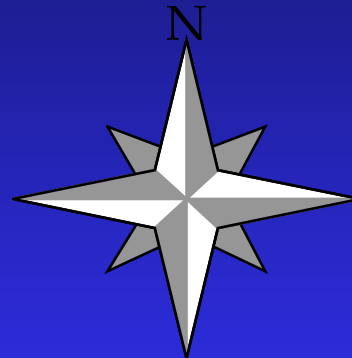
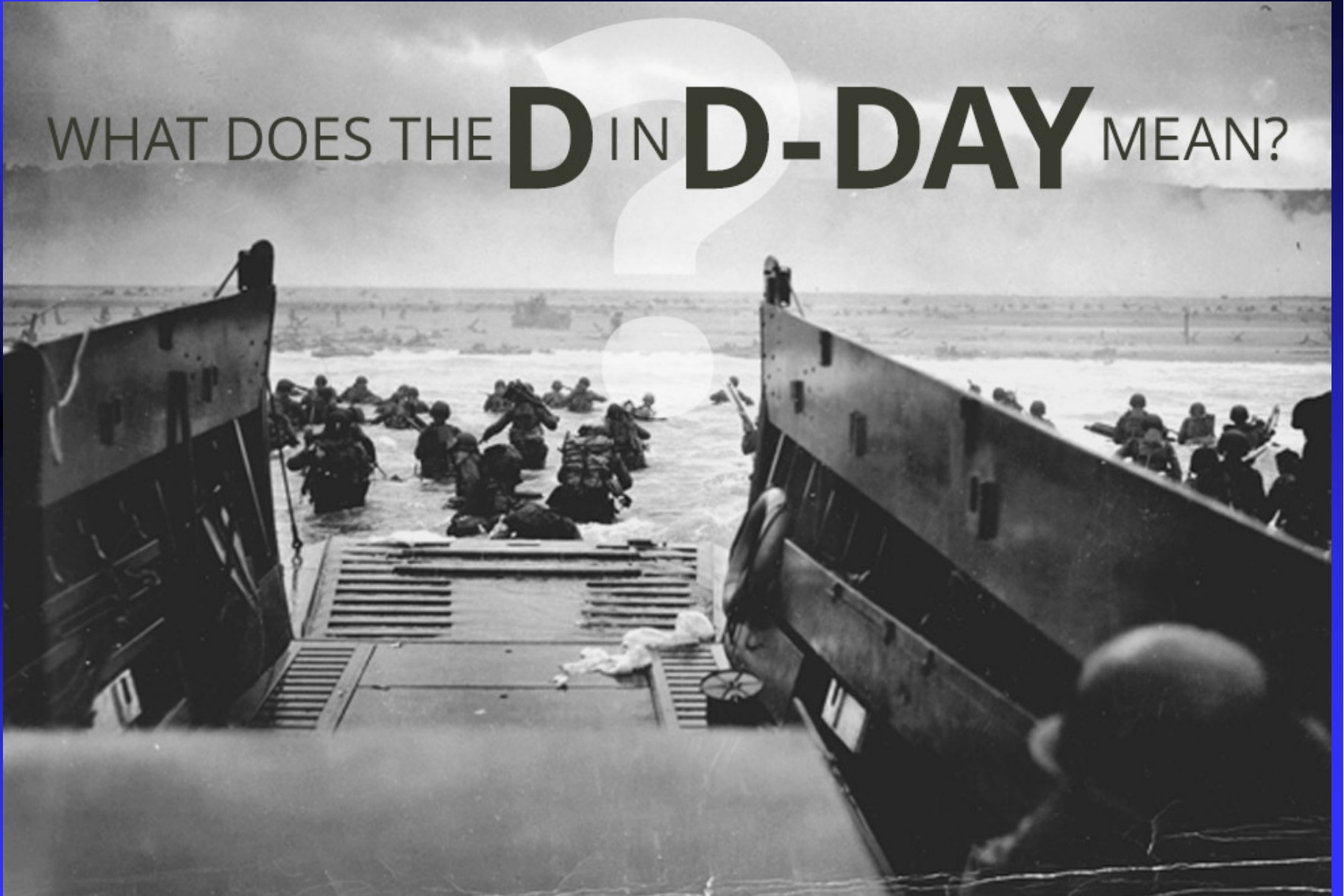


Plant Water Efficiency: →From the Plant Perspective←



June 2017 CIBO Meeting
Eric M. Hallman
Washington DC

WHAT DOES THE **D** IN **D-DAY** MEAN?



Water Efficiency - What is it?

General Definition:

Minimization of the amount of water used to accomplish a function, task or result. (Vickers)

What is it? General Definition:

- **Water efficiency** is reducing water wastage by measuring the amount of water required for a particular purpose and the amount of water used or delivered. ^[1] Water efficiency differs from water conservation. In that it focuses on reducing use/waste, not restricting use. ^[2]

What is it? United Nations:

- “Water efficiency is a multi faceted concept. It means “doing more and better with less” by obtaining more value with the available resources, by reducing the resource consumption and reducing the pollution and environmental impact of water use for the production of goods and services at every stage of the value chain and of water service provision.”
- “Improving water efficiency means increasing water productivity –that is, reducing the intensity of water use for, and pollution from socio economic activities through maximizing the value of the uses of water–, improving the allocation of water among competing water uses so as to obtain greater socio-economic value per drop of water – ensuring environmental flows–, and improving technical efficiency of water services and the management efficiency of their provision over the complete life cycle.”

What is it? Plant Water Efficiency

- Efficiency can be thought of as a %
- Water Efficiency is usually
 - ◆ $\text{Volume of Water} / \# \text{ of widgets or } \# \text{ of product}$



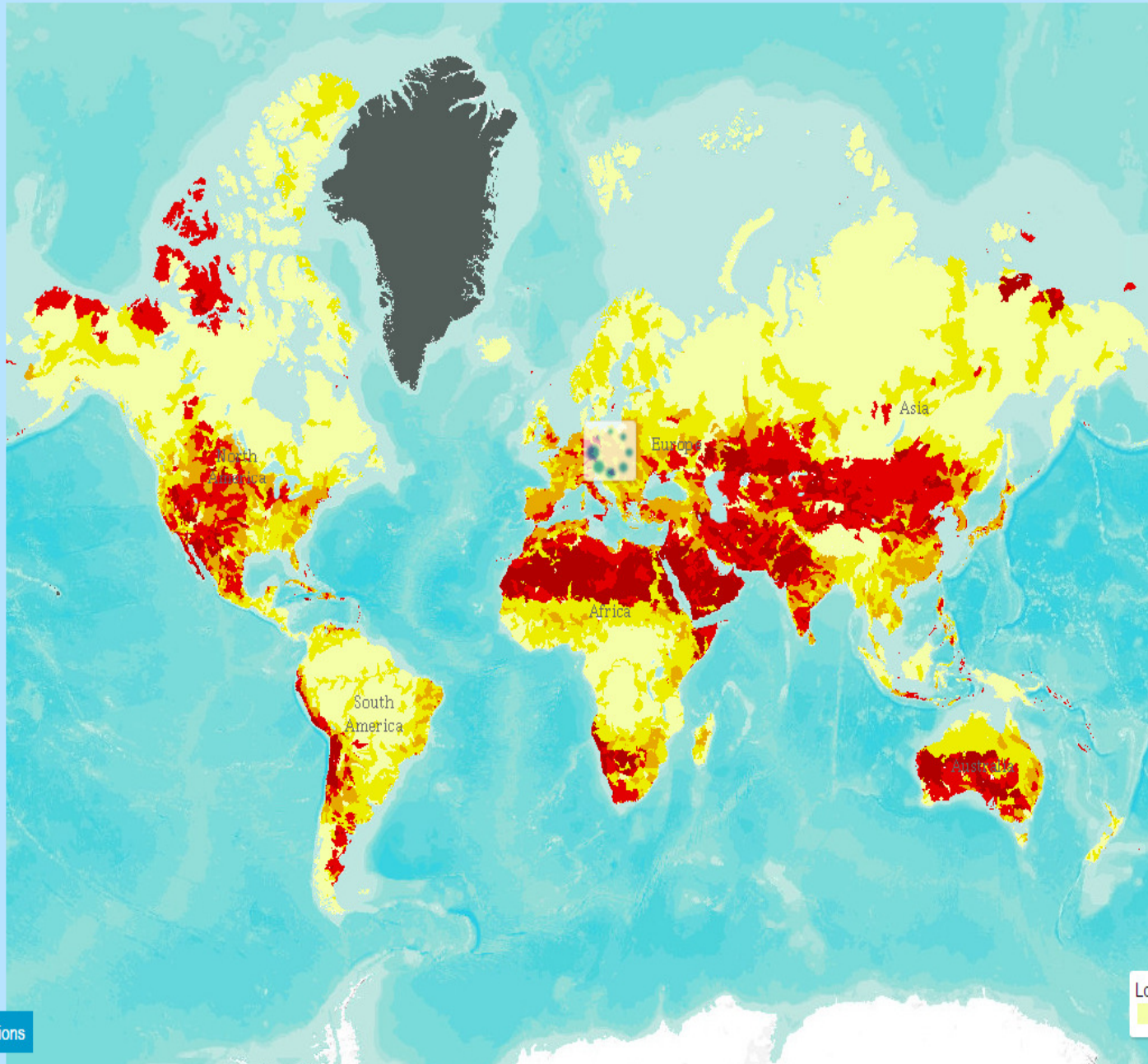
Why is it important?

Proactive Environmental Discussion:

Water: The Next Frontier

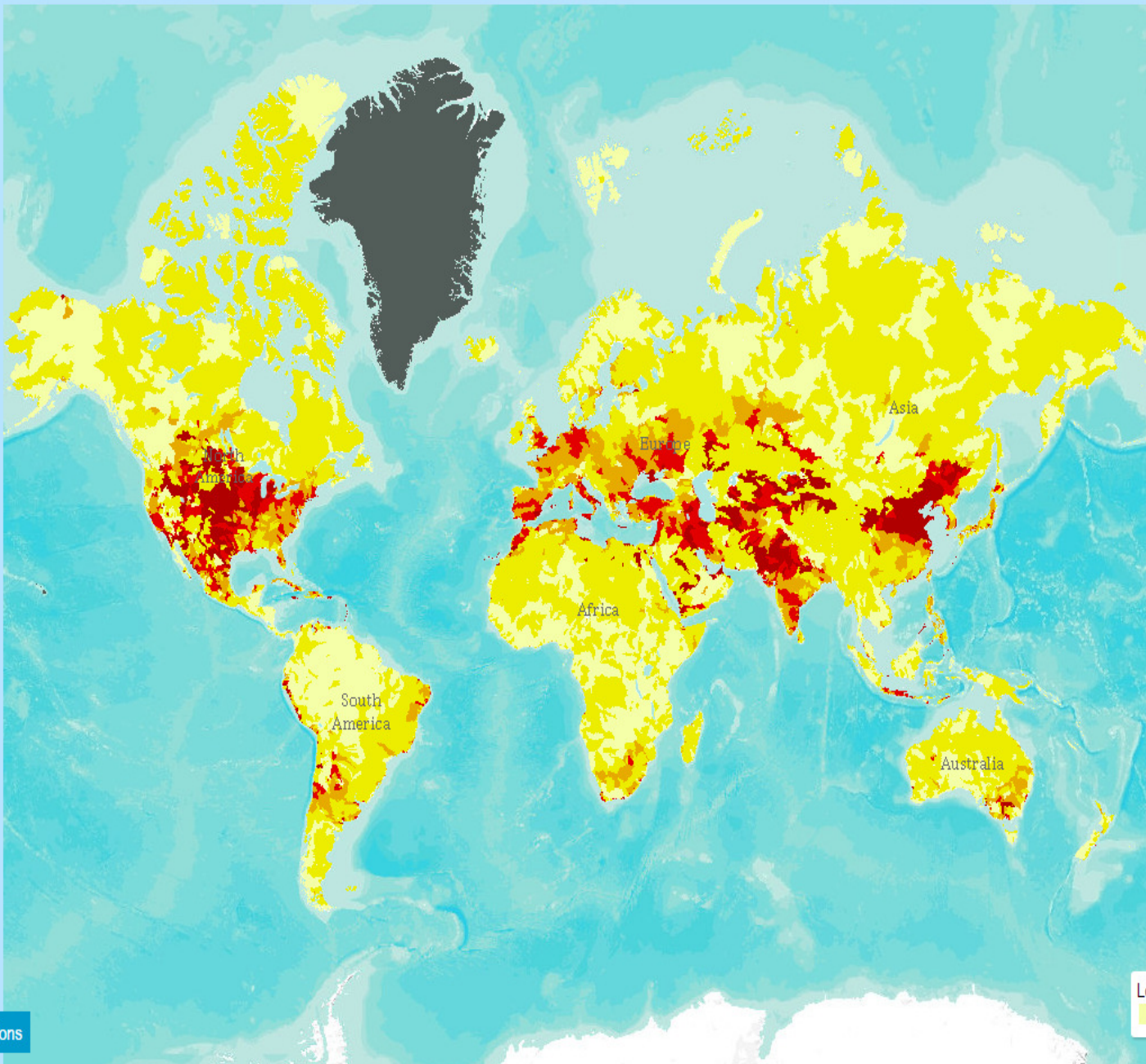


+ Indicators



+ Analyze Locations

+ Indicators



Map navigation controls including zoom in (+), zoom out (-), home, layers, and legend icons.

+ Analyze Locations

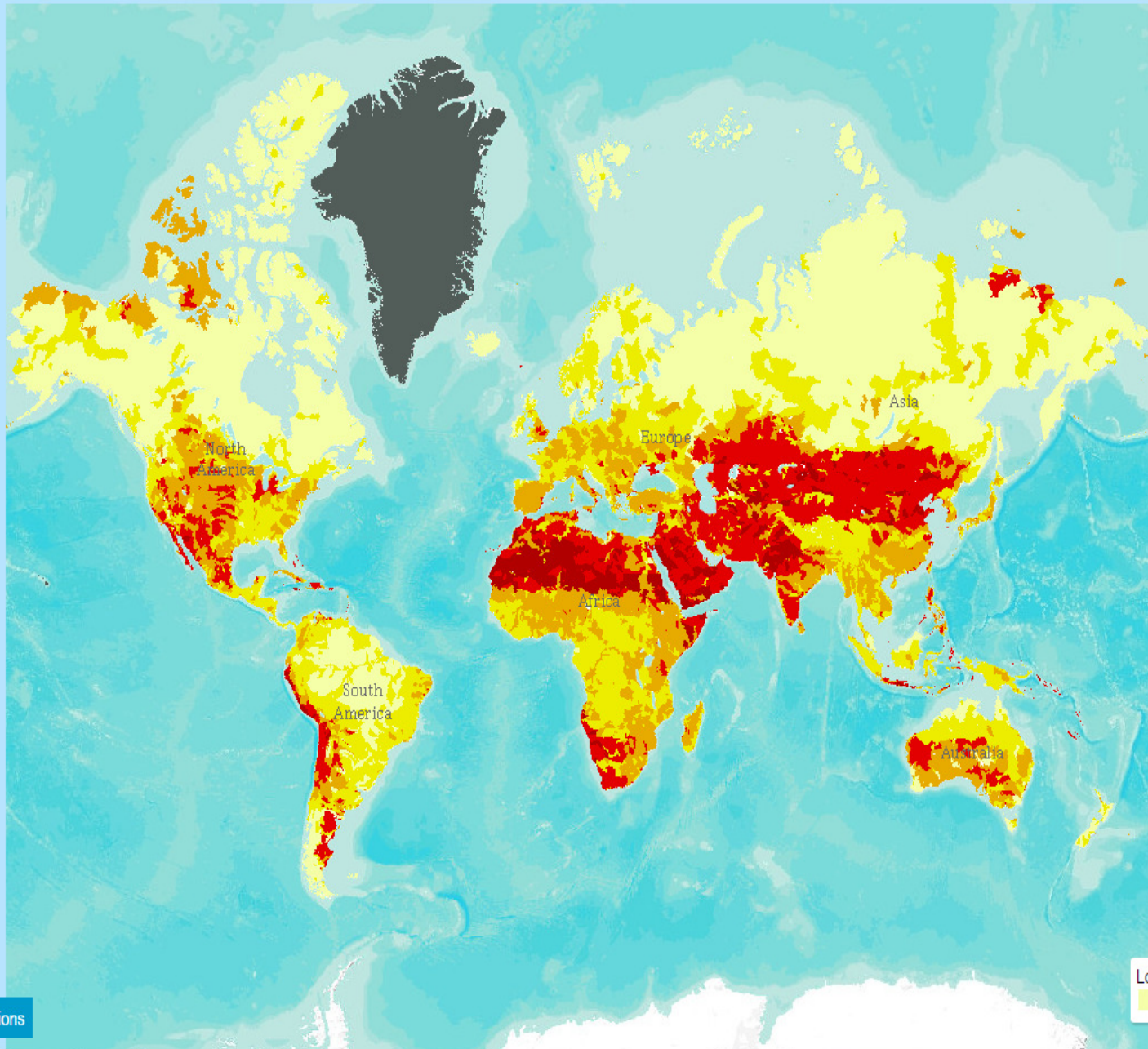


Current Conditions

Future Conditions

Methodology Download Share Print Help

+ Indicators



+ Analyze Locations

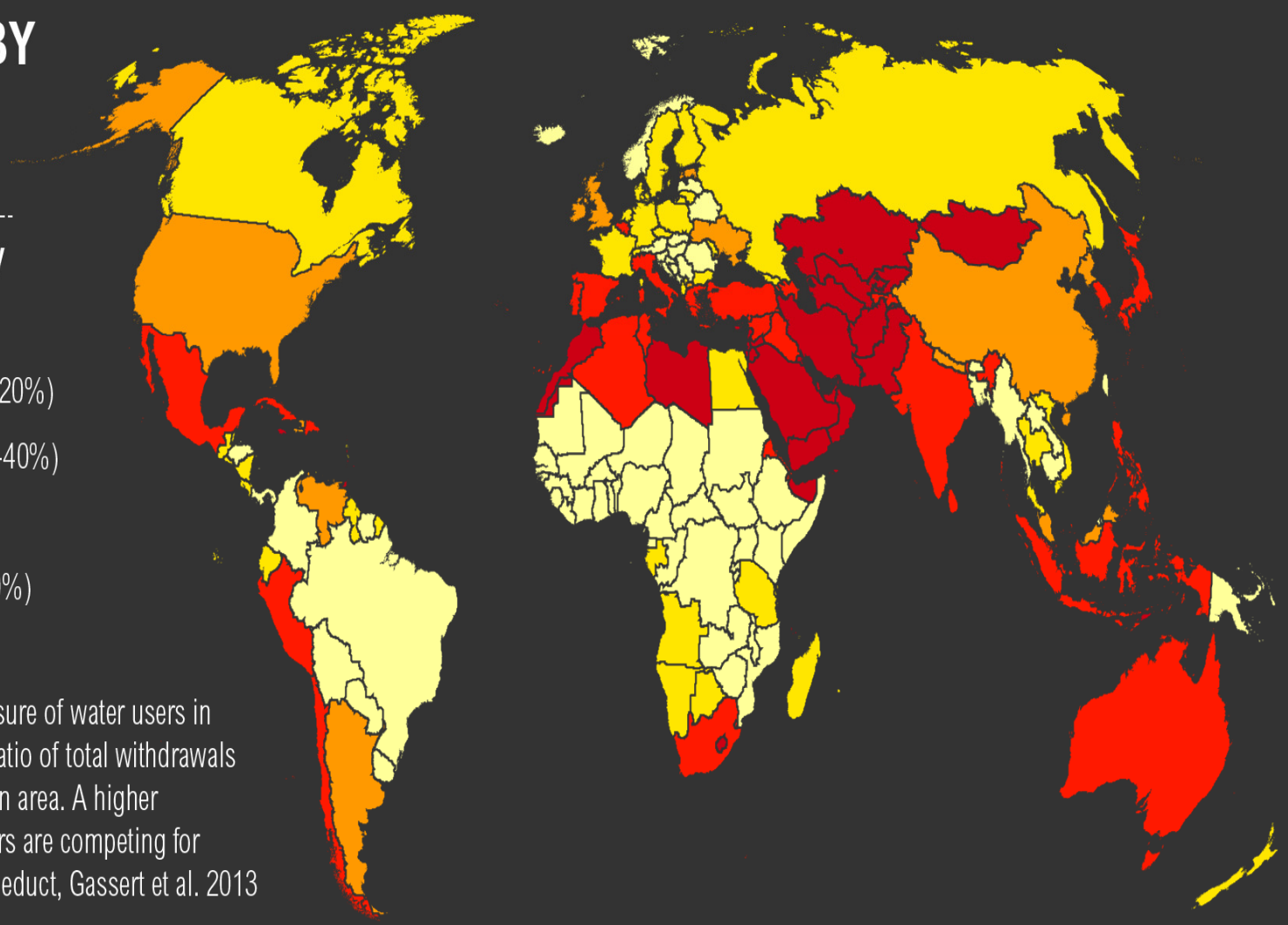


WATER STRESS BY COUNTRY

ratio of withdrawals to supply

- Low stress (< 10%)
- Low to medium stress (10-20%)
- Medium to high stress (20-40%)
- High stress (40-80%)
- Extremely high stress (> 80%)

This map shows the average exposure of water users in each country to water stress, the ratio of total withdrawals to total renewable supply in a given area. A higher percentage means more water users are competing for limited supplies. Source: WRI Aqueduct, Gassert et al. 2013



Water is the Next Frontier

■ Why?

- ◆ So Important for Life
- ◆ Global Quality & Quantity Depletion
- ◆ CIBO Members Want to be Good Stewards

■ Industrial Uses / Business

- ◆ Want to be Efficient
- ◆ Reputation is Important
- ◆ Seen as Champions of the Environment

Do You Have a Program?

Establishing a Plant Water Efficiency Program:

- Start it off - Conduct a facility wide water-use audit
 - ◆ Consultants offer this if no expertise internally
 - ◆ Develop a “living” Plant Water Balance
- Benchmark to similar industries/companies
 - ◆ Patterns, industry trends, case studies
- Set Goals and Track Data
 - ◆ Set baseline – work towards improvement

How do You Measure/Track?

■ Plant based activities:

◆ Measure water flow/use accurately

☞ In & Out, + Uses

◆ Track daily into data historian

◆ Track monthly vs production = efficiency

■ Operator Tool

◆ Instantaneous feedback on use/efficiency

☞ Loop tuning info

☞ Can set up alarms, color codes, etc on screens

What Can You Do? Boilers

- Inspection & Maintenance program for steam traps, lines, leak repair
- Implement annual (at least) boiler tuning
- Insulation on steam, condensate and holding tanks
- Proper Blowdown control. Too little = scaling, Too much = wastes water
- Water treatment – do it right

What Can You Do? Boilers

- Maintain condensate pumps properly
- Expansion flash tank to temper blowdown
- Install flowmeters on boiler make-up lines and on recirculation lines
- Install a condensate return system – lowers water use, chemical use, and energy use.
- Blowdown heat exchangers can preheat feed water

What Can You Do? Cooling

- Single Pass Cooling Systems → 2nd or 3rd Use
 - ◆ Opportunity for significant water reuse
 - ◆ Condensers, compressors, hyd eqpt, vacuum pumps, etc
- Wet Scrubber dust collectors
 - ◆ Go to closed loop or switch to condensate

What Can You Do? Operators

- Establish operating targets for operators
- Empower them to take ownership
- Create culture of water efficiency
 - ◆ Tank levels, wet scrubbers, operate within compliance and most efficiently
 - ◆ Real time information on control screens

What Can You Do? Management

- Use your data
- Use your water balance (good job Anne!)
- Find areas of the plant to improve
- Create culture of water efficiency
- Position your plant/business for the future!
- Tools to Help.....

Resources:

- <https://energy.gov/eere/femp/best-management-practices-water-efficiency>
- <http://www.wri.org/our-work/topics/water>
- http://www.un.org/waterforlifedecade/pdf/01_2014_water_energy_efficiency.pdf
- <http://www.allianceforwaterefficiency.org/resource-library/default.aspx>

Thank You – Questions & Discussions

