

Talking about Water: Focus on Quality *not* History



CH2MHILL

EMILY CALLAWAY

Presented to: Idaho Department of Environmental Quality
Wastewater Reuse Conference

May 13, 2009



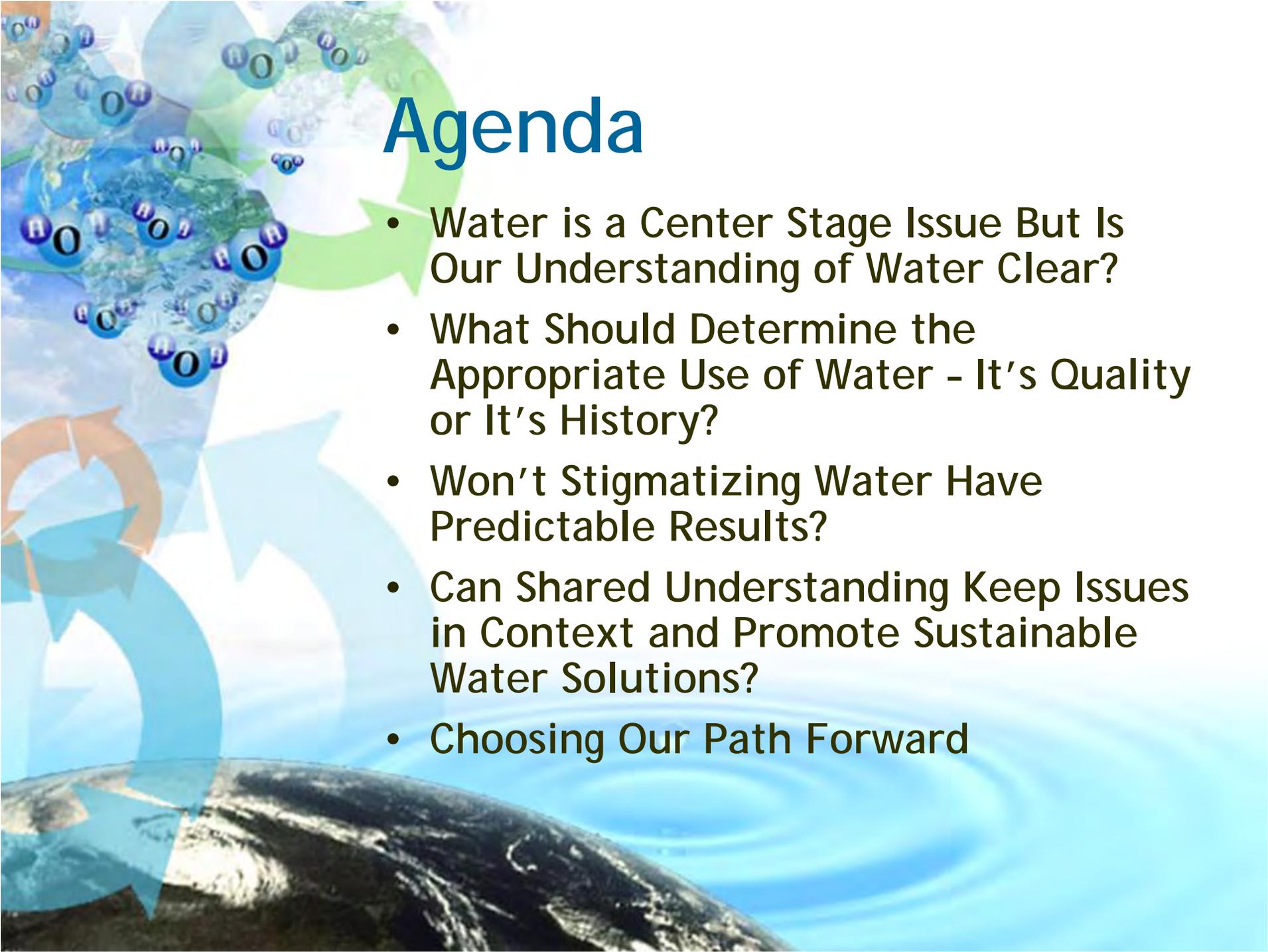
Linda Macpherson

an international advocate and strategist for water reuse information and acceptance...

- Involved in water education around the globe
 - Boise WaterShed Environmental Education Center
 - NEWater, Singapore
 - Tianjin, China



bridging the gap between the engineering/scientific community and the general public

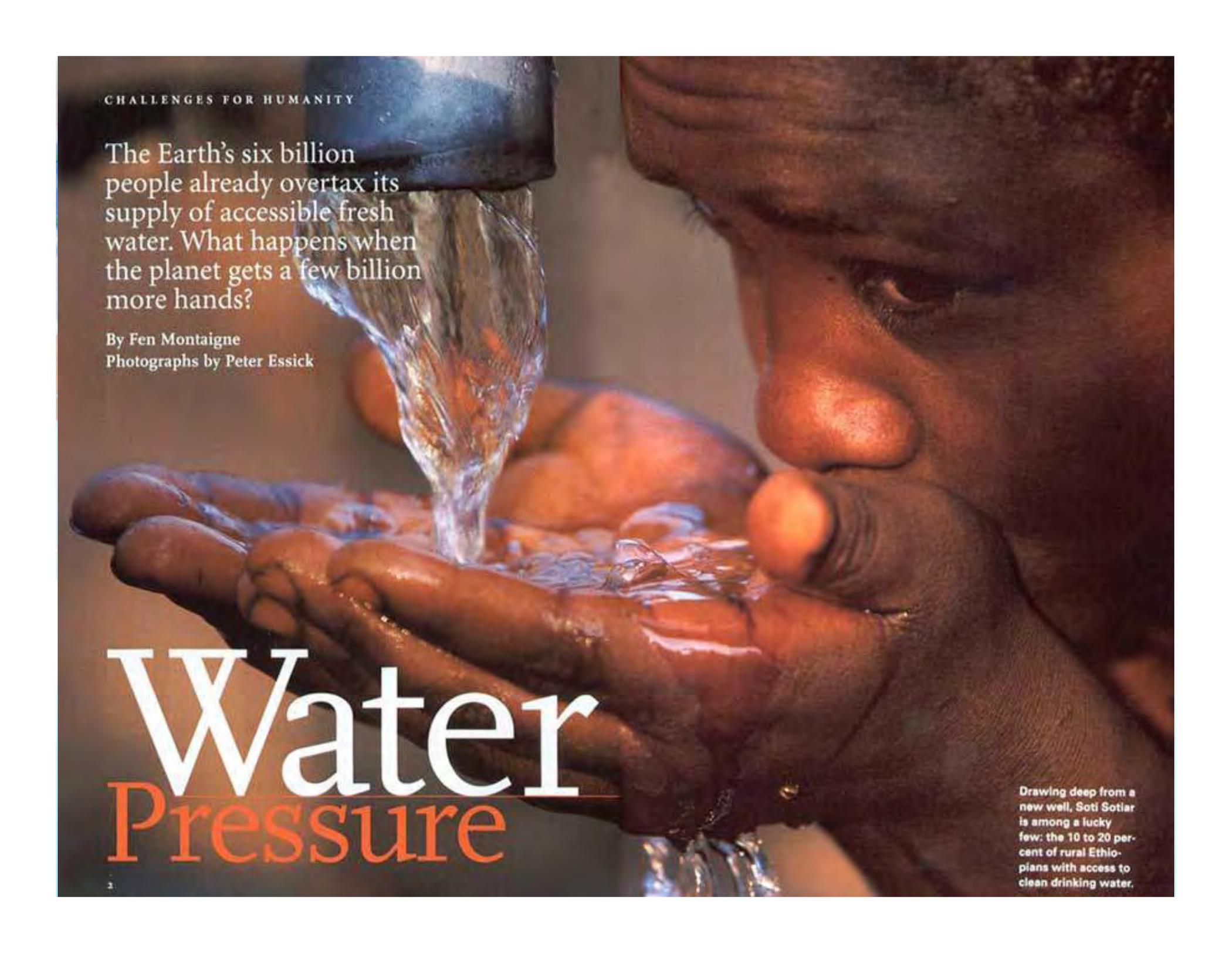


Agenda

- Water is a Center Stage Issue But Is Our Understanding of Water Clear?
- What Should Determine the Appropriate Use of Water - It's Quality or It's History?
- Won't Stigmatizing Water Have Predictable Results?
- Can Shared Understanding Keep Issues in Context and Promote Sustainable Water Solutions?
- Choosing Our Path Forward



Water is a Center Stage Issue
But Is Our Understanding of Water Clear?



CHALLENGES FOR HUMANITY

The Earth's six billion people already overtax its supply of accessible fresh water. What happens when the planet gets a few billion more hands?

By Fen Montaigne
Photographs by Peter Essick

Water Pressure

Drawing deep from a new well, Soti Sotiar is among a lucky few: the 10 to 20 percent of rural Ethiopians with access to clean drinking water.



Sustainable Water Management: Critical to a Secure Future



Water is a critical part of the international agenda

22 March 2003
Water for the Future

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World Water Day 2002 - Water for Development

World Water Day

Help make the difference

Join the movement for action around the World Water Day, 22 March of each year.

Water for the Future is the theme for World Water Day 2003. It calls on each one of us to monitor and improve the quality and quantity of fresh water available to future generations. This is essential if we are to achieve the **Millennium Development Goal** to halve, by 2015, the number of people living without safe drinking water and basic sanitation.

The United Nations Environment Programme (UNEP) is the lead UN agency for World Water Day 2003. The goal is to inspire political and community action and encourage greater global understanding of the need for more responsible water use and conservation.

World Water Day 2003 will be very much in the public eye. It will be a highlight of the **Third World Water Forum** (16-23 March 2003, Kyoto, Shiga and Osaka, Japan), which is itself a key event of the **UN International Year of Freshwater**. Discussions at the Forum in Kyoto will focus on the launch of the **World Water Development Studies**, the first ever UN system-wide effort to monitor progress against targets in such fields as health, food, ecosystems, cities, industry, energy, risk management, water valuation, resource sharing, knowledge base, construction and governance.

Water managers of the future

Many school children, especially girls, in the developing world are suffering from the lack of safe water and toilet facilities at school. This is hampering their learning and development. They also are the **water managers of the future**.

INVITATION

Singapore International Water Week

23 - 27 June 2008

Suntec Singapore International Convention and Exhibition Centre

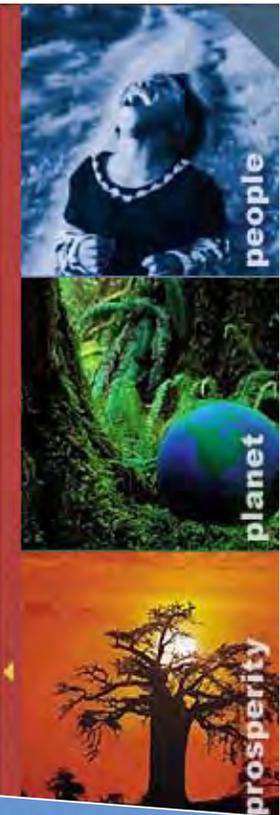
www.siww.com.sg

Held alongside with World Cities Summit 2008 - www.worldcities.com.sg
For more information, please contact SSWW - info@siww.com.sg

Johannesburg Summit 2003
people, planet, prosperity

JOHANNESBURG SUMMIT

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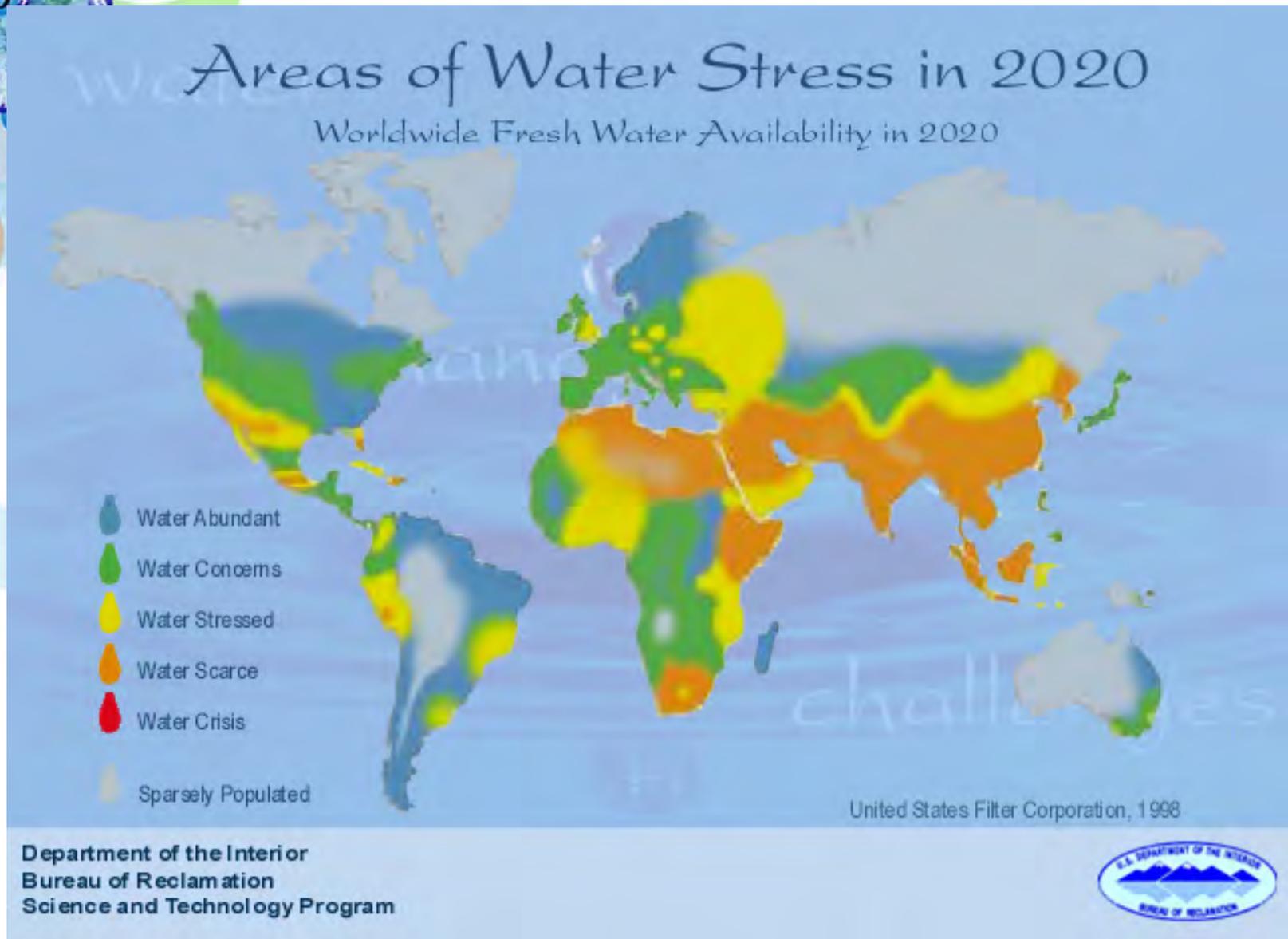


Stockholm International Water Institute

Young South African Wins Junior Water Prize Read more here! ->

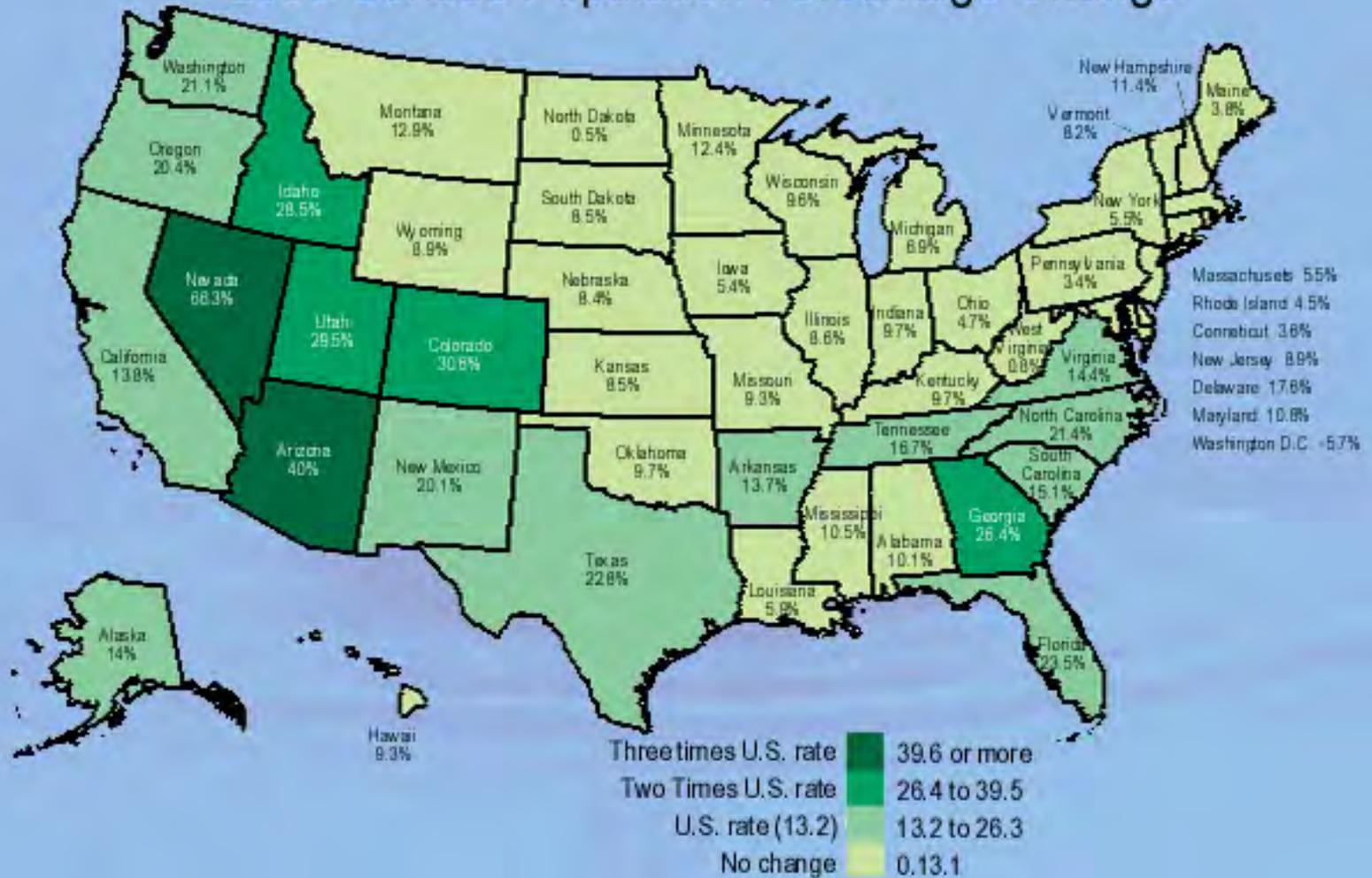
WORLD WATER WEEK

Stress on water supplies continues to increase world wide



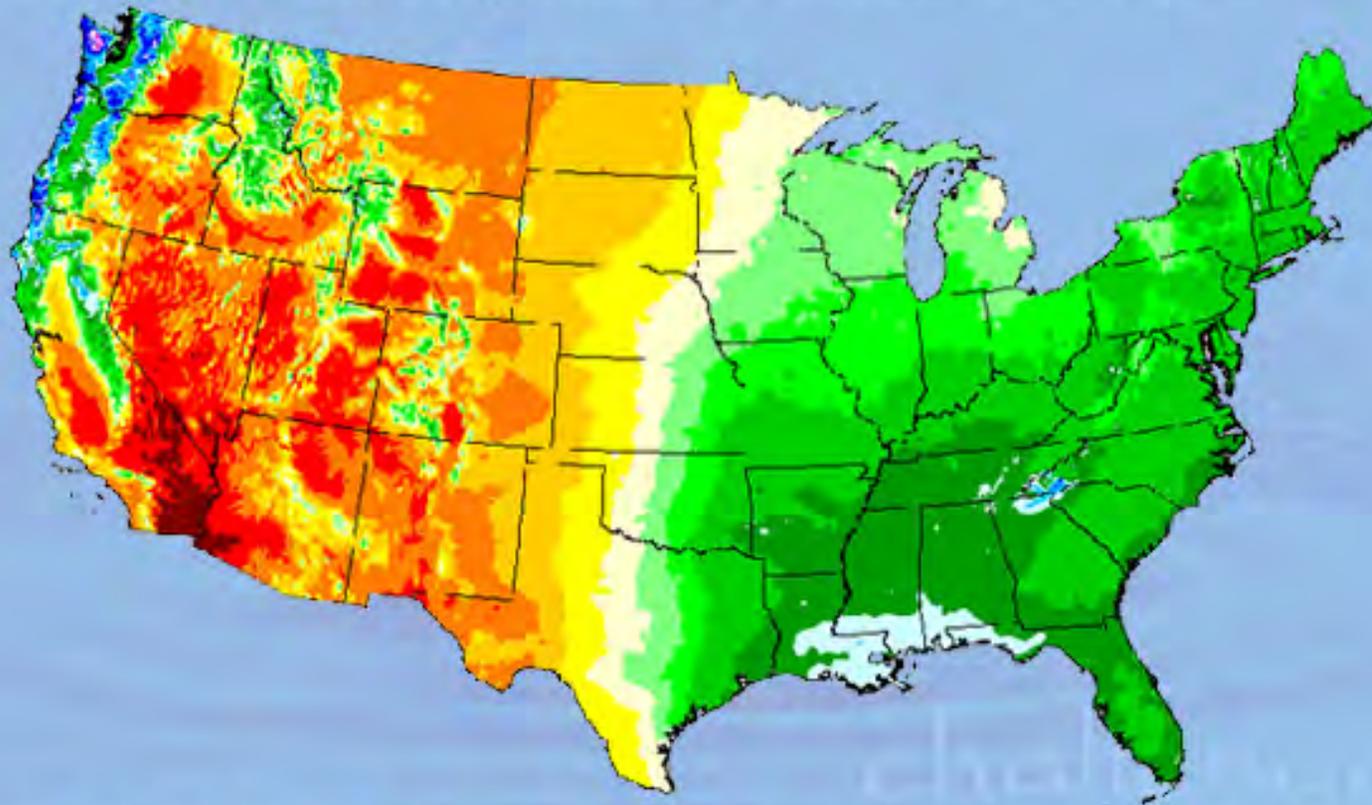
Population growth

2000 Census Population Percentage Change



Growing population centers are located in some of the dryer areas of the nation

Annual Average Precipitation in the United States

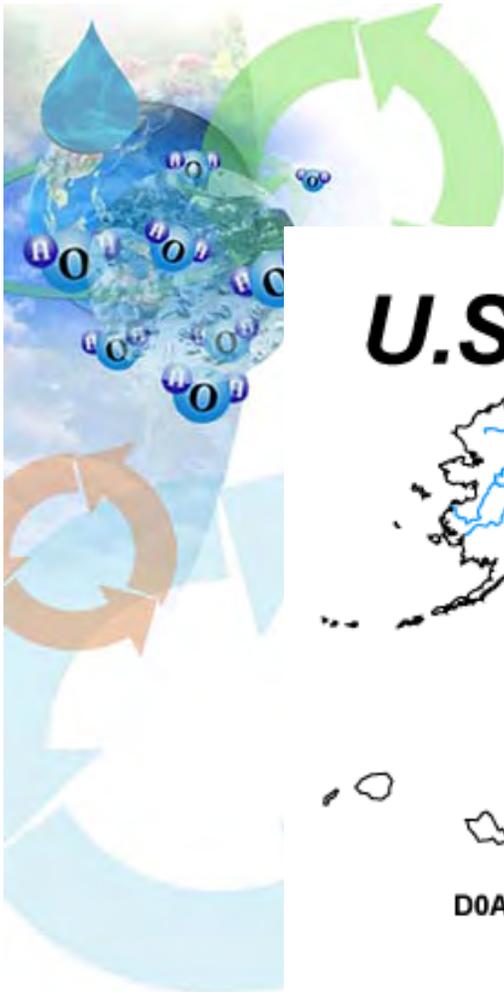


in centimeters >12.5---25.0---37.5---50.0---62.5---75.0---87.5---100---125---150---175---200---250---350---450---451+

1961-1990

Department of the Interior
Bureau of Reclamation
Science and Technology Program

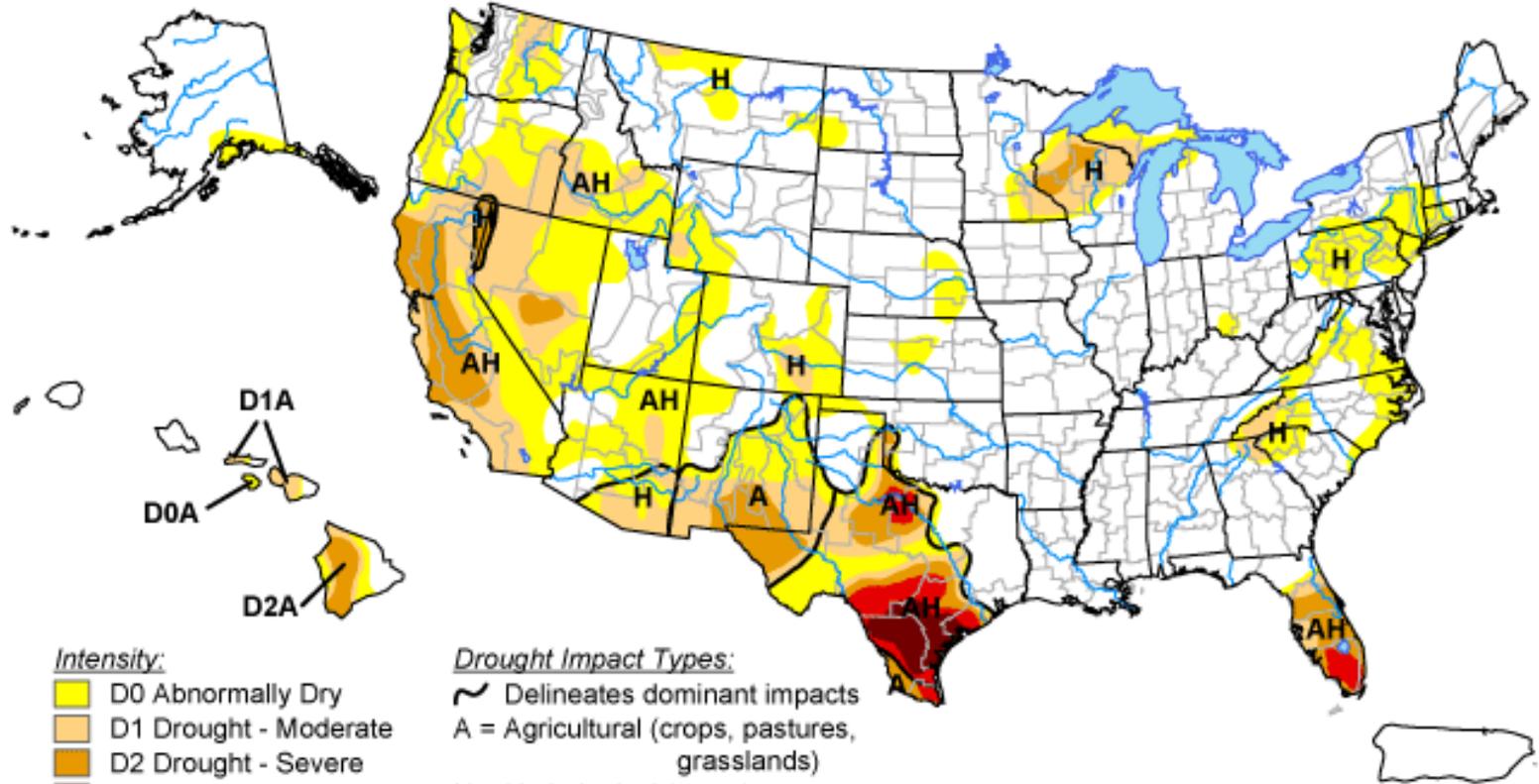




Many of these growth areas are experiencing an extreme drought

U.S. Drought Monitor

May 5, 2009
Valid 8 a.m. EDT



- Intensity:
- D0 Abnormally Dry
 - D1 Drought - Moderate
 - D2 Drought - Severe
 - D3 Drought - Extreme
 - D4 Drought - Exceptional

- Drought Impact Types:
- Delineates dominant impacts
 - A = Agricultural (crops, pastures, grasslands)
 - H = Hydrological (water)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



Released Thursday, May 7, 2009

Author: Laura Edwards, Western Regional Climate Center

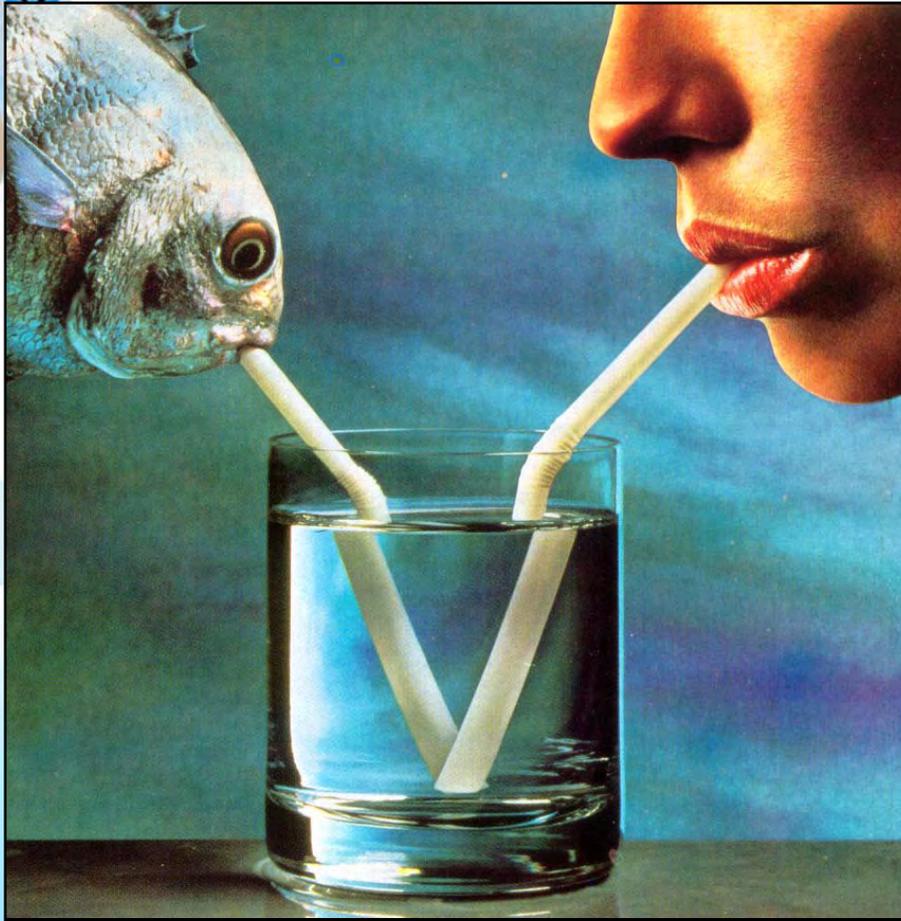
<http://drought.unl.edu/dm>

Climate and Water are *interlinked*



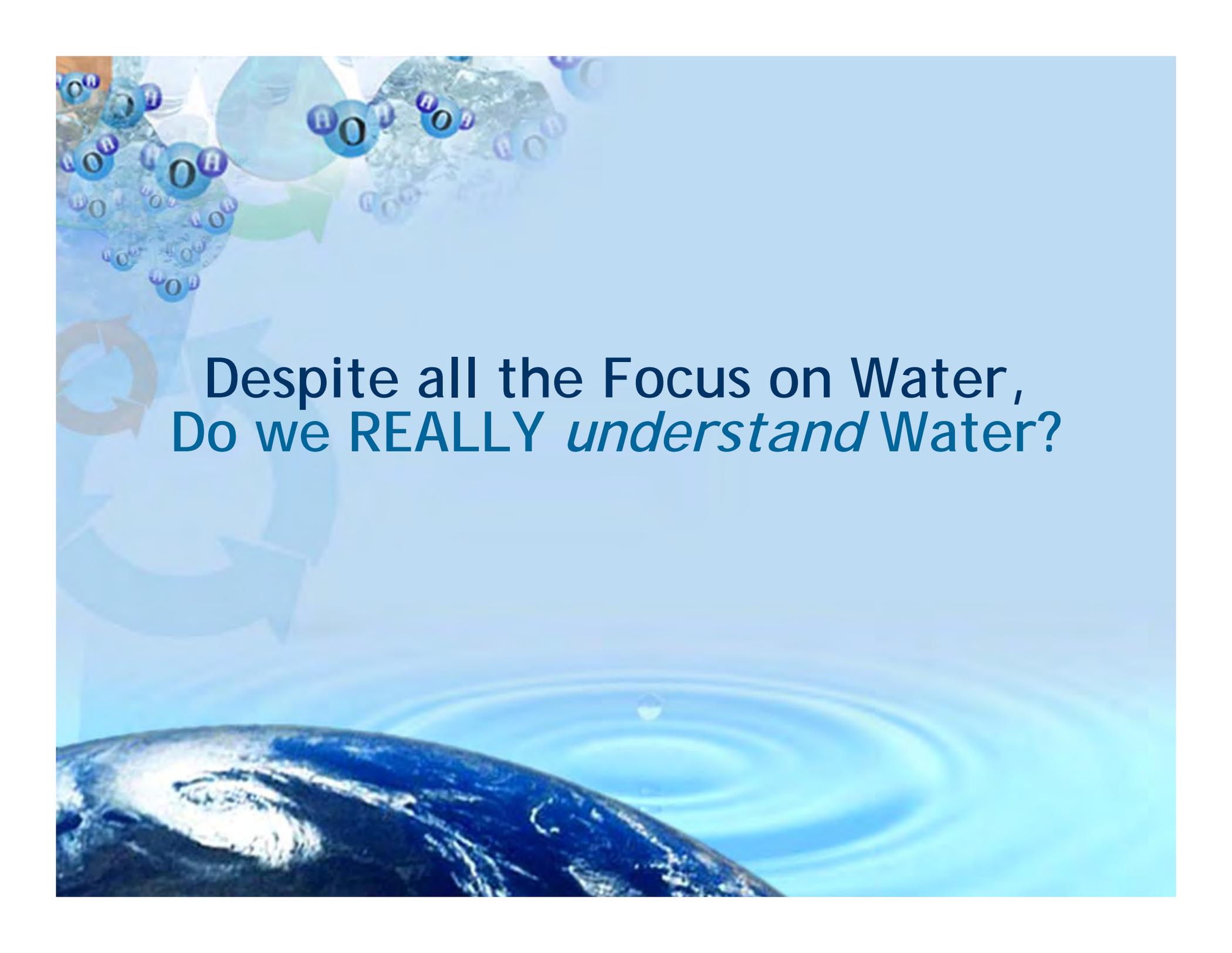


Our industry faces new challenges.
Should reuse be a part of the
solution? Isn't it *already*?



Adapted from Du Pont PERMASEP Permeators

- Water quality
- Population growth
- Endangered species
- Climate change

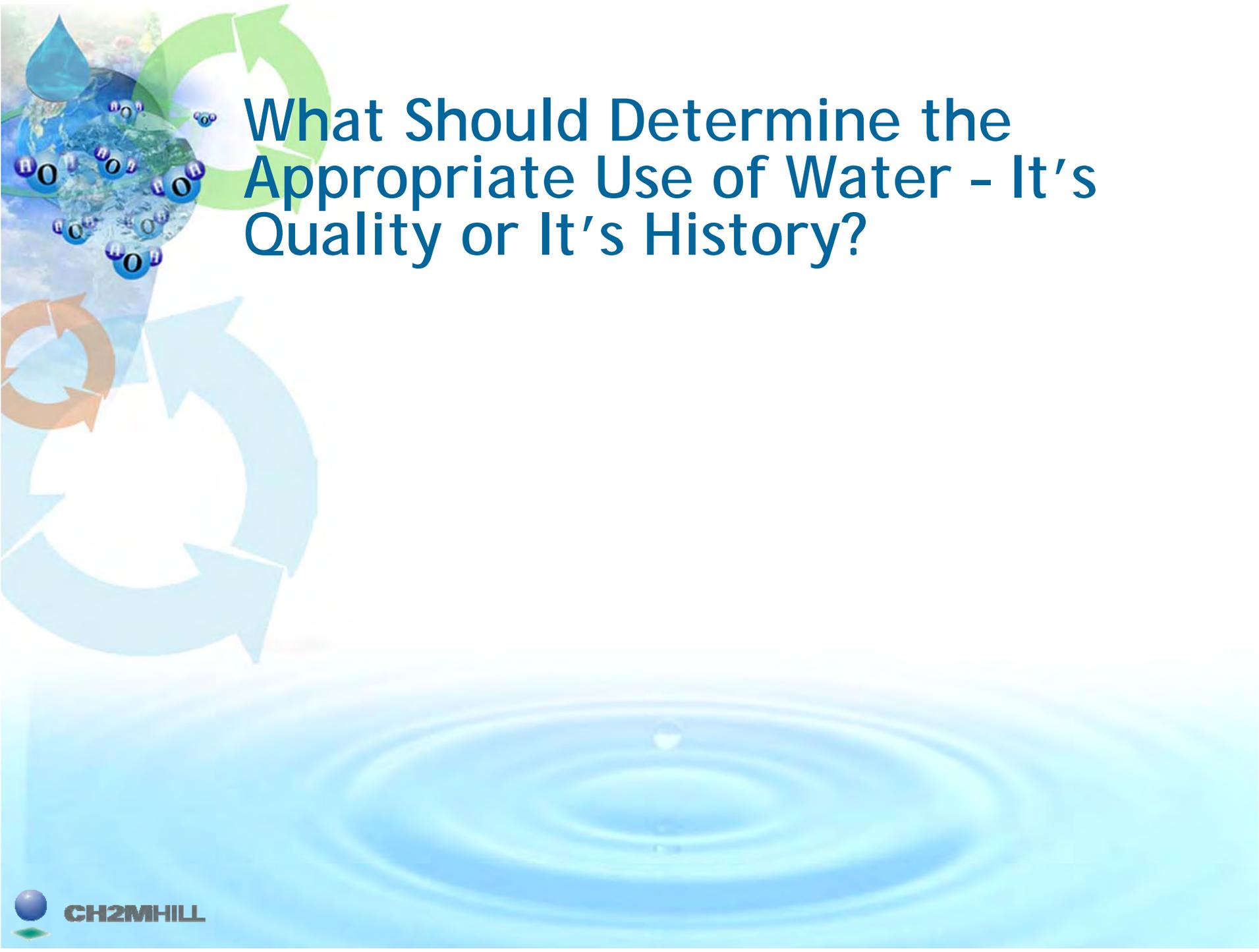


Despite all the Focus on Water,
Do we **REALLY** *understand* Water?



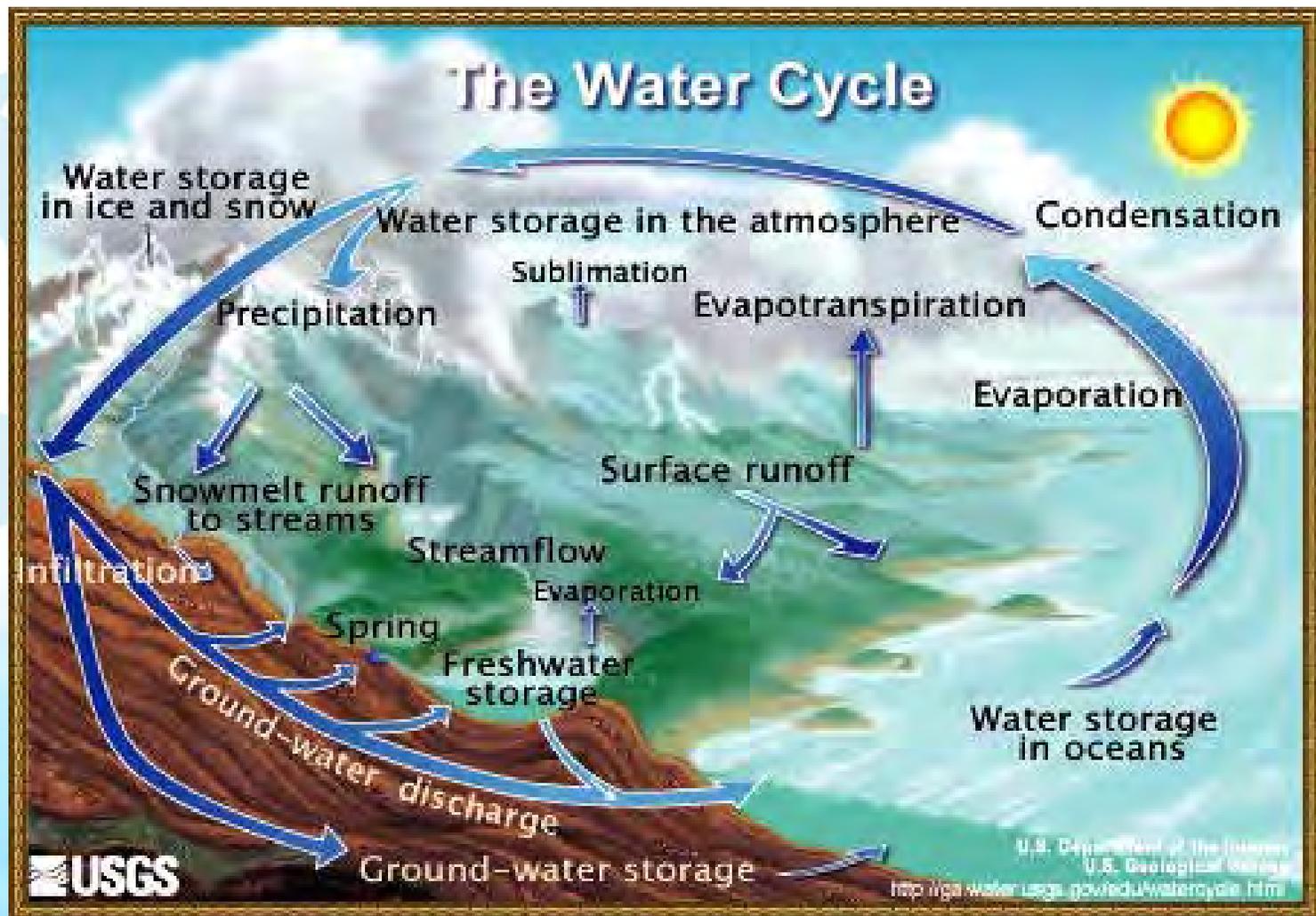
Are Snap Judgments Being Made from Sound Bites and Cartoons?

- Are we making decisions quickly on the basis of emotion or
- Are we considering all options rationally and making choices carefully?



What Should Determine the Appropriate Use of Water - It's Quality or It's History?

We understand the Water Cycle as the NATURAL water cycle



The *Water Cycle* and the *Life Cycle* are the same





When water has been through a WASTEWATER treatment plant, we call it treated wastewater, treated sewage, indirect potable reuse, unplanned indirect potable reuse, sewerage influenced waters



All water is “influenced” —We need to change the way we talk about WATER -

Why do we stigmatize some WATER?
Isn't ALL water reused?

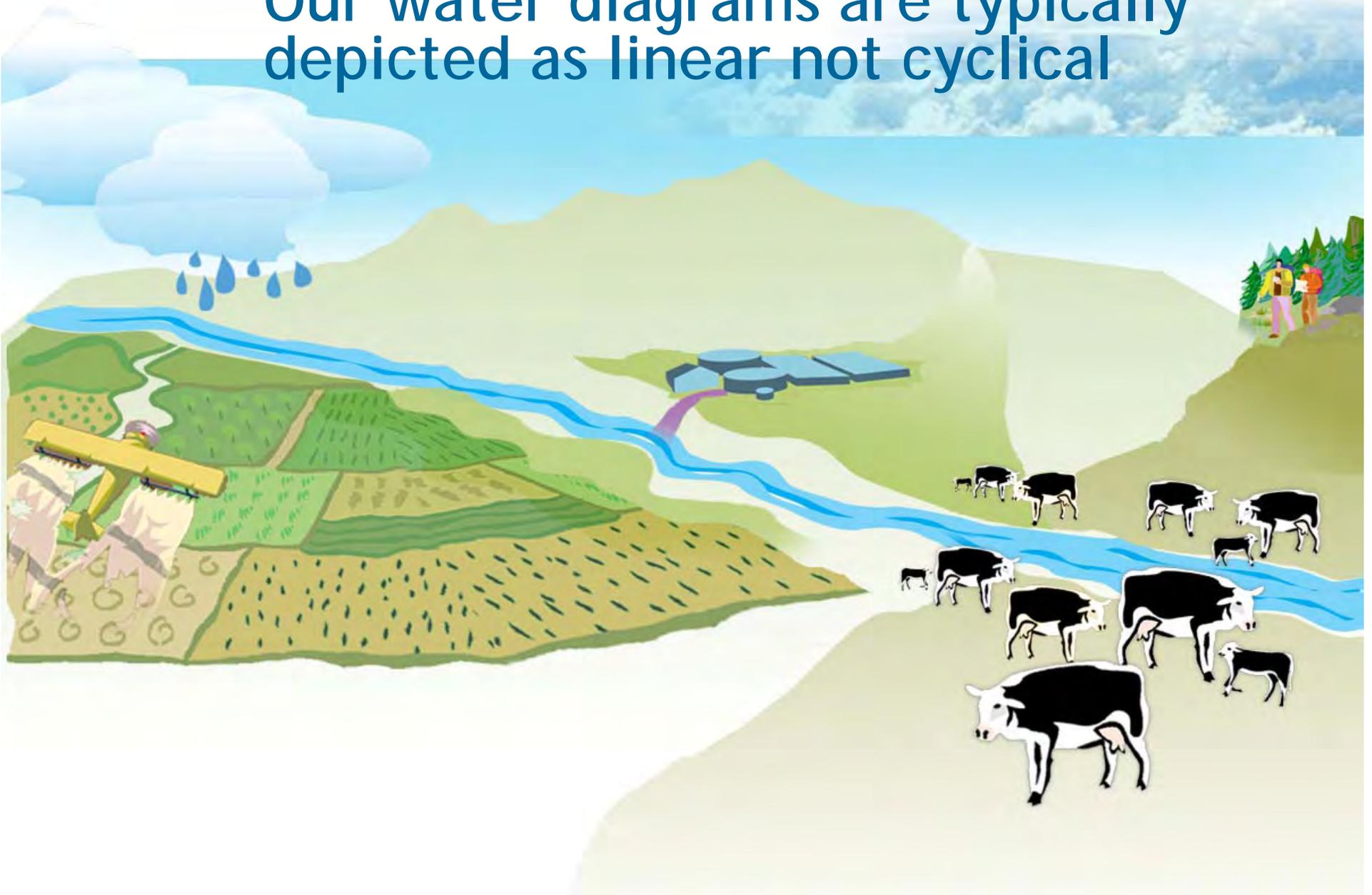




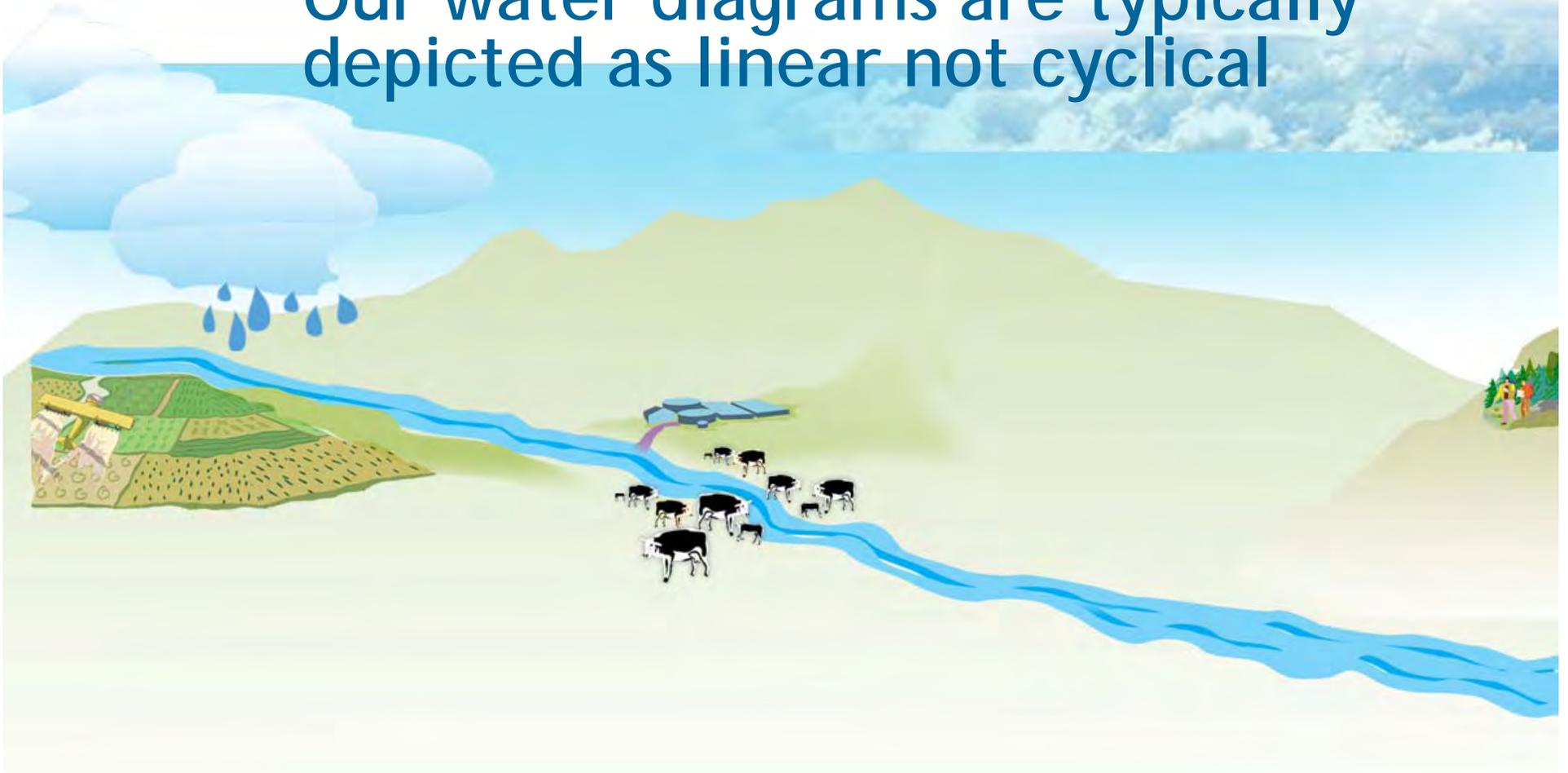
Most of us LIVE
downstream—

*Most of us DRINK
downstream*

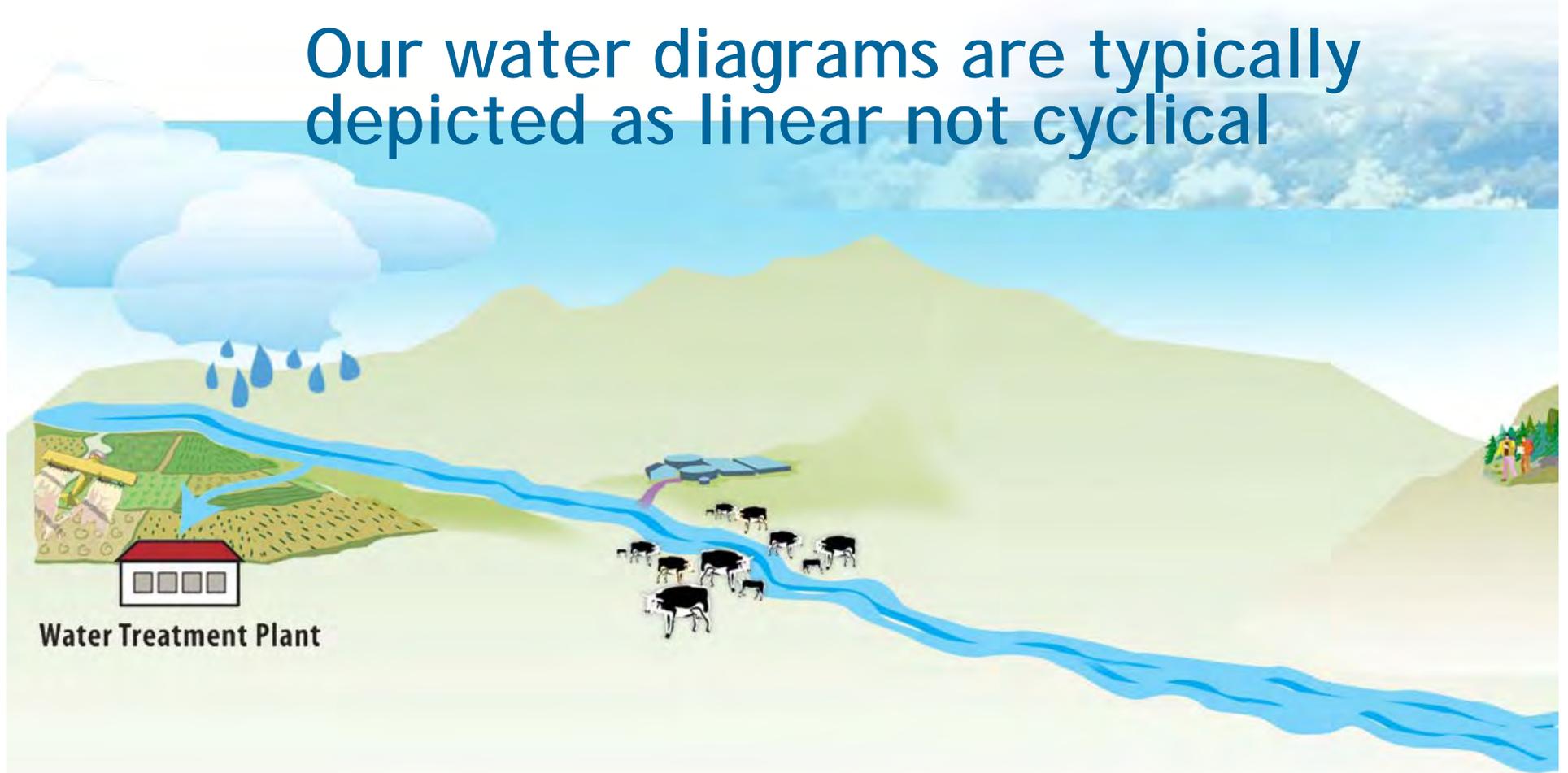
Our water diagrams are typically depicted as linear not cyclical



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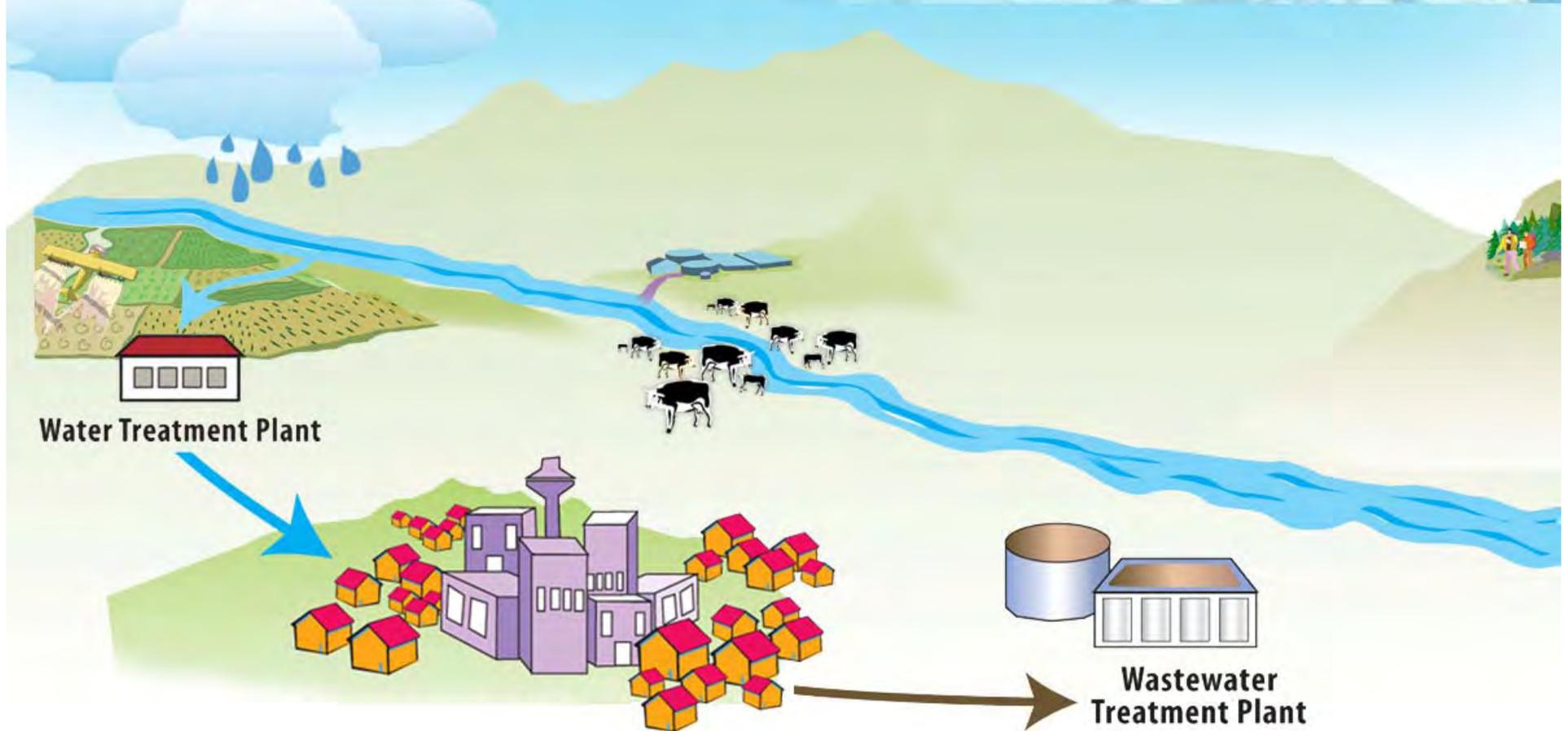


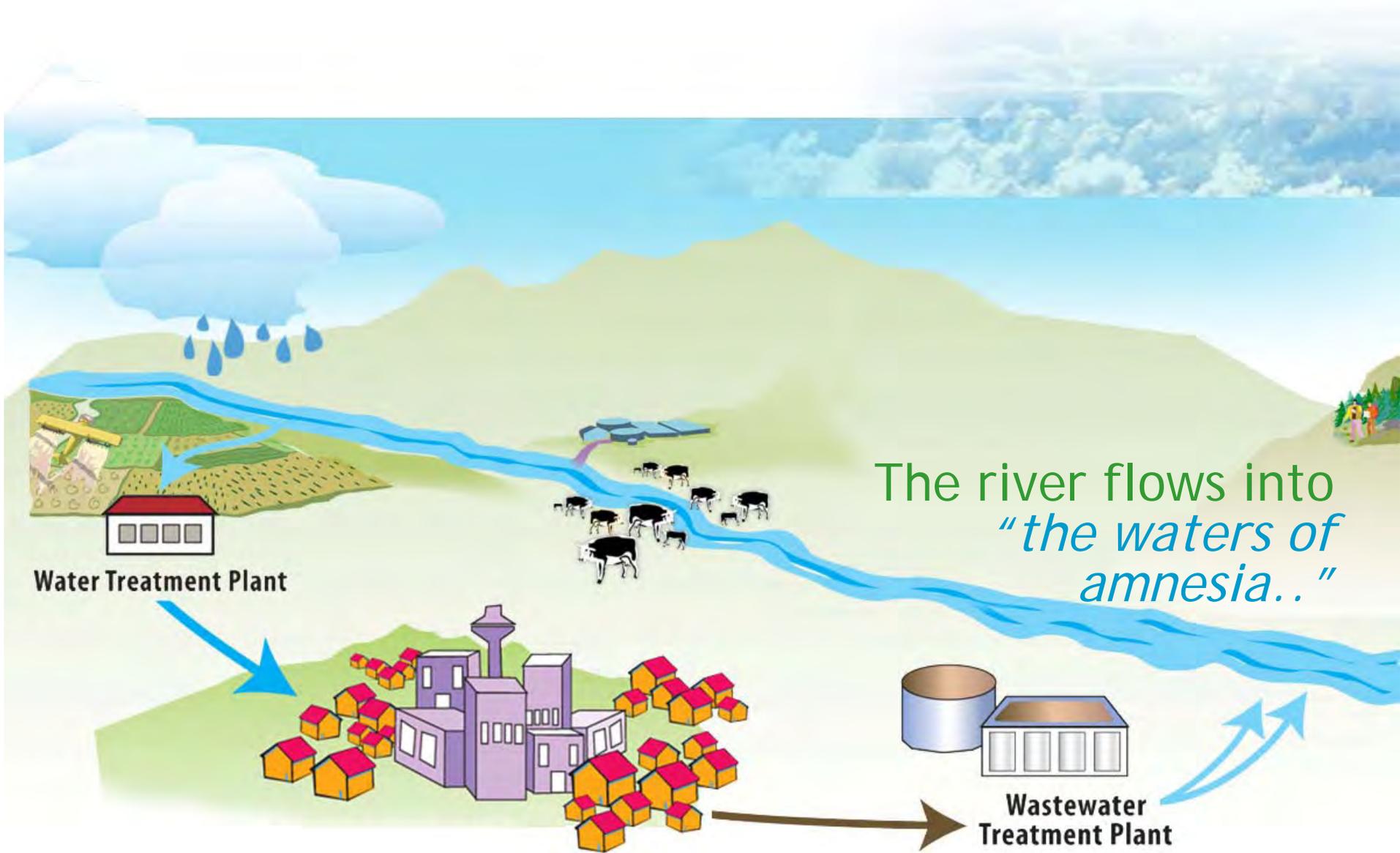
Water Treatment Plant

Our water diagrams are typically depicted as linear not cyclical

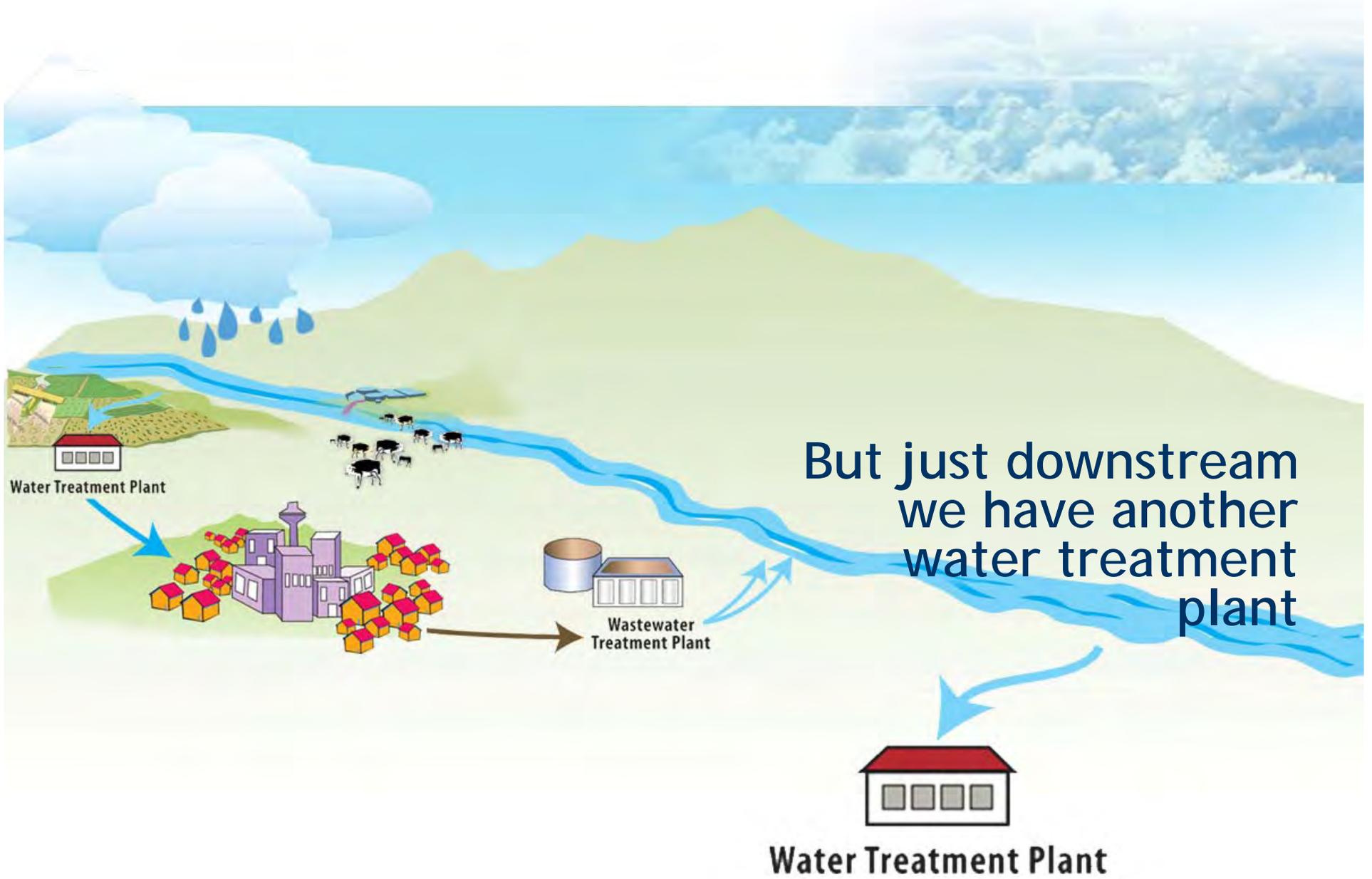


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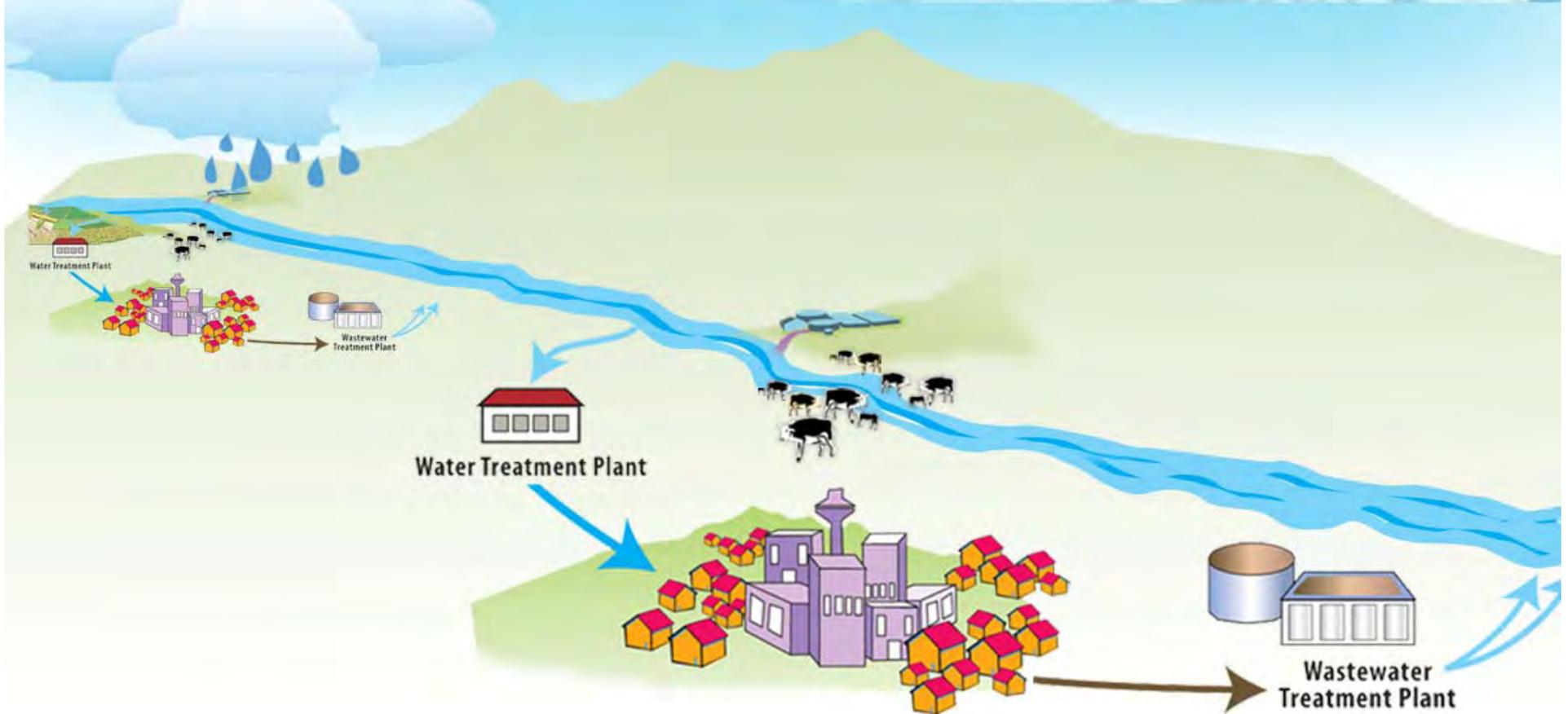




The river flows into
*"the waters of
amnesia.."*



another city and another wastewater treatment plant



Reuse Is a Reality for a Large Portion
of the Population *Right Now*

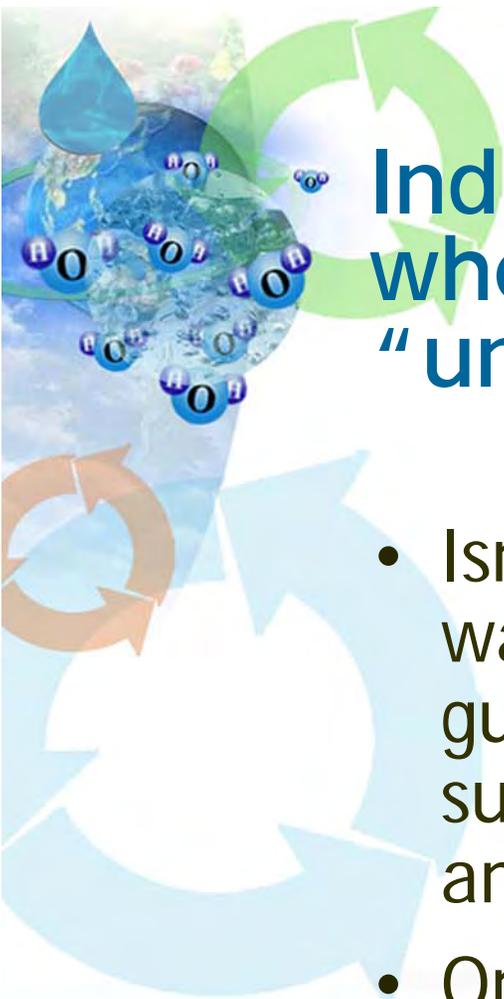


Can a Linear System That Evolved:

- For global population < 2 billion
- Mostly rural
- Lacking modern technology

Be the Solution When:

- Global population ~ 10 billion
- Mostly urban
- Experiencing greater resource constraints?



Indirect reuse is a reality now— whether it's “planned” or “unplanned”

- Isn't it appropriate that we (water, wastewater, and reuse) create projects, guidance, and regulations that promote sustainability and provide public health and environmental benefits?
- Or is it more important that we focus on the history of where the water has been - regardless of quality?



In our industry when we focus on who recycles water for drinking, we tend to emphasize only planned indirect potable use:

- Orange County, *California, USA*
- UOSA, *Virginia, USA*
- Singapore's NEWater
- Clayton County, *Georgia, USA*
- Gwinnett County, *Georgia, USA*
- El Paso, *Texas, USA*

*But the **REALITY** is...*

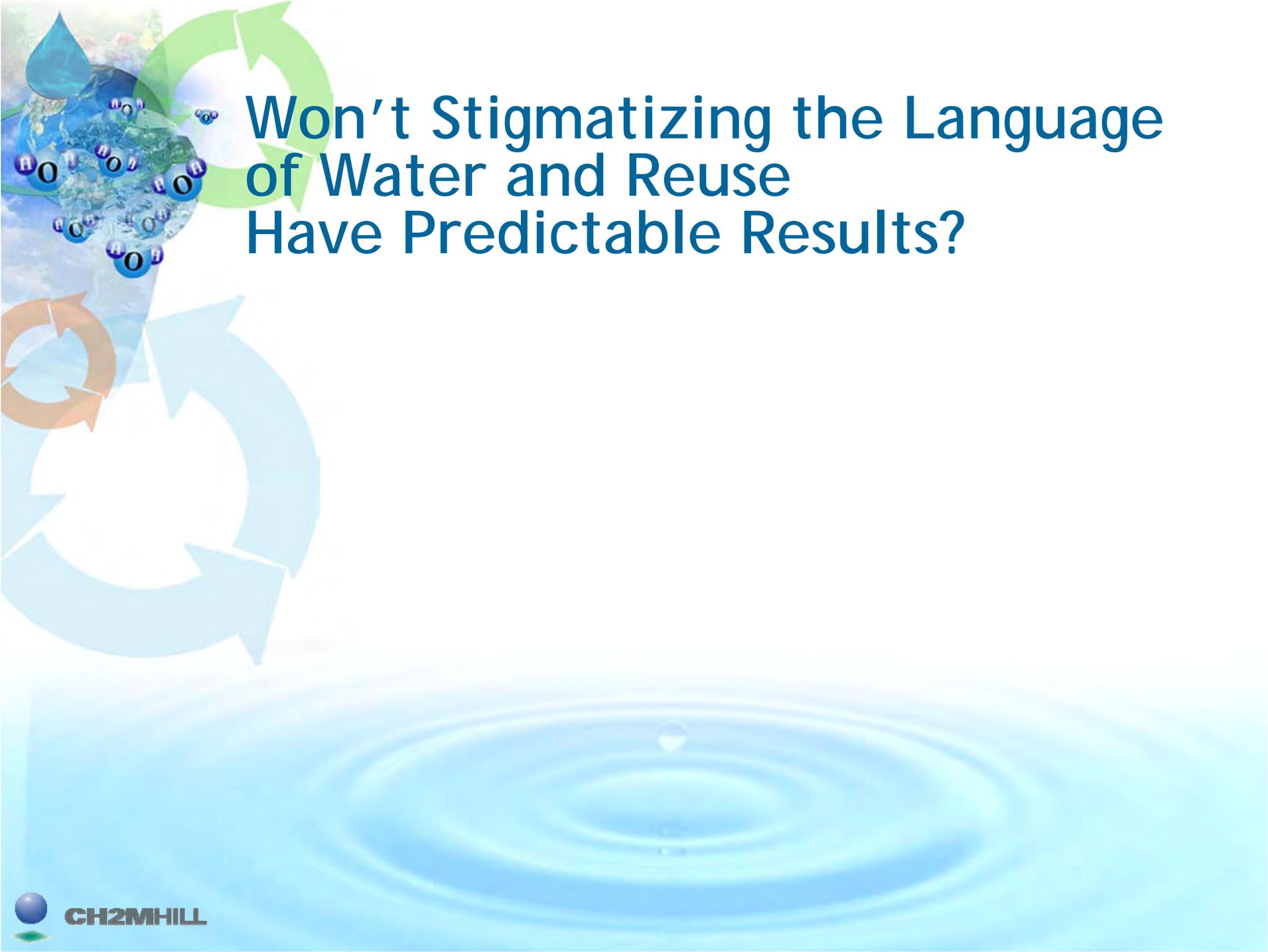
Planned and unplanned
indirect potable
uses have occurred
for many years —
with **no** known
health issues





Global water reuse is the water industry's best kept secret

- A very large part of the population of the world's industrialized countries practices indirect potable reuse
- We only focus on it when it is OUR water intake that is below OUR discharge
- We take reuse out of context making it extraordinary and unusual
- Extraordinary things are more alarming to the public than those that are commonplace
- **So, our language is actually scaring people away from reuse!**



Won't Stigmatizing the Language
of Water and Reuse
Have Predictable Results?



1 choice is continued discharge into Laguna; 3 go straight to ...

Santa Rosa Press Democrat - Santa Rosa, CA, USA
 Most comments focused on "emerging contaminants," non-regulated levels of pharmaceuticals, personal care products and pesticides found in wastewater, ...

A closer look at the questions

Arizona Daily Star - Tucson, AZ, USA
 Some critics say there may be troublesome compounds in wastewater, such as traces of pharmaceuticals, that won't be found until technology is more advanced. ...

Address threat to our water supply

Chicago Daily Herald - Chicago, IL, USA
 The results of that testing showed that percent of the streams tested positive for more organic wastewater contaminants. ...

Answering Questions On Emerging Contaminants

Water Online (press release) - Florham, PA, USA
 Trace organics are important challenges for the wastewater industry. Whether we are concerned about endocrine disruptors, microcontaminants, pharmaceuticals, ...

April Town Meeting cancelled

Easton Journal - Raynham, MA, USA
 "The pharmaceuticals issue is an issue of concern," Dombrowski said. The wastewater treatment plant in the project could be up and needed in ...

Are you concerned about drinking water?

Atlanta Journal Constitution - GA, USA
 A team of investigators discovered low-levels of two pharmaceuticals in the treated wastewater from Gwinnett County discharges into the Chattahoochee River ...

- Marsh Carey and Tina Cannon spill wedding beans
- Are you a "vegansocial"?
- Yankee daddo in Mexico not 100 yet
- Red Line to partially close for weekend
- R. Kelly defense team seeks to delay trial

- VOICES**
- Seeking advice in site section? Show off!
 - Europe like nifty, but all about our
 - The end for Seattle?
 - Instructions for the week of May 4-May 11
 - Cooking Chicago with TomKat
 - Robert call against U.S. communication
 - You're bustin'
 - Going the good way: Buy Buy, Vol. 1: Lovers' train
 - Robert's wish lists on Monday are out
 - My Aunt Chicago weather data
 - Don't you, you're a girl!
 - The Democratic Party in the new normal
 - Views from an another world
 - Catche Link by

Drugs and chemicals found in Michigan drinking water



Photo Gallery
 Water with a trace of drugs and chemicals found in Michigan drinking water.



By Michael Hawthorne and Alexia Elejalde-Ruiz
 Tribune, RedEye
 Published April 17 2008

Chicago officials have never tested the city and suburban water supplies for pharmaceuticals and other contaminated chemicals, even though they have found trace amounts of drugs and chemicals in Lake Michigan drinking water.

What's in your water?
 The Tribune finds trace amounts of drugs and chemicals—including anti-seizure medication and a Teflon ingredient—in Lake Michigan drinking water.

Trace concentrations—measured in parts per trillion—were found in water collected at City Hall, an elementary school on Chicago's South Side and a public library in Waukegan, which has its own treatment plant. The newspapers also had samples of the top three brands of bottled water tested, but no pharmaceuticals were found.

The Tribune/RedEye findings echo what authorities have detected in tap water supplies elsewhere in the country: dozens of prescription and over-the-counter drugs as well as chemicals from personal-care products, food packaging, clothing and household goods. The tests do not show that the drinking



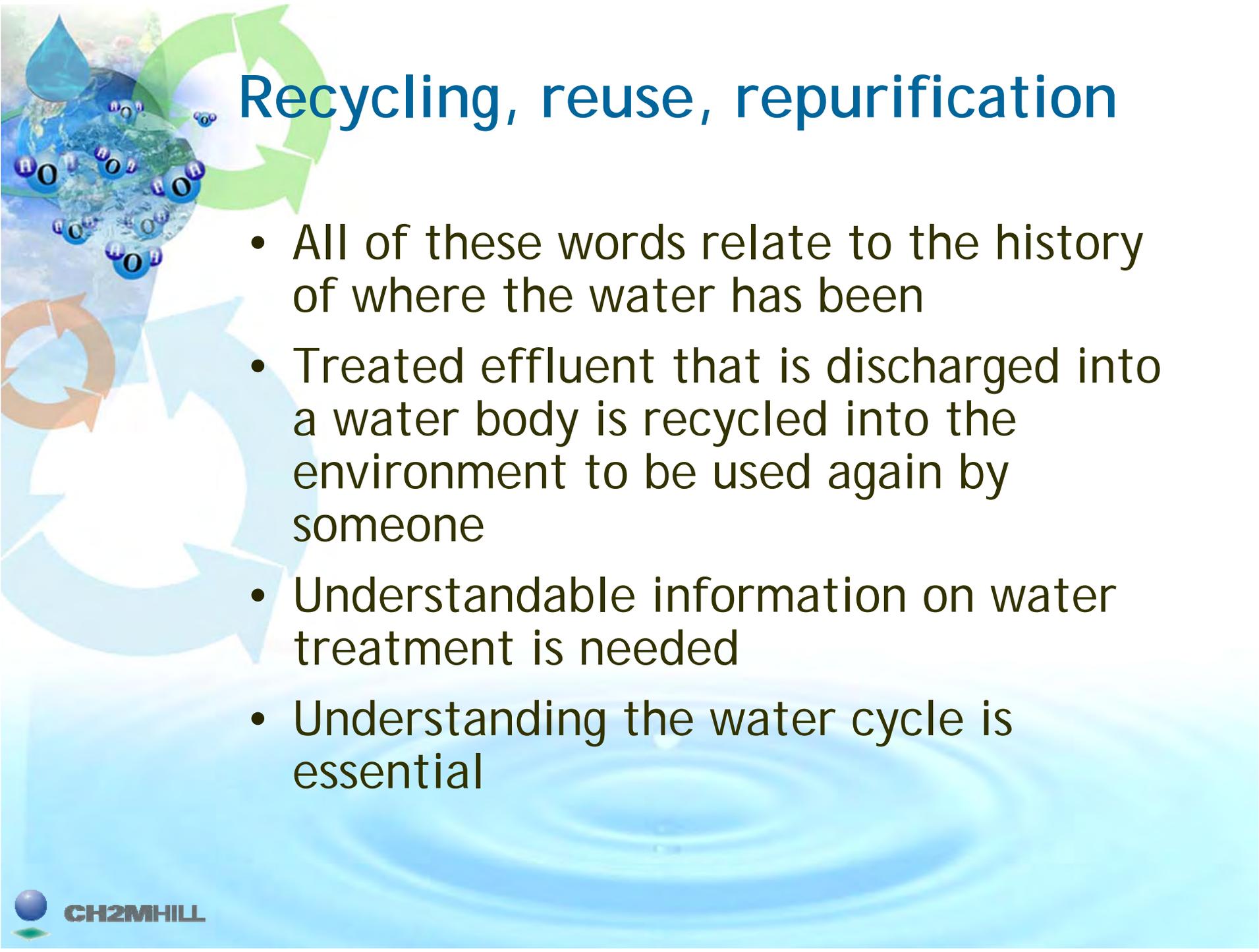
The image is a composite graphic. On the left, a globe is shown with several blue water droplets of varying sizes, some of which are partially overlapping the globe. A green recycling symbol (three chasing arrows) is positioned above the globe. Below the globe, a large, light blue arrow points upwards and to the right. In the bottom left corner, a portion of the Earth's horizon is visible, showing the dark blue of the ocean and the white of the clouds. In the bottom right corner, a series of concentric blue ripples emanate from a central point, suggesting a drop of water hitting a surface.

**Making the
familiar
unfamiliar
promotes anxiety**



We've invented new terms as the industry evolved that make commonplace things sound unusual

- Indirect Potable Reuse
- Unplanned Indirect Potable Reuse
- Inadvertent Indirect Potable Reuse
- Incidental Reuse/Influenced Waters
- Water Reuse, Reclamation, Recycling
(no matter what the end use)
- Sewage-Sourced Water



Recycling, reuse, repurification

- All of these words relate to the history of where the water has been
- Treated effluent that is discharged into a water body is recycled into the environment to be used again by someone
- Understandable information on water treatment is needed
- Understanding the water cycle is essential

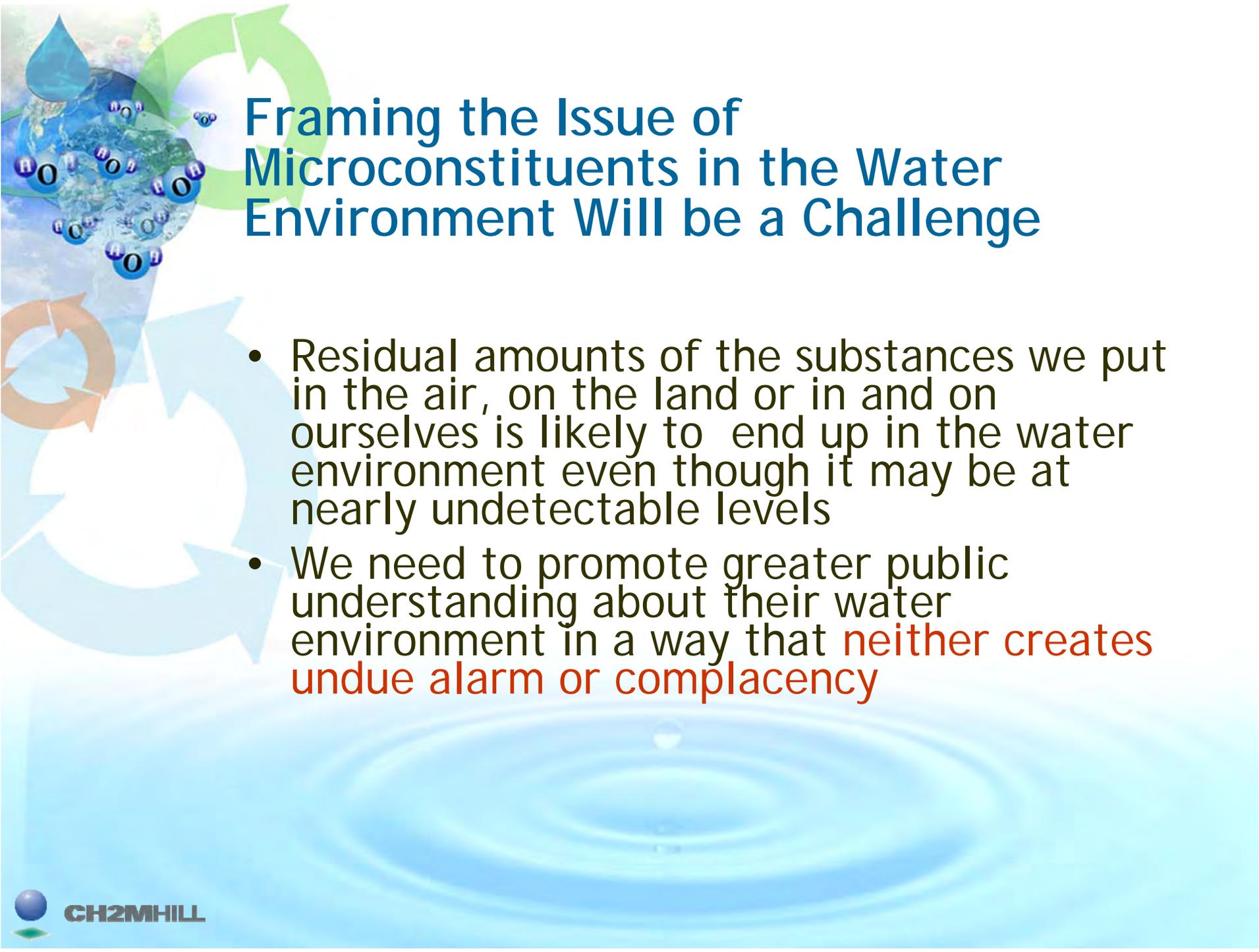
An understanding of The Water Cycle can lead to a better understanding of WATER REUSE – making reuse familiar





Is Our Alarm about Pharmaceuticals and Personal Care Products in Proportion to our Scientific Understanding?

- Is fear influencing our thinking - causing us to neglect the probability of harm
- “Fearmongering” is especially powerful in the absence of understanding of water quality and water uses



Framing the Issue of Microconstituents in the Water Environment Will be a Challenge

- Residual amounts of the substances we put in the air, on the land or in and on ourselves is likely to end up in the water environment even though it may be at nearly undetectable levels
- We need to promote greater public understanding about their water environment in a way that **neither creates undue alarm or complacency**

It *is* true and will
remain true...we add
things to water





Our Capacity to Detect Ever Smaller Concentrations of Substances in Water has Outpaced Our Ability to Interpret Such Findings

- The nature of the compounds and exposure is as important as mere detection
- Concentration, dose, and duration are receiving less attention than detection in media accounts creating a cascading sense of alarm



Could the result be a demand for higher levels of treatment due to emotion rather than scientific conclusions, logic or reason?

- Energy Costs Are Going Up at an Unsustainable Rate
- A Climate of Fear Can Create Global Warming
- Can our economy or environment afford less than truly thoughtful deliberation



As we focus on sustainability and global warming-
shouldn't we be careful of the carbon footprint of the decisions we make?





Percent increase in energy

Technology	1 mgd	10 mgd	50 mgd	100 mgd
Conventional	N/A	N/A	N/A	N/A
Conventional + UV	10	20	20	10
Conventional + O ₃ .5 log	30	100	110	120
Conventional + O ₃ 2 log	50	160	170	190
Conventional + MF/UF	60	170	190	190
Conventional + NF/RO	210	700	780	830



Generation of New Energy Has Significant Environmental Costs as Well

- This makes it important that we choose the right technology for the right use



So, don't we need to focus on the quality of the water for the intended *use*—*not the source of the water*?

From Wastewater (no stars) to Six Star or Highly Purified Water

No Stars Wastewater

- Domestic sewage and trade waste
- **USES:**
 - No discharge or use without treatment

One Star Effluent

- Treated to remove large particles
- **USES:**
 - No discharge or use without further treatment

Two Star Effluent

- Most biodegradable organic material has been removed
- Usually has been disinfected
- **USES:**
 - Discharge into some waterways
 - Apply to land in controlled conditions

Three Star Effluent

- Nearly all biodegradable organic material has been removed
- Nutrient content has been reduced
- Usually has been disinfected
- **USES:**
 - Discharge to land or waterway with approval of regulating authority

Six Star Purer than drinking water

- Treated to a very pure quality
- Lacks nutrients and minerals
- **USES:**
 - Kidney dialysis
 - Industrial processes such as pharmaceutical manufacturing
 - Can be blended with fresh water supplies

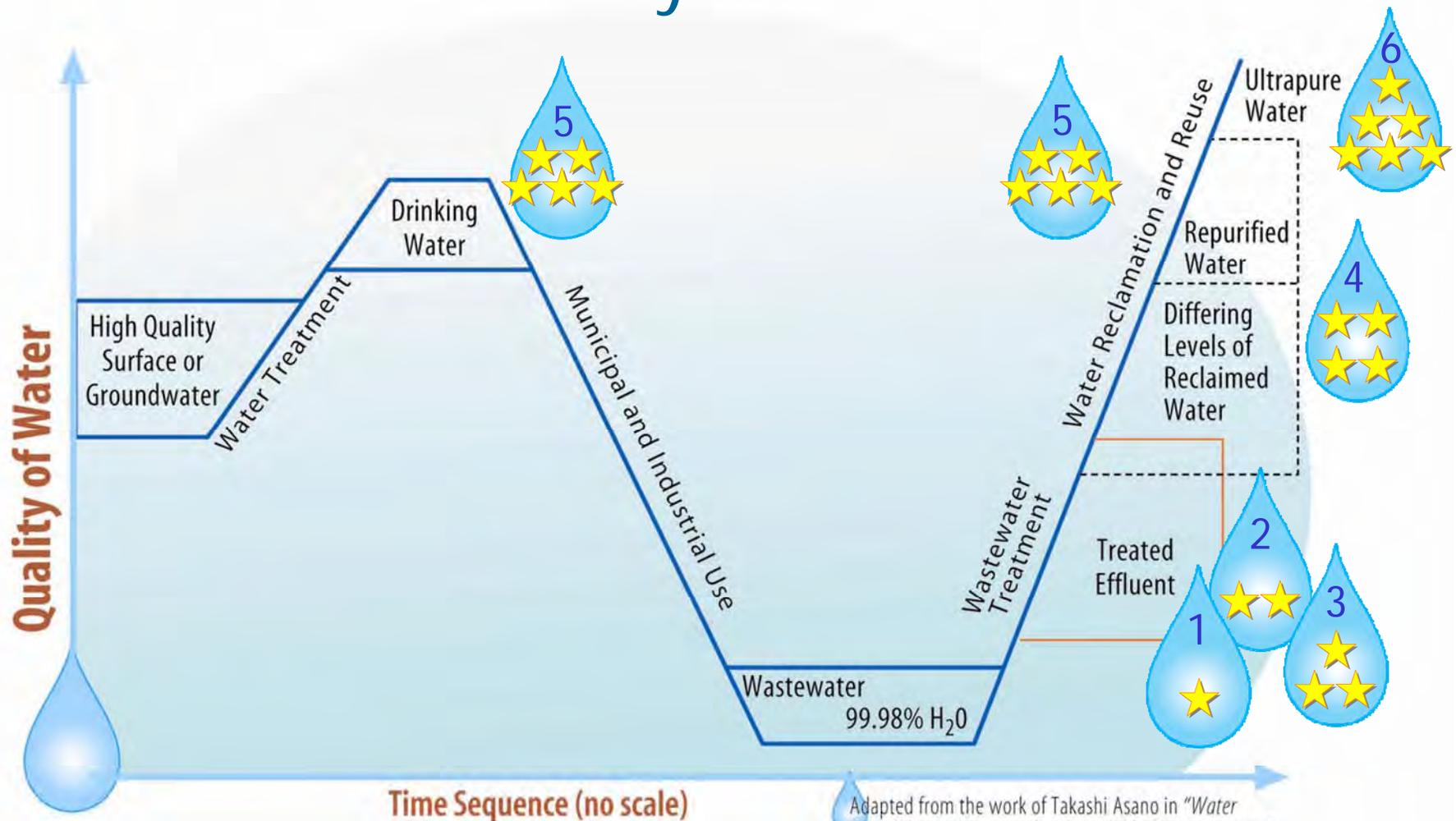
Five Star Drinking water

- Treated sufficiently for human consumption
- Conforms to Australian Drinking Water Guidelines
- Monitoring must conform to specified quality assurance procedures
- **USES:**
 - Can be blended with other drinking water supplies or used directly

Four Star Reclaimed water

- Has received further treatment such as artificial wetlands, conventional, or membrane filtration so that its quality is fit-for-purpose for its intended use
- **USES:**
 - Industrial processes
 - Irrigation of public areas
 - Crops for consumption
 - Dual reticulation

Understanding water qualities determines how water can be safely used!



Adapted from the work of Takashi Asano in "Water from (Waste) Water—the Dependable Water Resource" written for the 2001 Stockholm Water Prize Laureate Lecture, August 13, 2001, Stockholm, Sweden



**“Uninformed people cannot
make informed decisions”**

Jenifer Simpson

- Agreement must be reached on a basic terminology that informs, does not inappropriately stigmatize, and can be understood by the general public to aide informed decision-making



Choosing Our Path Forward



Sustainability Must Be Considered Carefully *(it isn't just a buzz word)*

- Included in treatment considerations is the need to address the sustainability of a given treatment process.
- Example: the idea that RO membranes can be used for all water and reuse applications may be impractical considering the brine disposal problems, the potential progressive salt buildup in our watersheds and energy/climate change implications



- Once all sustainable treatment options have been considered, the resultant water quality will be as good as the available treatment technologies can provide



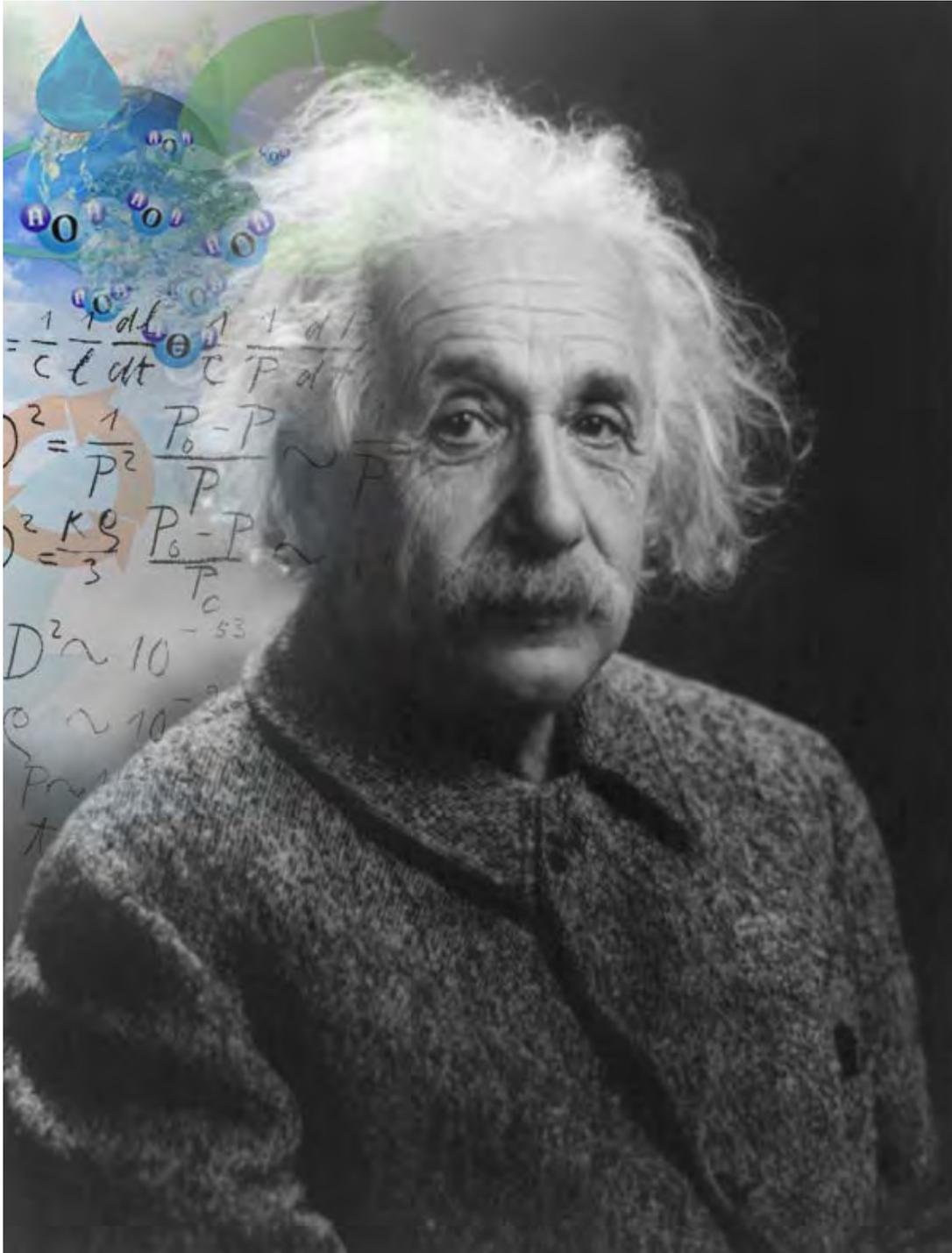
Overcoming negative perceptions is possible!

- Use positive, accurate terminology that avoids stigmatizing the product
- Provide knowledge and understanding of water quality and treatment
- Discuss the quality of water, make reuse “normal” — acknowledge where and how it already happens
- Realize that education and knowledge of water are important to establishing trust
- Have fun and use engaging education and outreach techniques

The background features a water cycle diagram with green arrows forming a circular path. On the left, there are blue water molecules (H2O) and a globe of Earth. At the bottom, there are blue water ripples and a portion of the Earth's horizon. The text is centered on the right side of the image.

*“I am the clouds and the lakes. I am the oceans and the rain. I am a river, and I run through everything.
I am WATER”*

Adapted from Grand Canyon Adventure: River at Risk
used by permission of MacGilvry Freeman Films



“Not everything that counts can be counted, and not everything that can be counted, counts.”

-Albert Einstein



*A shared vision of the future
of water on this planet*

*is a shared vision for the
future of life on the planet.*



H₂O will our generation
and our community sustain
the benefits of this
precious resource?



Water:

Nature's Amazing
Reusable Resource