Bridging Science and Policy: Creating a World with Equitable Water Access

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SEI Stockholm Environment Institute

Brief personal note

Why do I work on water?

Safe drinking water is a global concern

An estimated 790 million **people** (11% of the **world's population**) without access to an improved **water** supply.

An estimated 1.8 billion **people** (25% of the **world's population**) without access to adequate sanitation.

www.cdc.gov/healthywater/global/wash_statistics.html

Equality in water access fulfills key Sustainable Development Goals

- We need to focus on equality in water access for humans and for the environment
- We have the science & engineering
- We know how to influence policy

Opportunities for improved water development: Global water supply and demand

Developed countries

1800s – Tapping into natural water supplies; widespread use of ecosystem services.

Mid 1900s – Small and then even larger dams; irrigated crops expand food supply.

Late 1900s – Interbasin-transfers of water.

Early 2000s – Manage demand; de-salination; recycle waste water.

Present day – Regain what was lost; rehabilitate river systems; dam removal.

Developing countries

1800s – Tapping into natural water supplies; widespread use of ecosystem services.

Late 1900s – Small and then even larger dams; irrigated crops expand food supply; **river ecosystem services very important for livelihoods.**

2000s – Attempting more balanced development; protecting ecosystem services; saving what there is.

SEI is working around the world on water

SEI Stockholm Environment Institute

Bridging science and engineering with policy is a key goal

RELEVANT SCIENCE AND ENGINEERING

Water quality, including fires and sediments

Flooding

Ecosystems

Remote sensing

EXISTING ANALYTICAL TOOLS

Serious games

Data assimilation

Data visualization

New tools that address existing gaps

Technical facilitation

Capacity development

Communications

Sustainable finance

POLICY ENGAGEMENT

Decision making

Communities engagement

Equitable resource sharing

Equality in water access is a key missing piece in water management

Including all voices: from information extraction to co-production

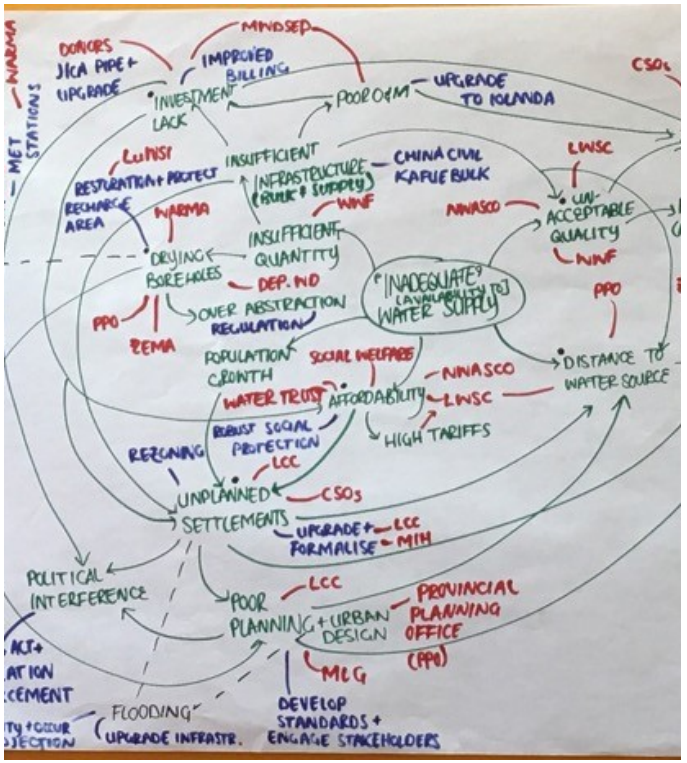
Levels or participation	Diversity angle
Co-production	Provide mentoring for diverse groups to contribute knowledge and expertise
Co-learning	Look for spaces where diverse groups are more comfortable expressing their ideas
Cooperation	Diverse groups are brought to the process by creating appropriate spaces
Consultation	Appropriate proportions from different groups being consulted
Information extraction	All participant's contributions are highlighted

mediamanager.sei.org/documents/Publications/SEI-2017-Gender-guidance-for-modelling-studies.pdf

Case study: collaboration helps address climate change in urban Africa

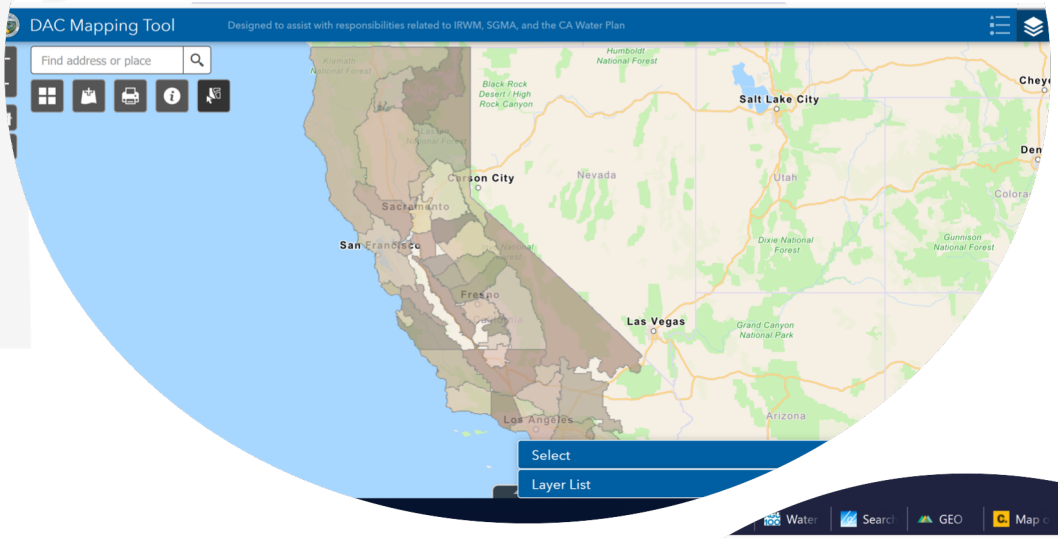
In Lusaka, Zambia, being intentional about participatory inclusion and co-production led to:

- A critical reflection in reviewing the city's master plan
- The enforcement of regulations including the relocation of households from sensitive areas
- The extension of water distribution and sewerage networks

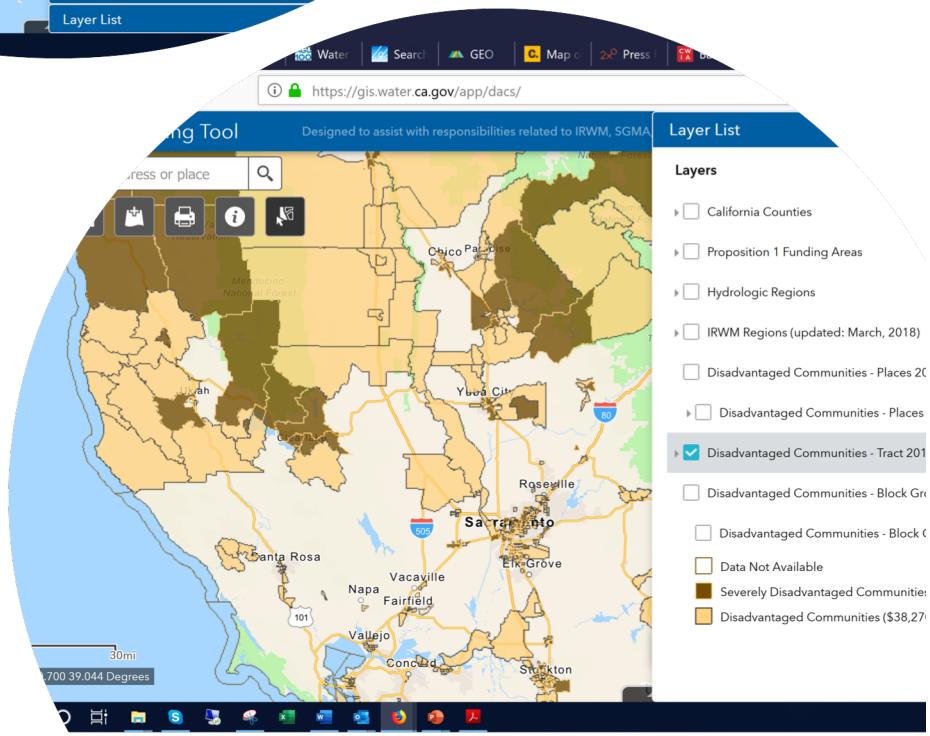


www.sei.org/perspectives/exploring-the-power-of-collaboration-to-address-climate-change-in-urban-africa

Determining who is disadvantaged



Funding in California (USA) is focused on addressing disadvantaged communities



What is remarkable is that in a place like California, inequalities still exist

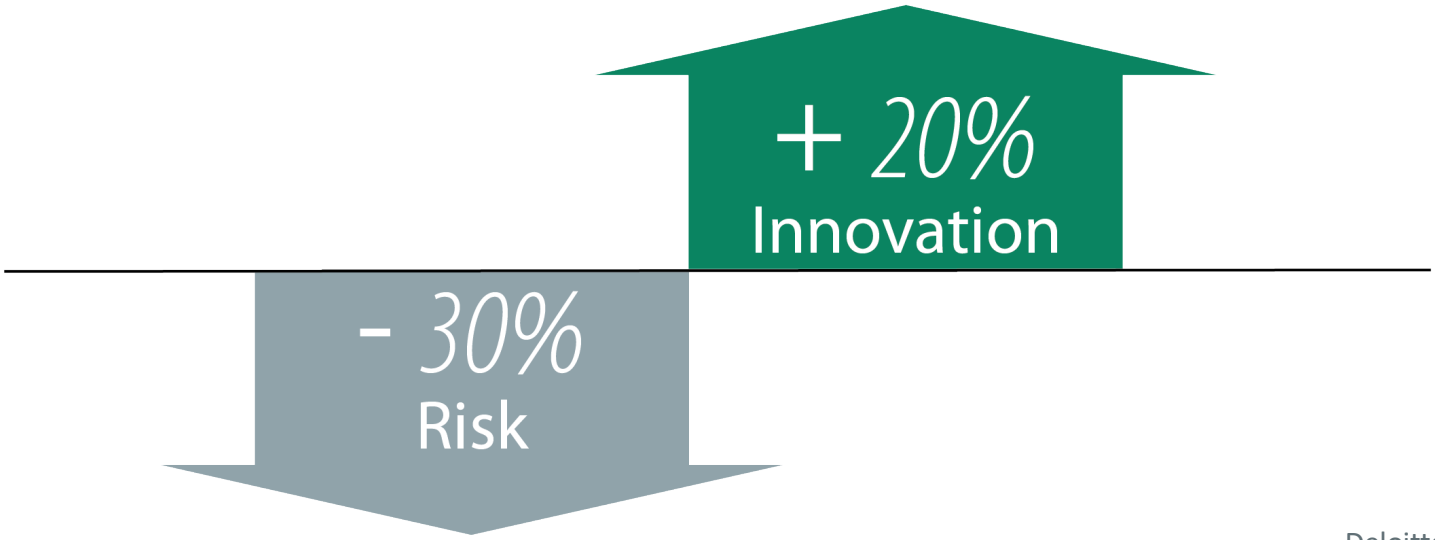
Guillermina Andrade (left) and Vicente Tapia fill five 208-liter (55-gallon) barrels twice a week from this water depot outside the East Porterville, California, fire station. The well at their nearby home ran dry months ago.

https://www.circleofblue.org/2015/world/slideshow-faces-of-tulare-countys-drinking-water-crisis/

We need to recognize that diverse teams are smarter

Non-homogenous teams are smarter, focus on facts, process facts more carefully, and are more innovative.

The value of diversity of thinking



We need to enhance the role of women in a sustainable future

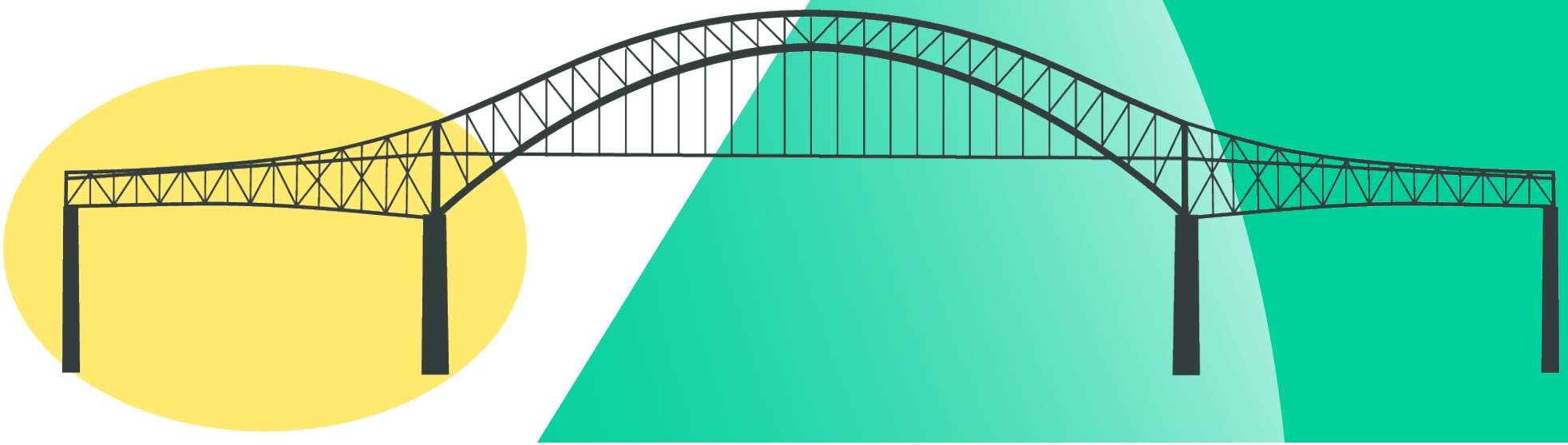
Does the presence of women affect positive environmental and social impact of organizations?

- Women are more aligned with sustainability
- More women on Boards of Directors mean more profit
- Taking action: pipeline to keep women, foster sponsorship, and train leaders to be change agents

www.haas.berkeley.edu/groups/online_marketing/facultyCV/papers/Women_Create_Sustainable_Value_FINAL_10_2012

RELEVANT SCIENCE AND ENGINEERING

Current status and new advancements in Latin American countries



The proportion of researchers in a population is an important indicator

Current status in Latin America and the Caribbean

- Number of researchers/per million people
- A reasonable goal: 1000 researchers/million people
- Still some way to go

Country	Population (in millions)	Researchers (per million people)
Costa Rica	4.87	1233
Argentina	41.45	1121
Brazil	200.40	698
Uruguay	3.40	549
Chile	17.62	320
Mexico	122.30	312
Venezuela	30.00	200
Colombia	48.32	193
Bolivia	11.00	166
Ecuador	15.74	141
Guatemala	15.47	25
Cuba	11.27	NA
El Salvador	15.47	NA
Panama	3.86	NA
Paraguay	6.80	NA
Peru	30.90	NA
Trinidad and Tobago	1.34	NA
Developed countries		
Japan	127	5153
USA	316	3867
China	1357	903

www.ncbi.nlm.nih.gov/pmc/articles/PMC5655372/

We need to recruit young people with new energy and interests

Building talent and networks: Water projects recruit young South American researchers

By engaging early-career engineers and scientists in Peru, Colombia and Bolivia – particularly women – SEI has improved gender inclusion and laid a foundation for long-term collaboration.

Nilo Lima, Manon von Kaenel and Gladis Celmi celebrate the Fourth of July together in California.

As the Water Group undertakes new projects in South America, Cusguen, Celmi, Lima and other young professionals will continue to be key collaborators.

www.sei.org/featured/building-talent-and-networks-water-projects-recruit-young-south-american-researchers/

Our motivation to work in SEI is…

Opportunities for engagement: hydropower development

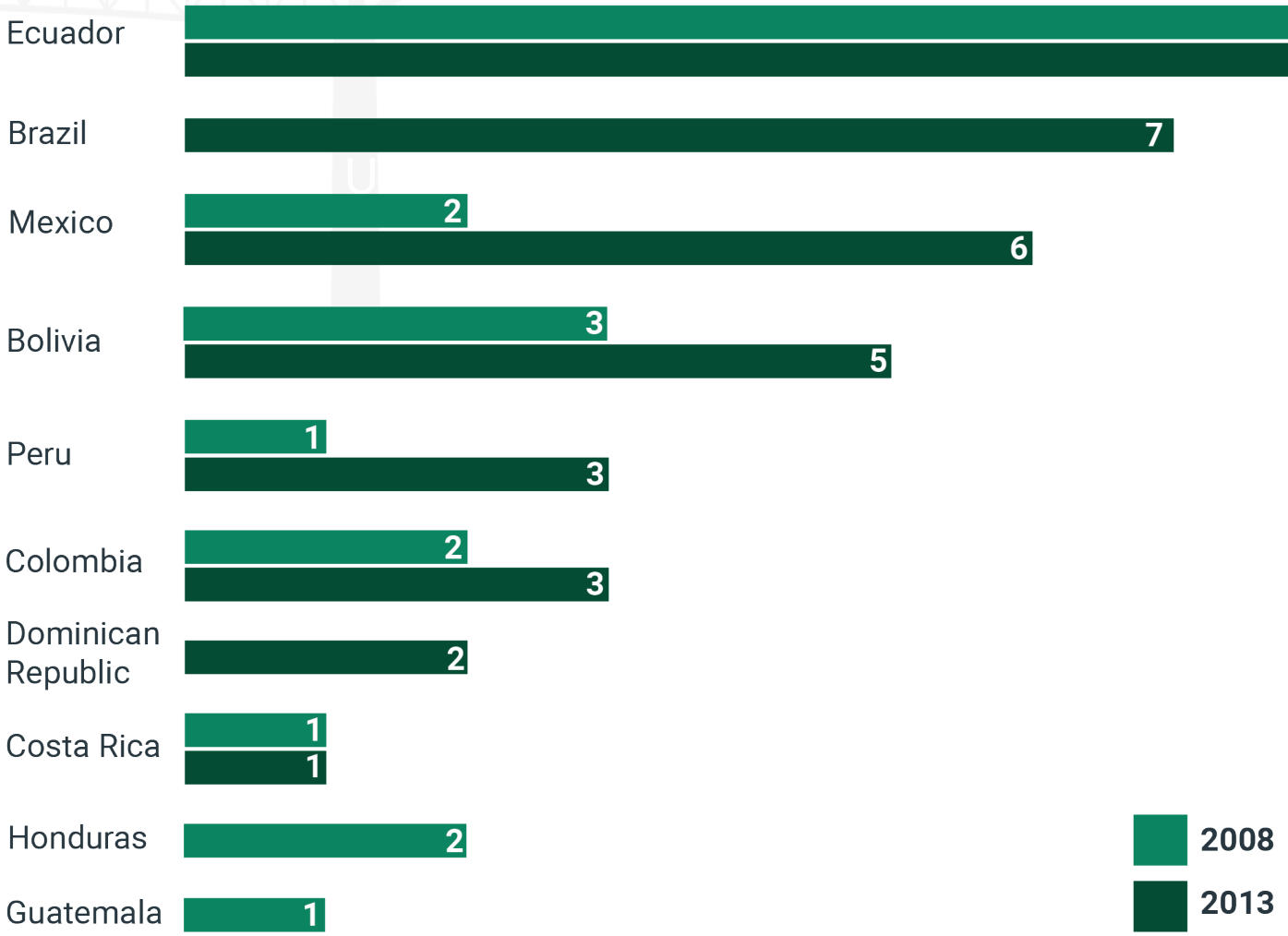
Great potential for research and technology progress

Investment and economic development

Identification of sustainable solutions

www.hydroworld.com/world-regions/latin-america/infographic.html

Opportunities for engagement: conservation of water resources in Latin America

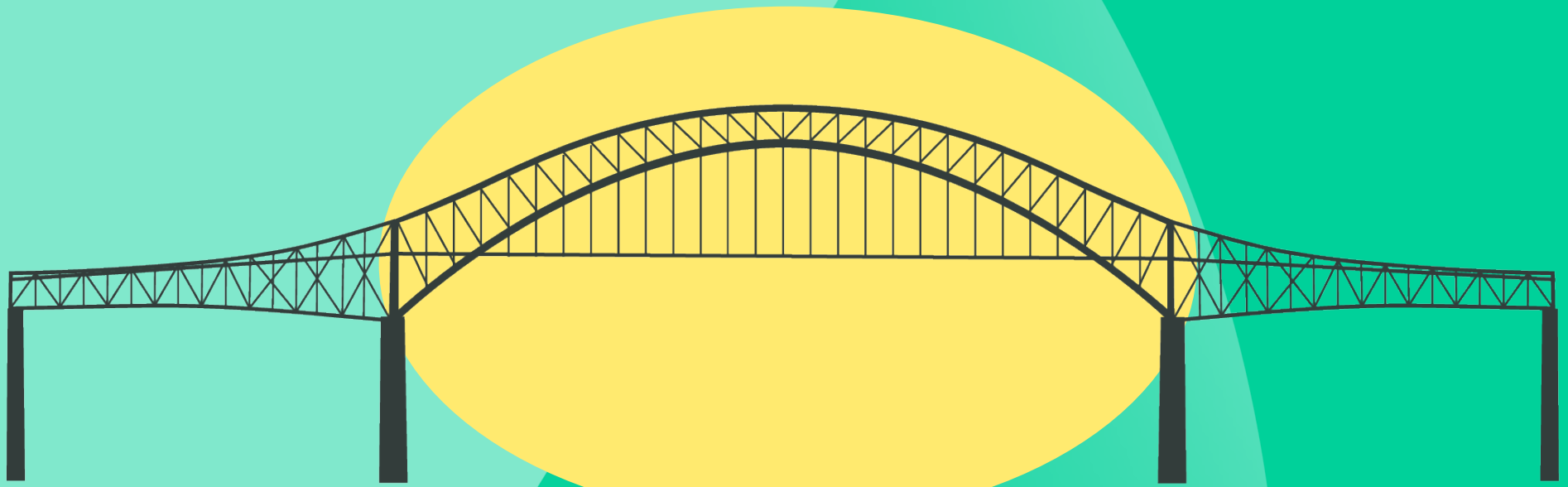


Total = 28 Initiatives Investment = 14 Million USD

ecodecision.com.ec/wp-content/uploads/2016/09/informeRegionalAgua.pdf

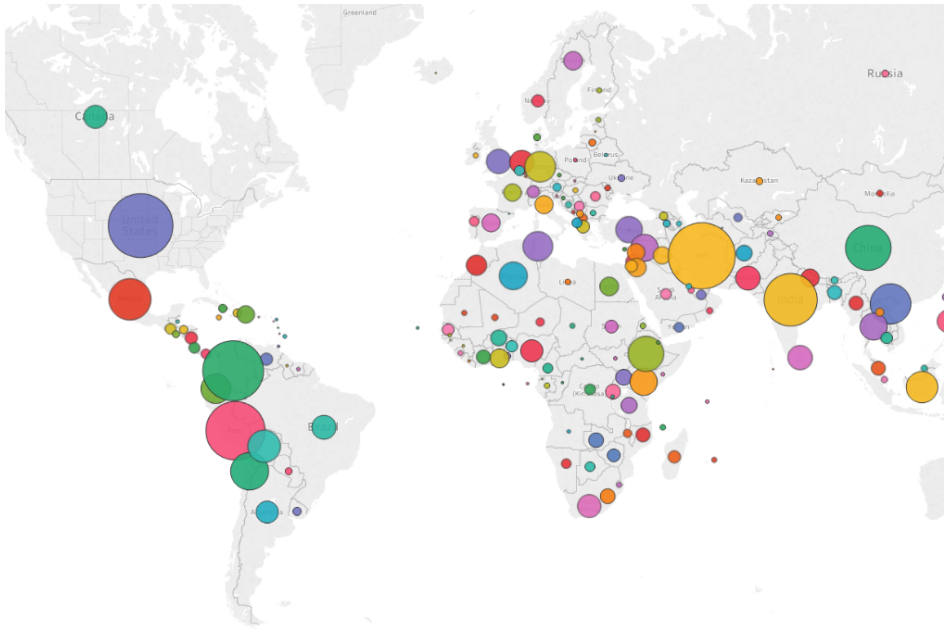
EXISTING ANALYTICAL TOOLS

Computer tools and capacity building



Use key tools and methods for water planning

- **Robust Decision Support (RDS):** work with diverse stakeholders to identify objectives, concerns and options.
- **Water Evaluation And Planning System (WEAP):** uses stakeholder-driven input and knowledge to build a representation of the water resources system.
- **Capacity-building:** to build up a community of more than 33,000 WEAP downloads in more than 186 countries.
- **Data visualization:** to distill complex information into graphics that allow non-experts to grasp the big picture.



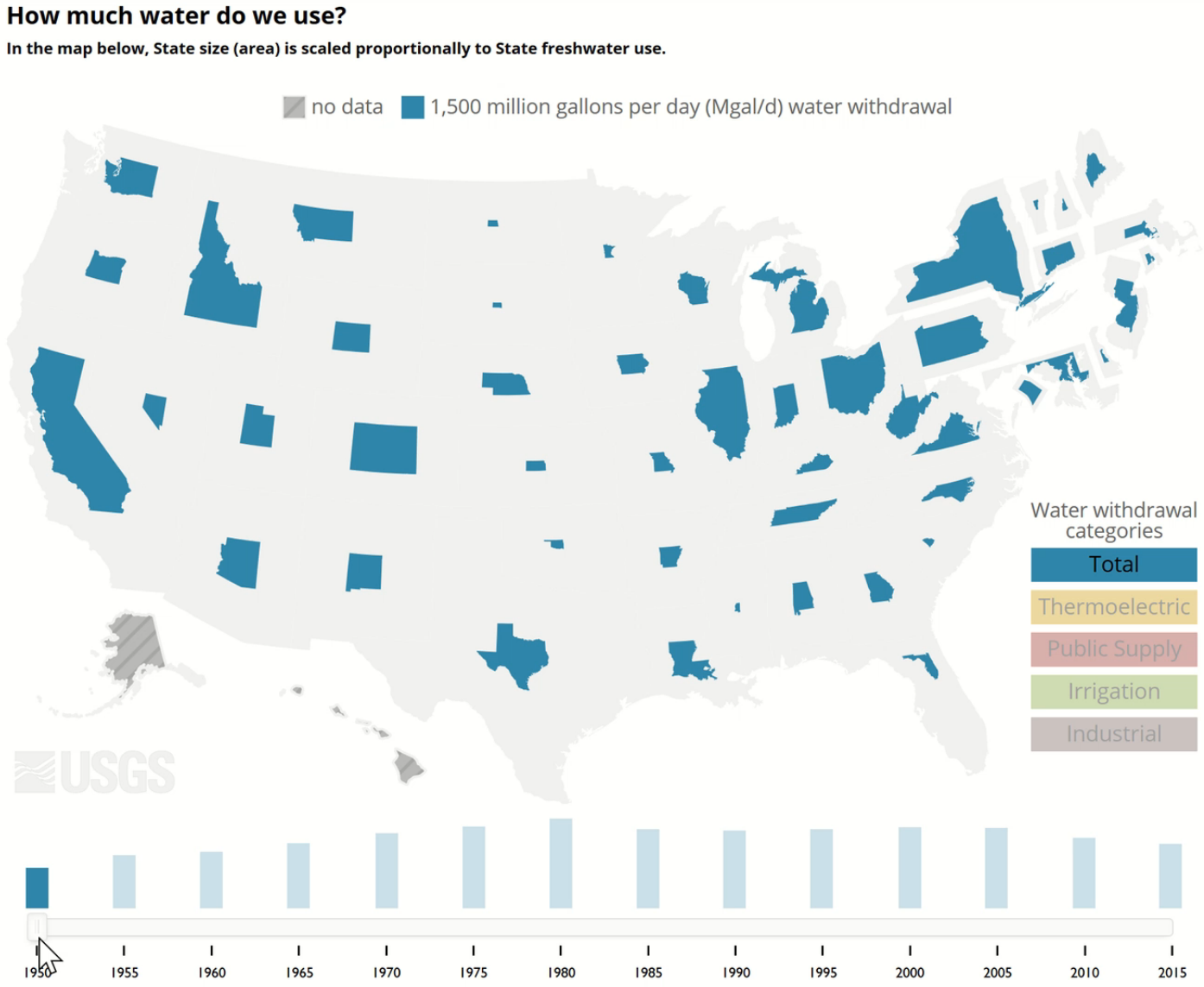
Software types used in addressing water resource issues

WRS Types	Time Frame	Water Resource Issue														
	Planning/Design	Real-Time	Climate Issues	Land Use Change	Water Allocation	Reservoir Operations	Irrigation	River Flows Routing	Flood Mapping	Real-time Flood Warning	Groundwater	Conjunctive Use	Water Quality	Sediment Transport	Socio-Economic, Ecological
WRM Models	X	x	X	X	X	x	X	x	x	-	x	x	x	x	A
River Basin Model (RBM)	X	x	X	-	X	x	X	-	-	-	-	-	X	-	A
Distributed Hydrologic Model (DHM)	X	-	X	X	-	-	X	x	x	-	x	x	x	x	A
Groundwater Models	X		x	X	-	-	-	-	-	-	X	X	X	-	A
Hydraulic Models	X	X	x	-	x	X	-	X	X	X	-	-	X	X	A
Water Quality Models	X	X	x	X	x	-	-	-	-	-	X	-	X	X	A

Note: X = primary applicable, x = secondary applicable, and A = additional analysis.

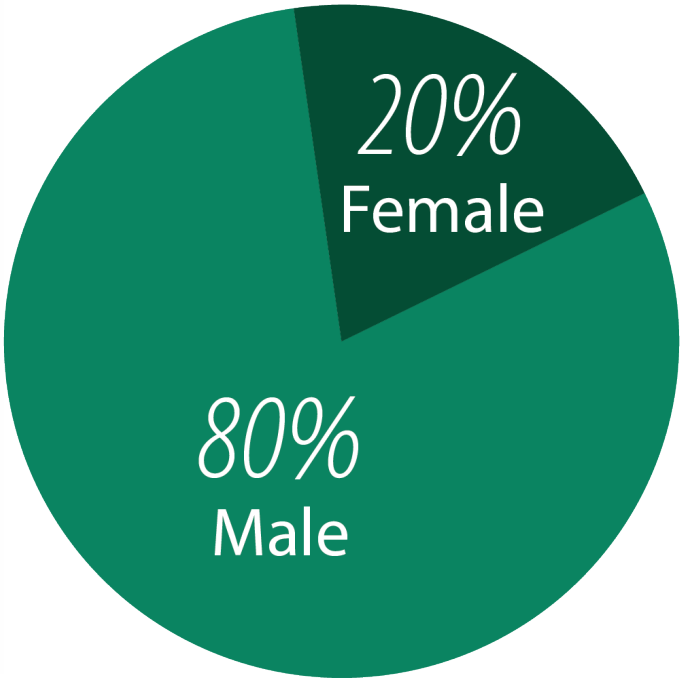
openknowledge.worldbank.org/handle/10986/24762

Dynamic data visualizations are effective



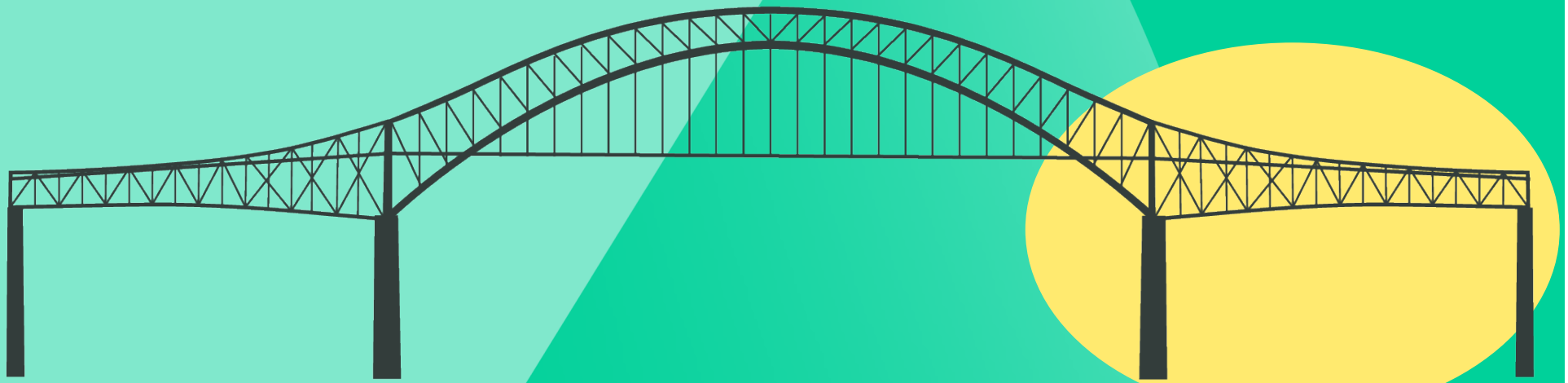
Generate capacity building opportunities for diverse audiences

Average participation in Bolivia National Water Balance workshops

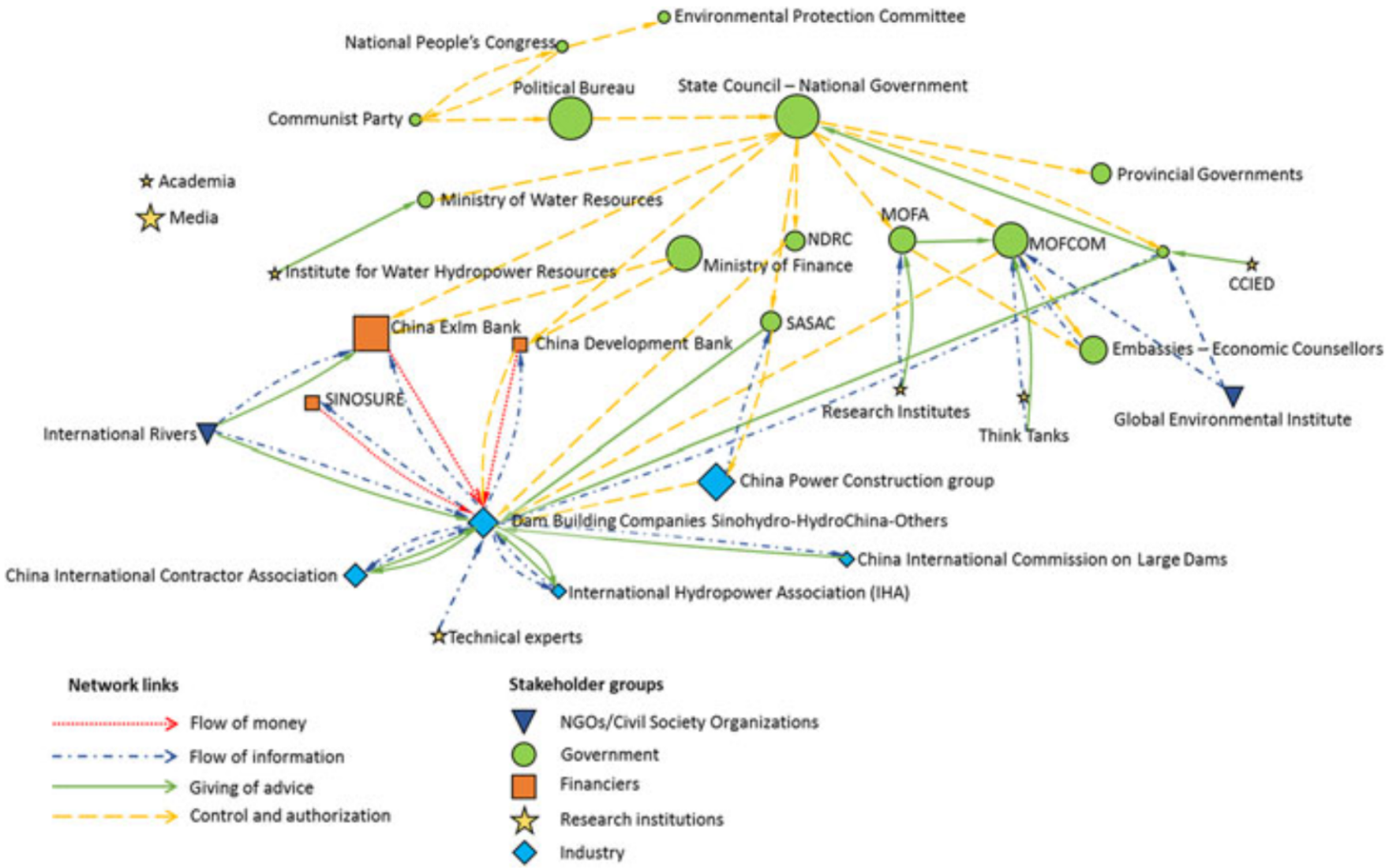


POLICY ENGAGEMENT

Actors, community engagement and decision making



Invite the right actors

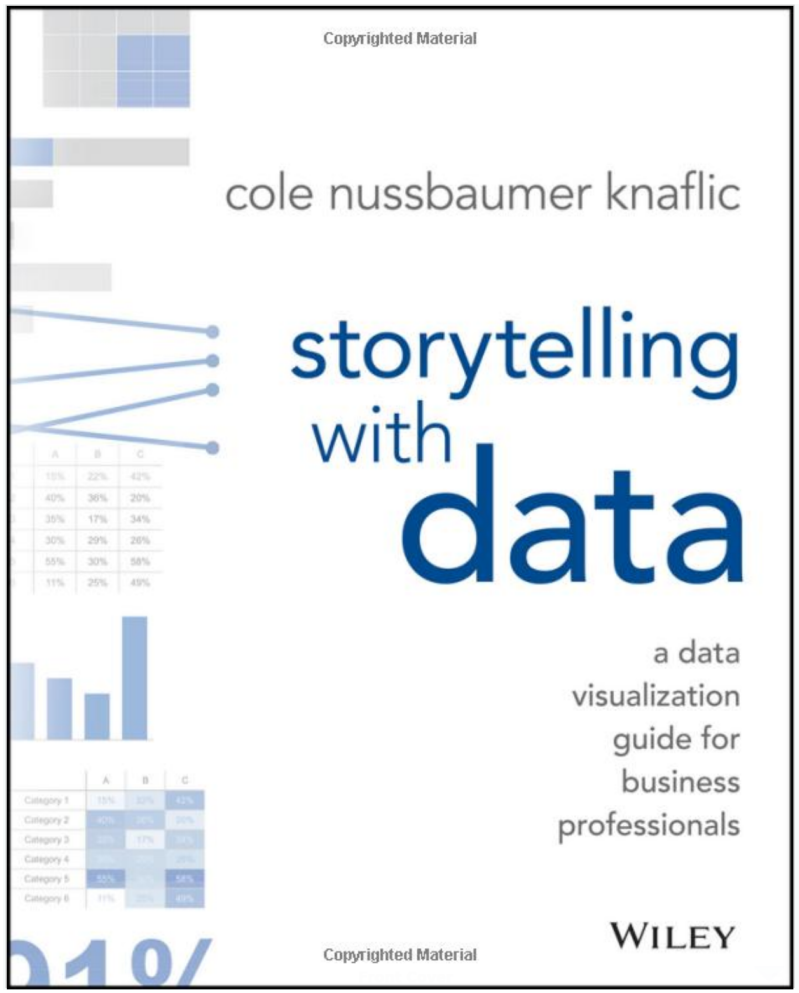


http://eprints.nottingham.ac.uk/51025/7/evaluating_the_behaviour_of_chinese_stakeholders.pdf

Engage with the community

- Application of the decision support tool with Rio Rocha stakeholders

Use tools to present data for decision making



Set-up & Hook: What is status quo? What unexpectedly changed?

Rising Insight: What influenced or contributed to the change?

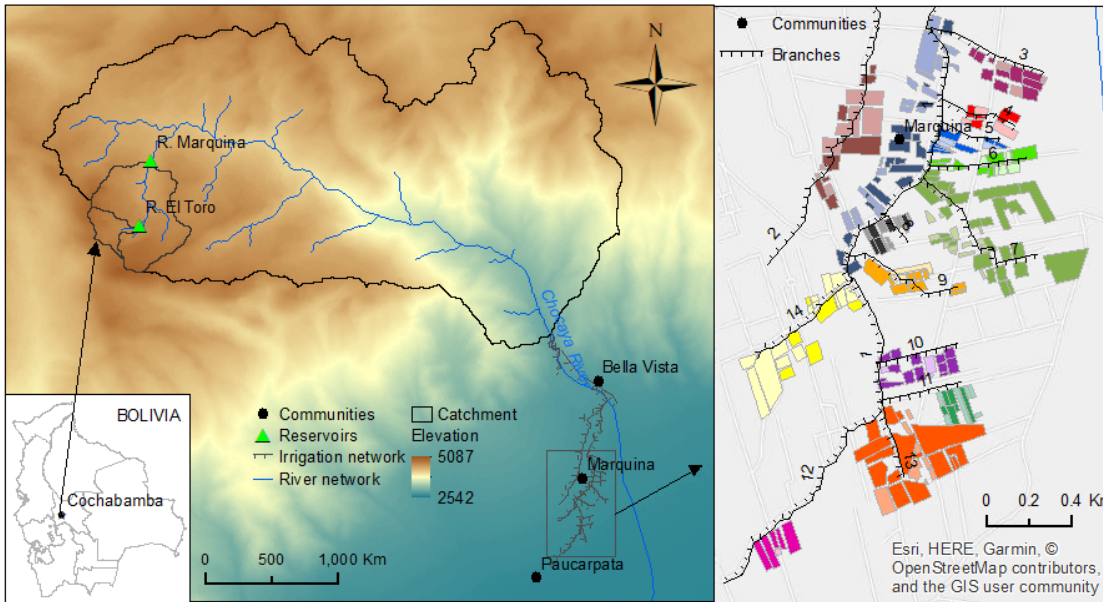
Aha Moment: What is the impact if nothing changes?

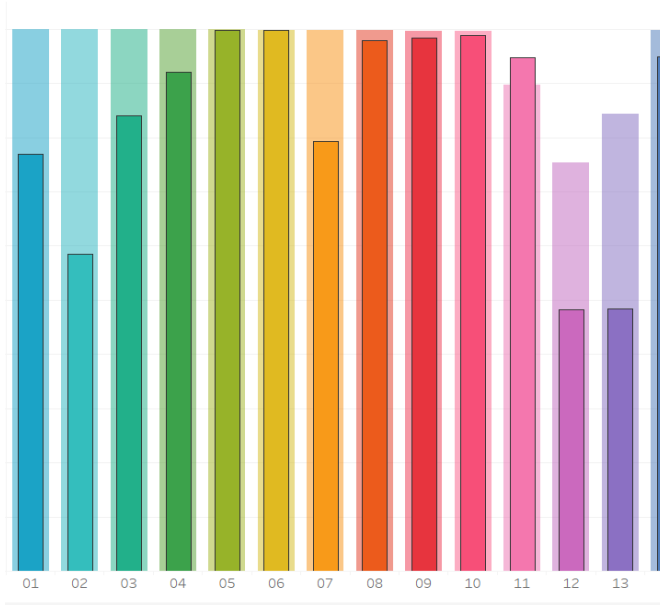
Solutions & Next Steps: What are the options? What is the best course of action?

www.storytellingwithdata.com/

Learn to quantify inequalities

- Looking at the detail of what happens in communities
- Taking the necessary data
- Disaggregating information at the level of inequalities





www.sei.org/featured/how-a-water-model-can-reveal-inequalities-and-inform-better-policy/

Bridging science and engineering with policy

- The science and tools exist
- We have the power to influence policy through community engagement, communicating data, and social media
- Working together we can reach an equitable world that will be better and more profitable for all

So what?

5

10 REDUCED INEQUALITIES

16 PEACE, JUSTICE AND STRONG INSTITUTIONS

Our challenge

Then, what can we do?

How to reduce water inequalities

How to cross the bridge between science and policy

How to work together

What we can do

- Create opportunities for diverse teams, be aware of the pipeline, and keep women moving up in the ranks - the face of the workforce should reflect the face of society
- Support young scientists in their careers – we need to achieve the 1000 researchers/million people in Latin American countries, and the rest of the world
- Continue innovating in tools and communication of research to influence decision for a more equitable world