hydropower by design**": planning approach that meets energy needs while also maximizing conservation outcomes and minimizing impacts.

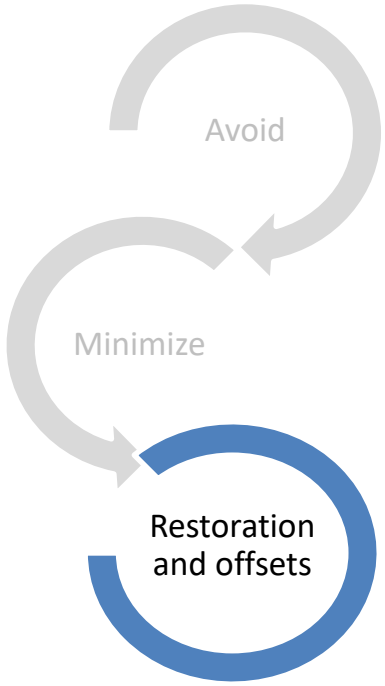
PROTECT rivers by integrating conservation and restoration into all stages of the dam cycle (planning, operations and removal).



China Three Gorges: Carp and Collaboration

Partnered with the Three Gorges Corporation to help design and monitor an environmental flow release program from Three Gorges Dam to improve spawning conditions in the Yangtze River carp species.

PROTECT rivers by integrating conservation and restoration into all stages of the dam cycle (planning, operations and removal).



Penobscot River Restoration: A global model

Working with partners, a series of hydropower dams that had blocked the upstream travel of the biggest runs of Atlantic salmon in the United States—along with 11 other migratory fish species—for more than a century were reconsidered and two dams have been removed, opening up 1000 miles of new habitat.

TRANSFORM the policies and practices of companies, financial institutions, and governments towards more sustainable development

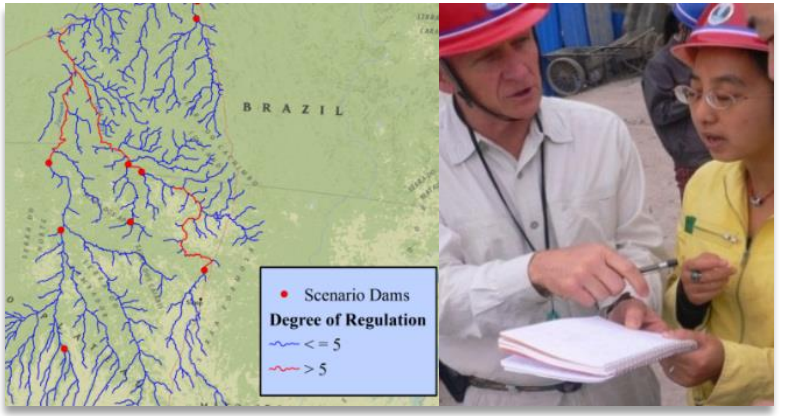
CENTER FOR SUSTAINABLE
HYDROPOWER

A platform to forge more balanced solutions between energy development and the conservation of healthy, productive rivers.

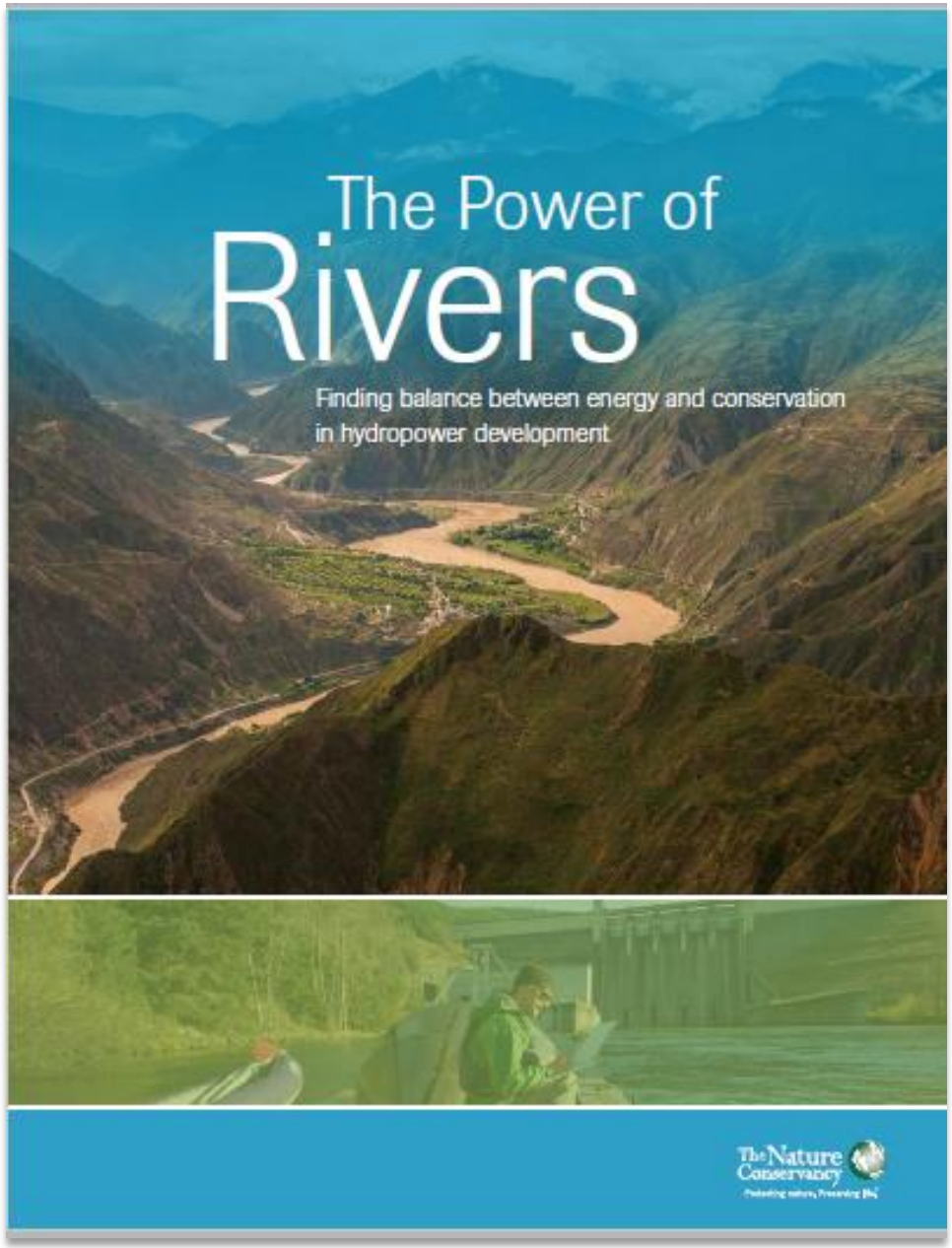
Influence policies and practices of governments, developers, and funders

Develop and deliver impact investing solutions

Develop tools and science



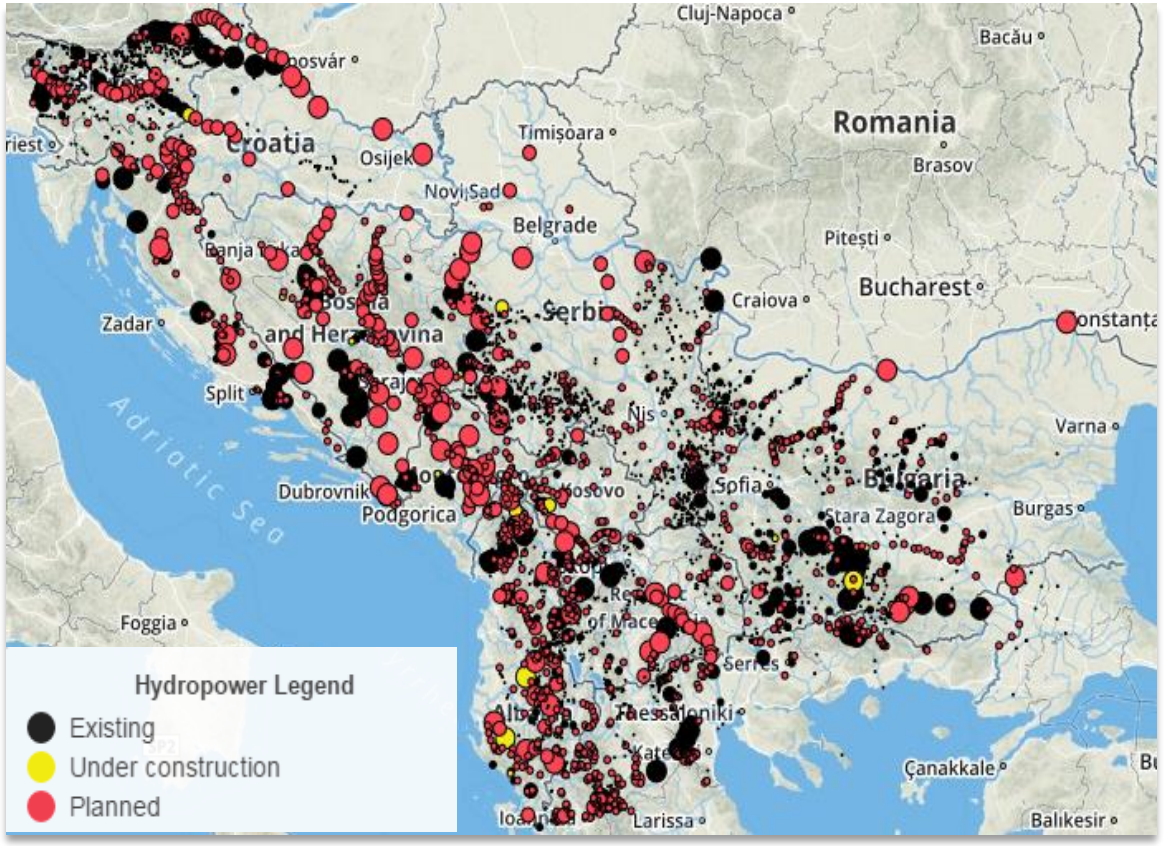
INSPIRE change in the hydropower sector by empowering key stakeholders



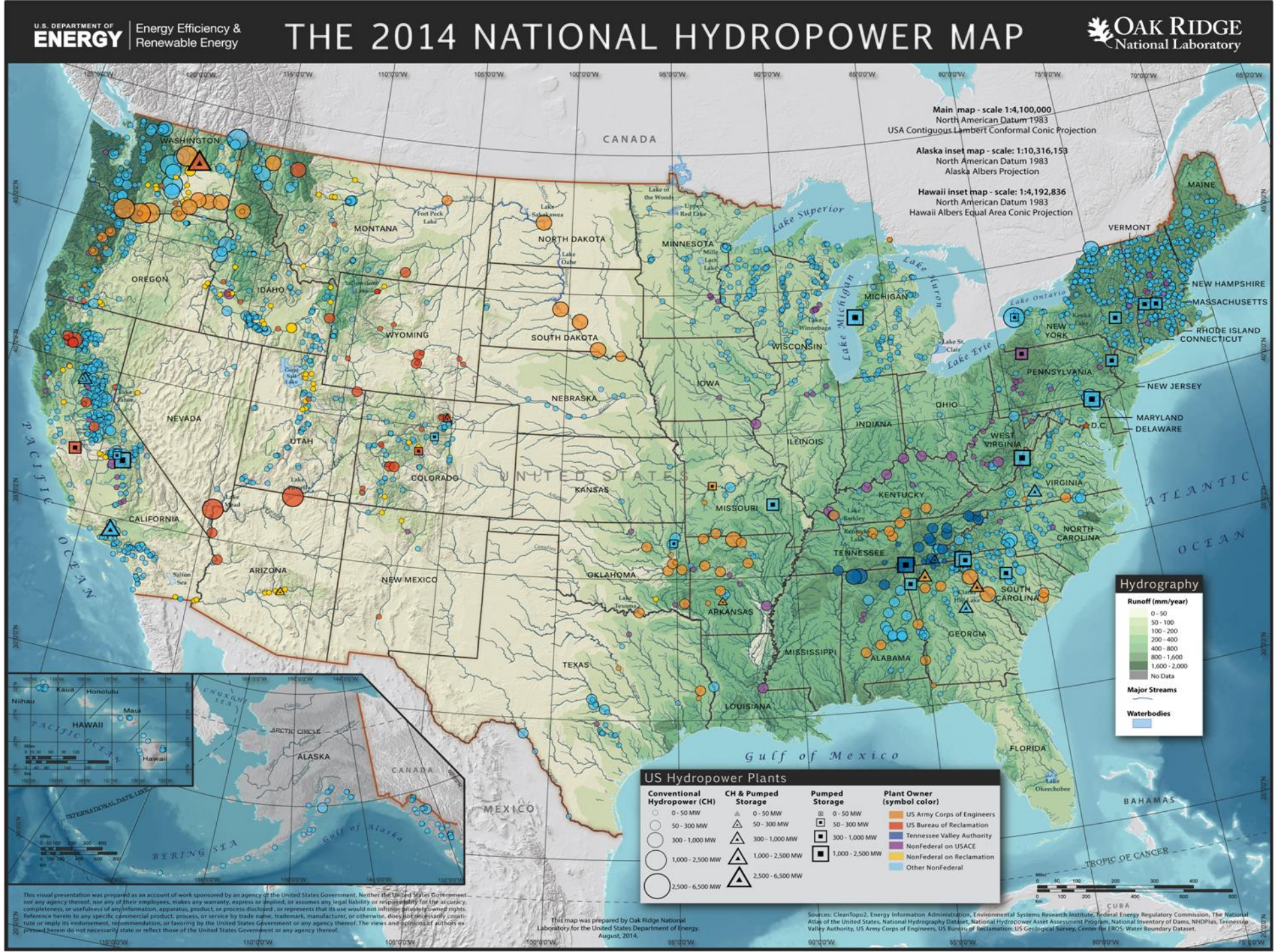
Catalyze global change in how river basins are managed through thought leadership, dissemination of tools and information, and strategic communications.

The next frontier: coordinated wind, solar, and hydropower design

Multiple criteria, multiple scenarios, multiple types of energy production



Balkan Rivers, Europe
Integrating hydropower, solar, and wind energy.


U.S. DEPARTMENT OF ENERGY
Energy Efficiency & Renewable Energy
THE 2014 NATIONAL HYDROPOWER MAP
OAK RIDGE National Laboratory
Main map - scale 1:4,100,000
North American Datum 1983
USA Contiguous Lambert Conformal Conic Projection
Alaska inset map - scale: 1:10,316,153
North American Datum 1983
Alaska Albers Projection
Hawaii inset map - scale: 1:4,192,836
North American Datum 1983
Hawaii Albers Equal Area Conic Projection
CANADA
MEXICO
UNITED STATES
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
ILLINOIS
MICHIGAN
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
WEST VIRGINIA
PENNSYLVANIA
NEW YORK
MARYLAND
DELAWARE
D.C.
NEW JERSEY
CONNECTICUT
RHODE ISLAND
MASSACHUSETTS
VERMONT
NEW HAMPSHIRE
MAINE
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
PACIFIC OCEAN
ATLANTIC OCEAN
Gulf of Mexico
BAHAMAS
CUBA
TROPIC OF CANCER
HAWAII
Niihau
Kauai
Honolulu
Maui
Hawaii
ALASKA
ARCTIC CIRCLE
INTERNATIONAL DATE LINE
BERING SEA
Gulf of Alaska
Hydrography
Runoff (mm/year)
0 - 50
50 - 100
100 - 200
200 - 400
400 - 800
800 - 1,600
1,600 - 2,000
No Data
Major Streams
Waterbodies
US Hydropower Plants
Conventional Hydropower (CH)
0 - 50 MW
50 - 300 MW
300 - 1,000 MW
1,000 - 2,500 MW
2,500 - 6,500 MW
CH & Pumped Storage
0 - 50 MW
50 - 300 MW
300 - 1,000 MW
1,000 - 2,500 MW
2,500 - 6,500 MW
Pumped Storage
0 - 50 MW
50 - 300 MW
300 - 1,000 MW
1,000 - 2,500 MW
Plant Owner (symbol color)
US Army Corps of Engineers
US Bureau of Reclamation
Tennessee Valley Authority
NonFederal on USACE
NonFederal on Reclamation
Other NonFederal
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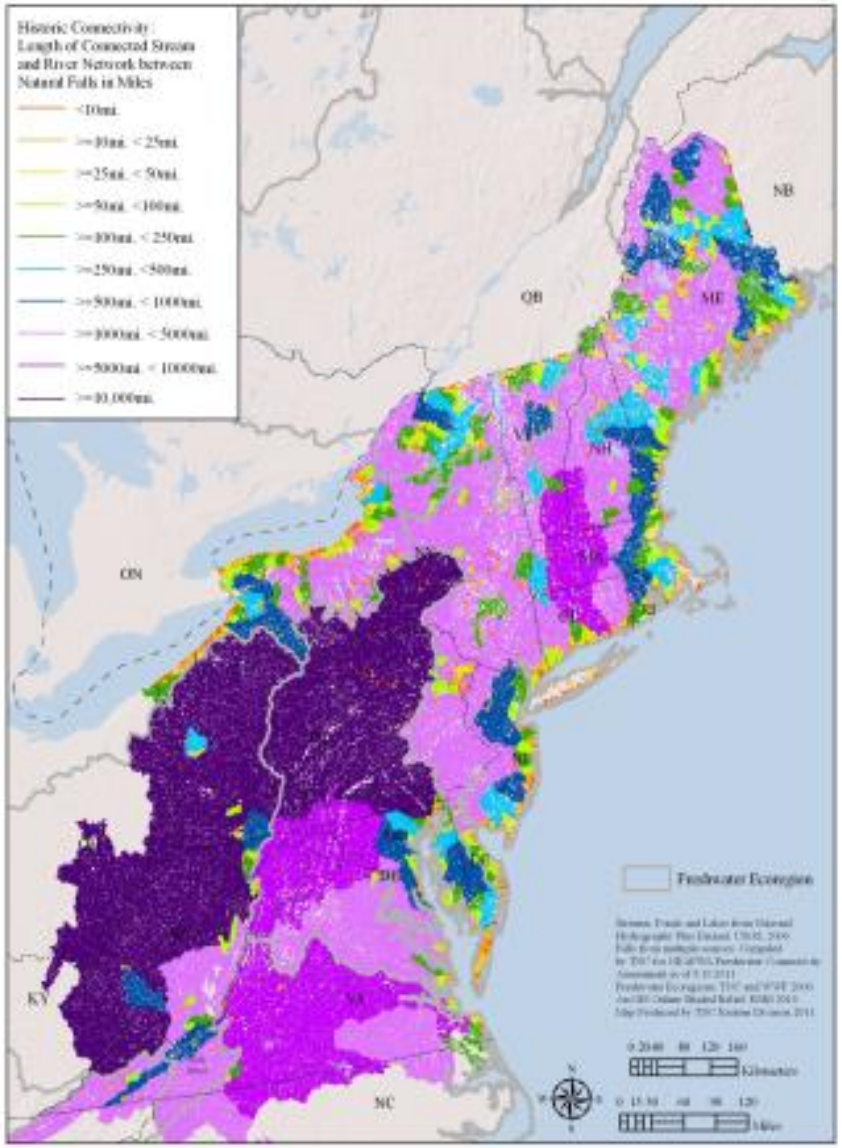
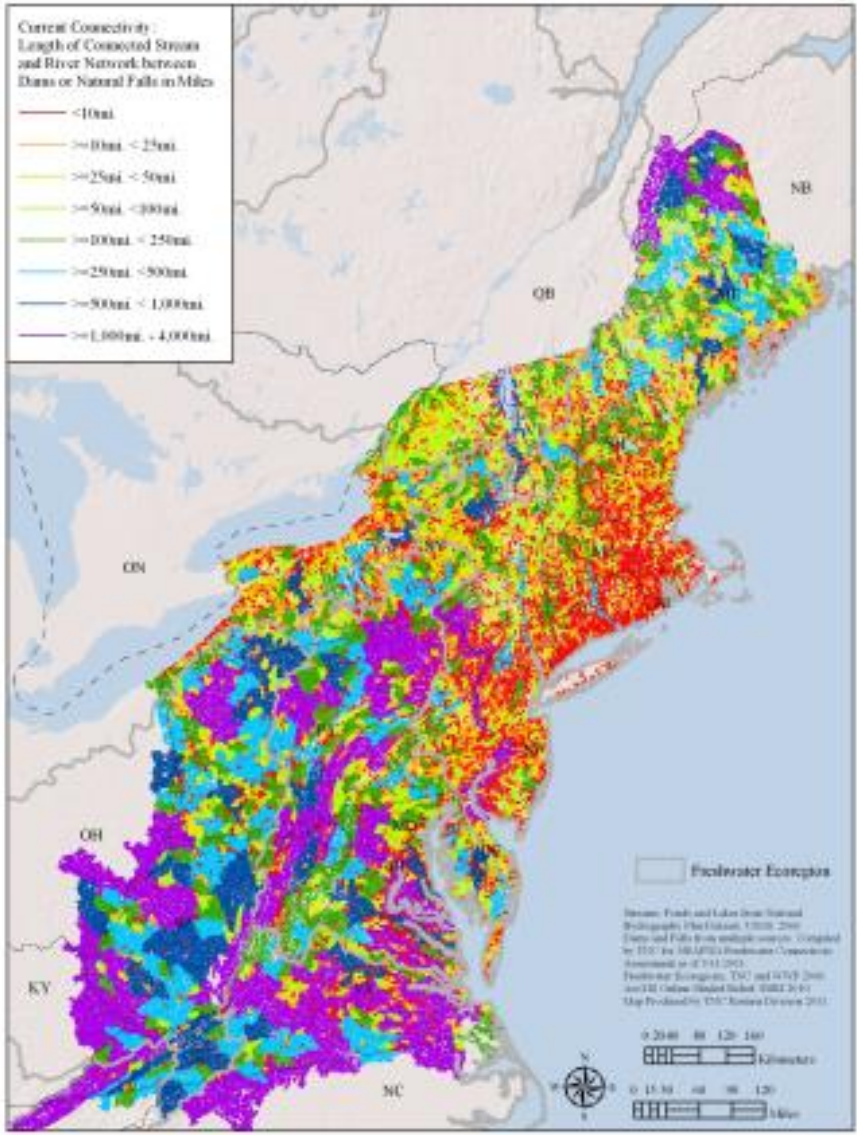
This map was prepared by Oak Ridge National Laboratory for the United States Department of Energy. August, 2014.
Sources: CleanTopo2, Energy Information Administration, Environmental Systems Research Institute, Federal Energy Regulatory Commission, The National Atlas of the United States, National Hydrography Dataset, National Hydropower Asset Assessment Program, National Inventory of Dams, NHDPlus, Tennessee Valley Authority, US Army Corps of Engineers, US Bureau of Reclamation, US Geological Survey, Center for EROS: Water Boundary Dataset.

Historical Connectivity

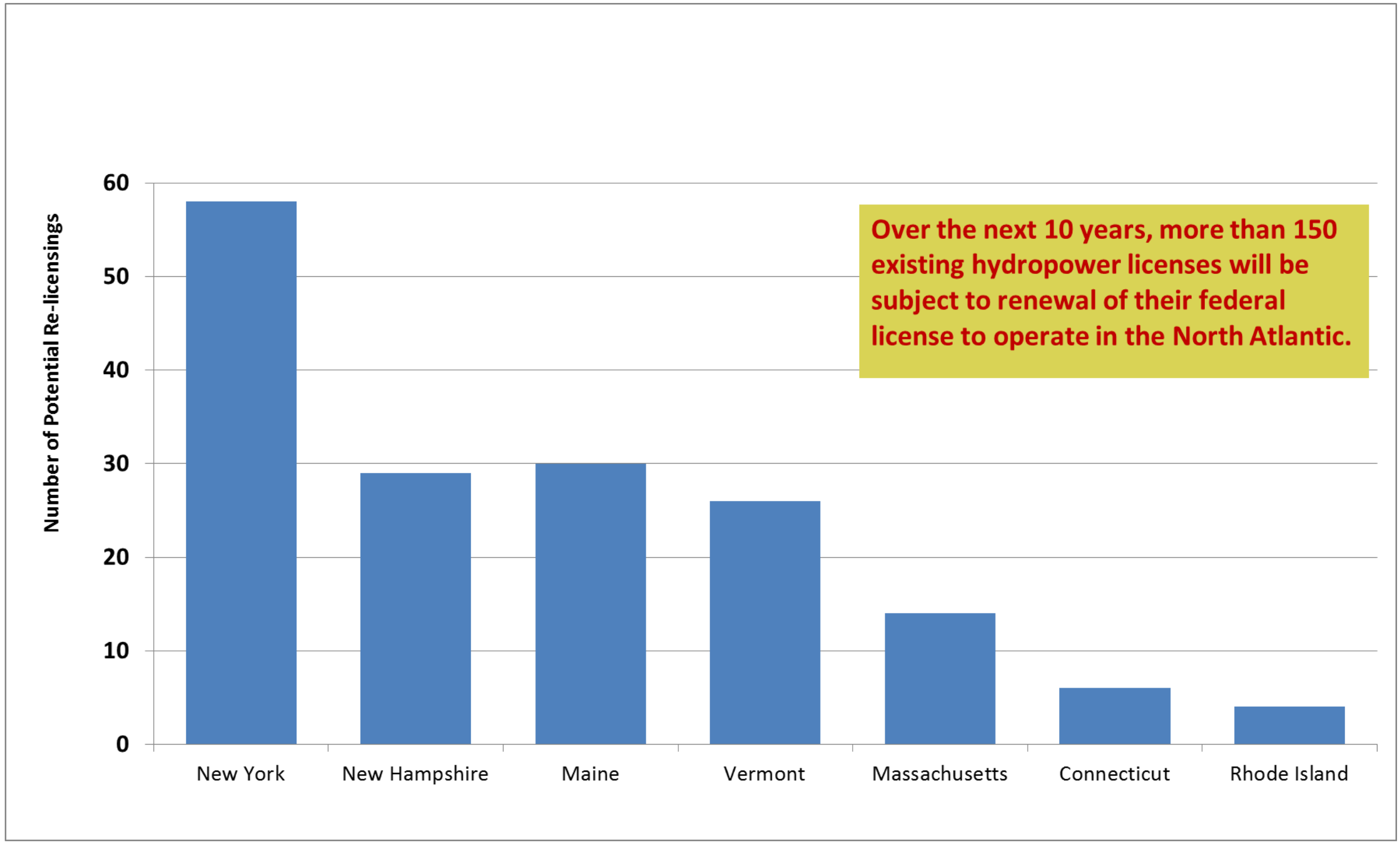


Current Connectivity



Martin et al. 2016

PhotoCredit: Recollecting Nemasket


Number of Potential Re-licensings
60
50
40
30
20
10
0
New York
New Hampshire
Maine
Vermont
Massachusetts
Connecticut
Rhode Island
Over the next 10 years, more than 150 existing hydropower licenses will be subject to renewal of their federal license to operate in the North Atlantic.