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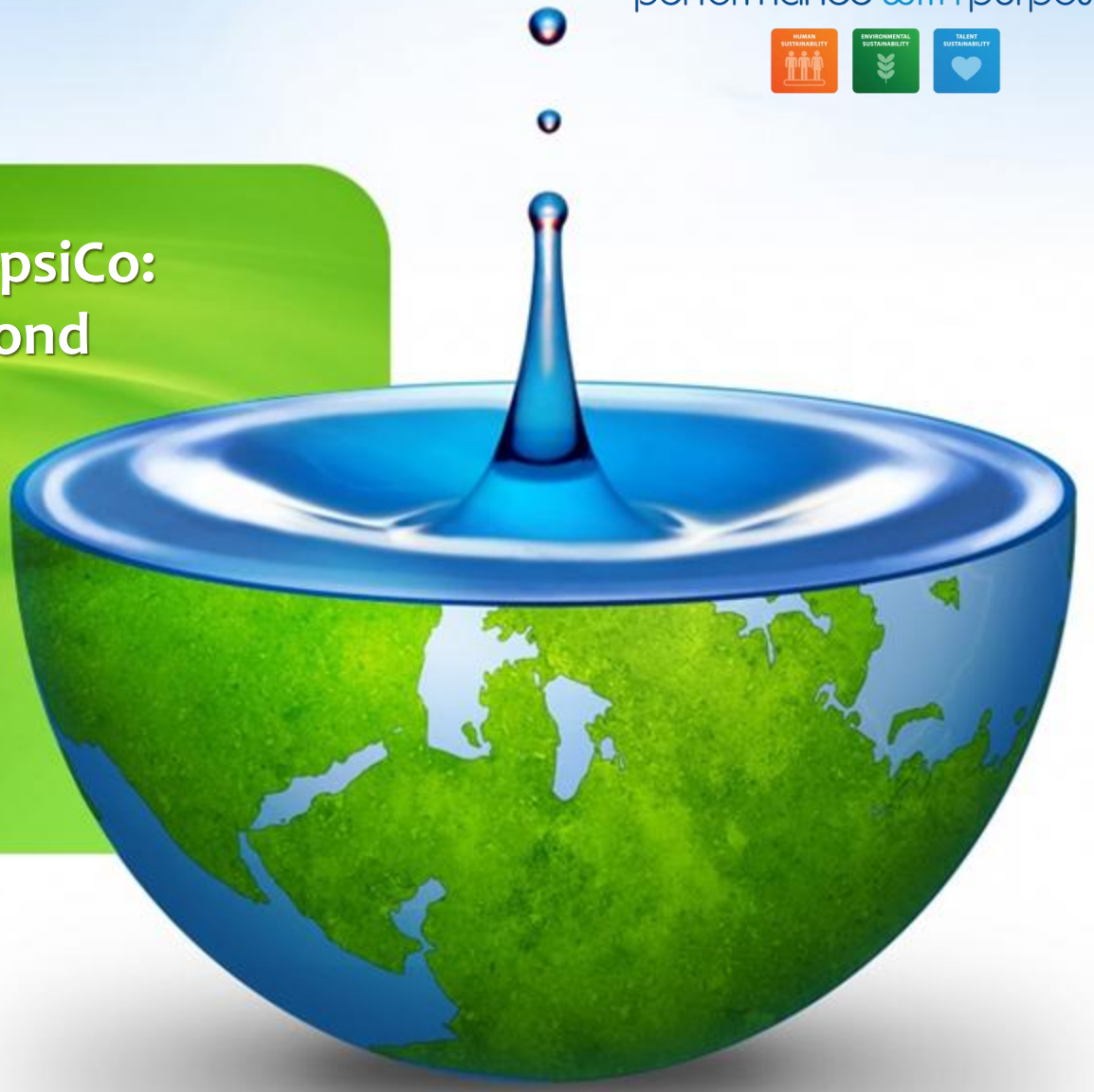
Water Stewardship at PepsiCo: Looking In, Out, and Beyond



Liese Dallbauman, PhD
Director, Water Stewardship
PepsiCo

Water Stewardship is a Key Component of the Promise of PepsiCo

We respect the human right to water through world-class efficiency in our operations, preserving water resources and enabling access to safe water.

- Improve our water use efficiency by 20 percent per unit of production by 2015.
- Strive for positive water balance in our operations in water-distressed areas.
- Provide access to safe water to three million people in developing countries by the end of 2015.

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PepsiCo's ReCon Program is a Four-Stage Approach to Resource Conservation

In our manufacturing plants

Stage 1: Common

- Identify and quantify in-plant water use

Stage 2: Critical

- Understand and optimize major in-plant water users

In our environment

Stage 3: Catchment

- Assess local impact so that mitigation strategies make sense

Stage 4: Comprehensive

- Focus conservation efforts on watersheds where direct and indirect water use has the greatest impact

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ReCon Water Stage 1: Common

- ReCon Stage 1 focuses on understanding basics and setting baselines
- ReCon Water Stage 1 provides a comprehensive toolkit for water savings
  - The Profiler gathers usage data and assigns a relative value to each stream
  - The Diagnostic evaluates water use practices
  - This quantitative and qualitative information is used to develop a prioritized list of actions and projects
  - Plant-specific data -> practical, effective water saving strategies

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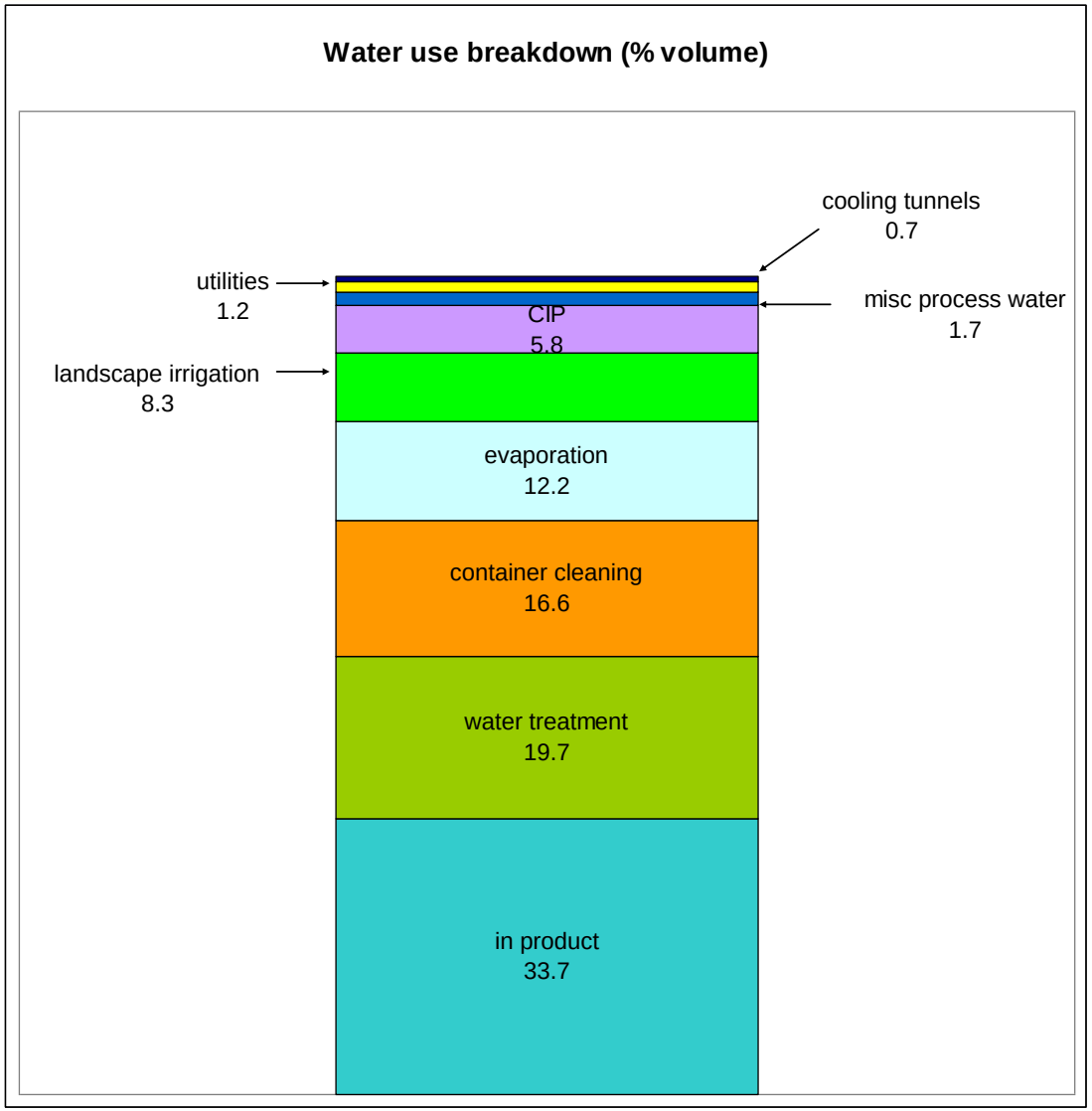
The Profiler Calculates the Relative Volume of Different Uses …



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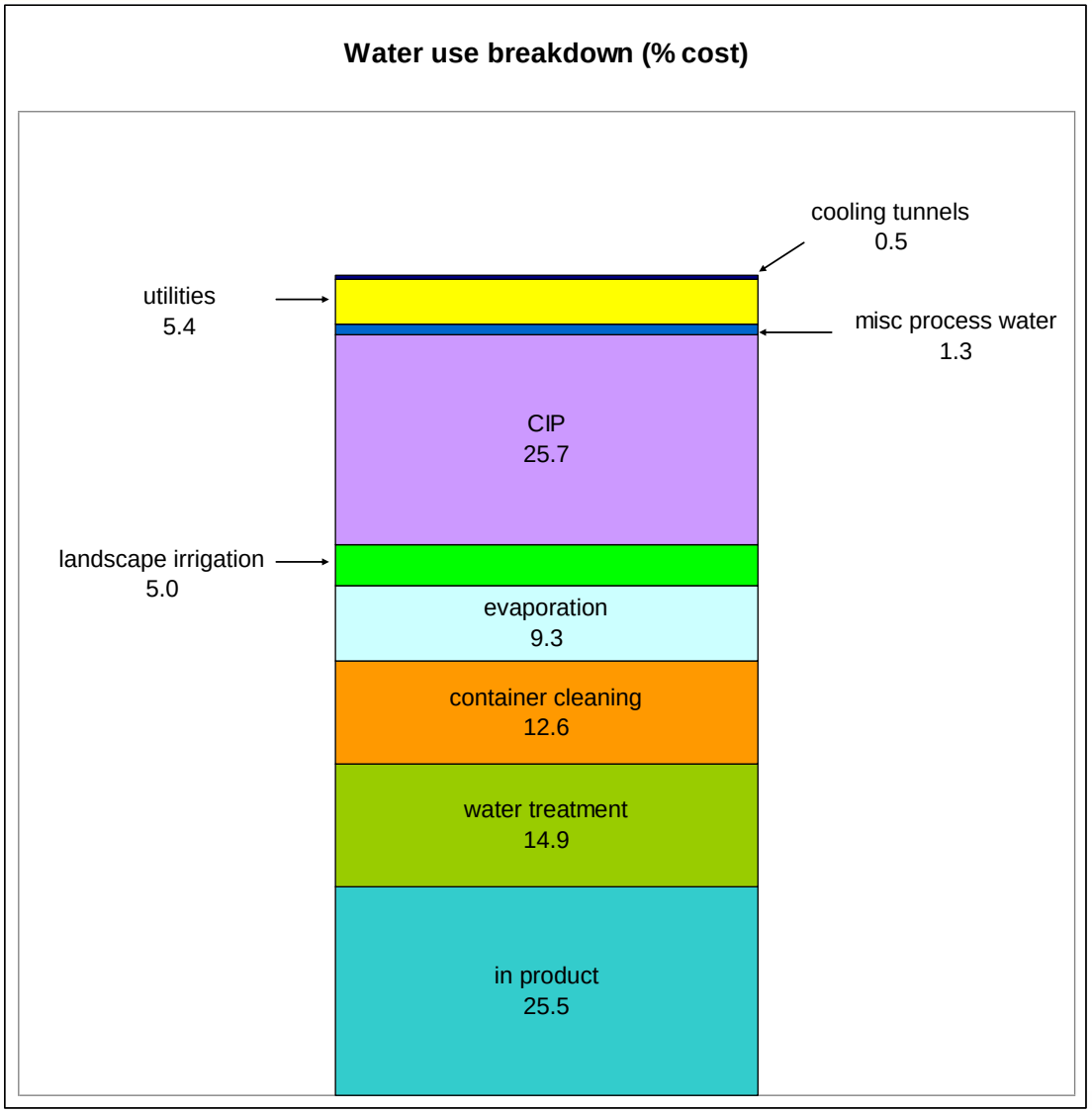
… as well as the Relative Costs of These Uses



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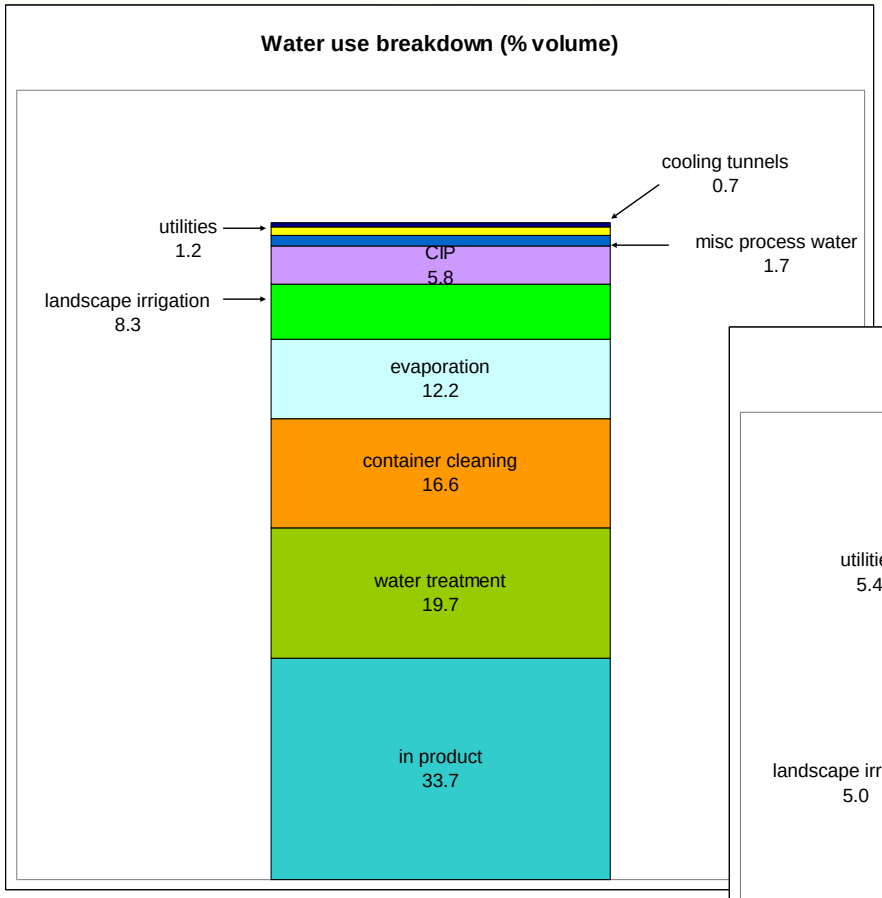
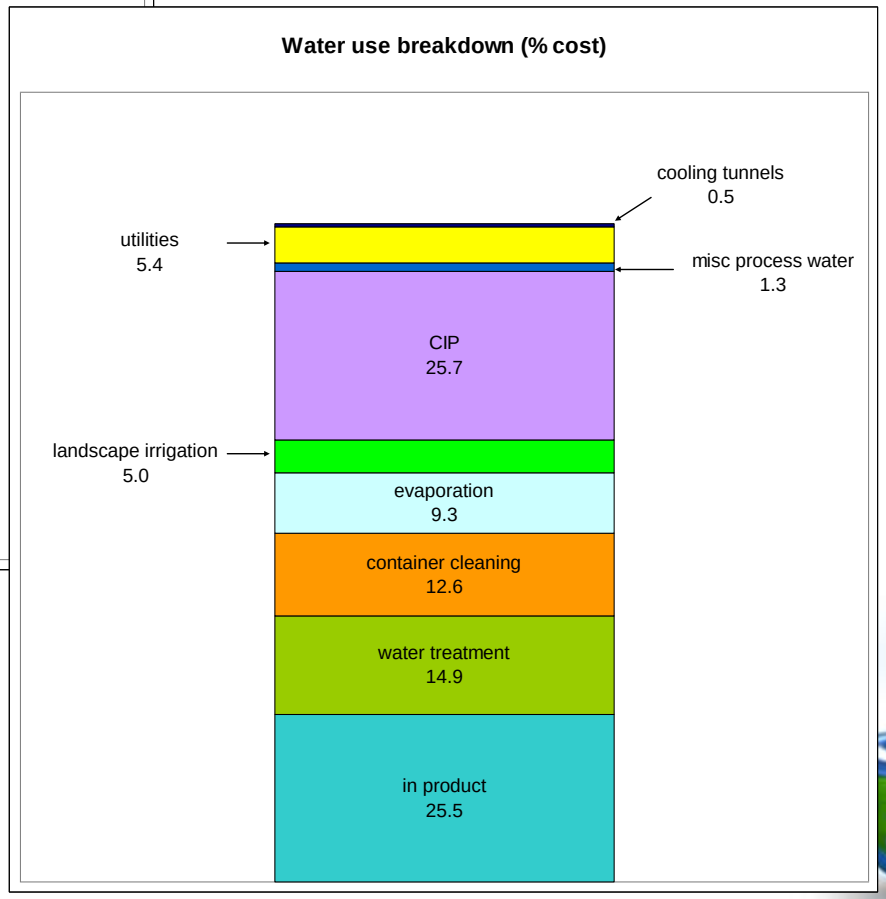
All Water is NOT Created Equal



Usage

Cost



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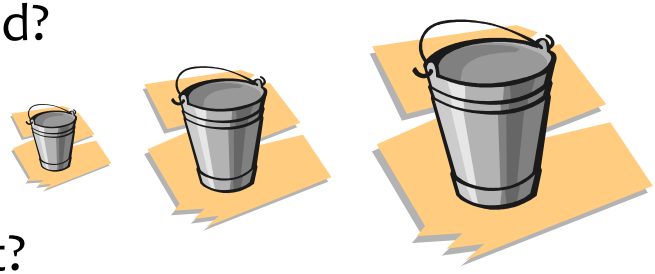
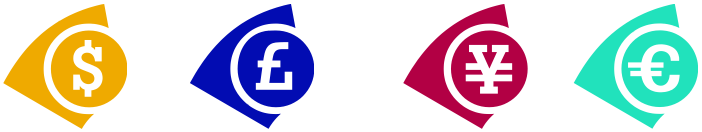
The Profiler "Feeds" the Diagnostic

- Profiler provides numeric data
  - How much water is being used?



  - How much does that use cost?



- Diagnostic focuses on qualitative information
  - Is the plant following best practices?
  - Does the plant have unique opportunities?

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ReCon Diagnostic Process

- A series of questions tailors the survey for a specific plant – and a specific purpose
- Once the survey has been constructed, the team answers the relevant questions
  - Questions may have pre-seeded suggested actions
  - Reference material is often provided
- Example
  - Question: Are daily boiler logs maintained?
  - Suggested action: initiate and maintain boiler log
  - Reference: link to sample boiler log, with description of tests to be conducted

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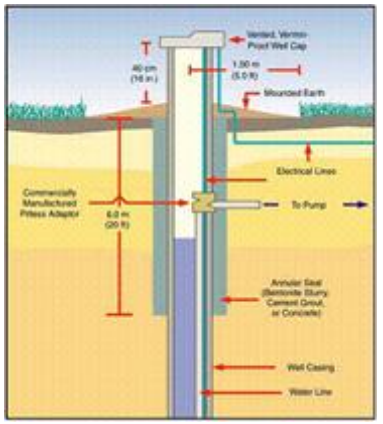
Water Diagnostic Sample Questions

- Have the economics of well water opportunities been evaluated?
- Are backwash reclamation systems installed? If so, do they comply with corporate QA standards?
- Are automatic shutoff nozzles installed on all hoses?



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ReCon Water Hotlist

- A priority
  - Low capital, quick payback
  - Example: Develop leak detection and repair program
- B priority
  - Significant capital and payback
  - Example: Implement cascading

- C priority
  - Low capital, no guaranteed payback
  - Example: Record daily water readings
- D priority
  - Significant capital , low payback
  - Typically not implemented – at least, not yet!

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ReCon Water Uses a Formalized Training Program to Build Capability "On the Ground"

- Training has been hosted at sites around the world
  - Snack plants in Venezuela, Thailand, UK, Mexico, Argentina
  - Beverage plants in Egypt, Belgium, Turkey, Russia, Ireland
- The tool has also been shared with select supply chain partners
  - A variety of suppliers have participated in training at two US copackers

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Lead Site Savings Opportunities in Excess of 1.2 *Billion* Liters Were Identified

- This corresponds to > 30% of the combined lead site annual water use
- Average across lead sites = 23.9%
- Corresponding cash savings exceed $720,000

Context

If these lead sites were located in Tucson, the water saved would satisfy the city's water needs for nearly three days

http://cms3.tucsonaz.gov/files/water/docs/wp08-sec03.pdf
accessed 2 May 2011

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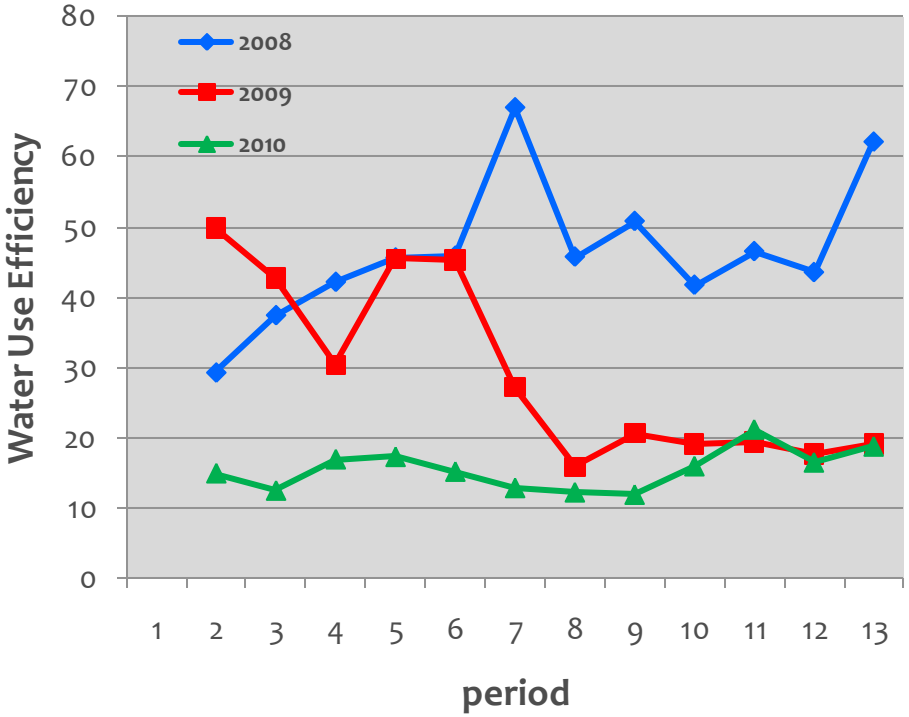
Example: Lead Snack Plant

- Training was held June 2009
- Immediate actions included installation of accurate meters and hose nozzles
- Plant has continued to improve its water use efficiency



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Beyond Lead Sites:
Latin American Beverages

- Water Profiler was piloted at a Latin American beverage plant in August 2008
- ReCon Water 1 was deployed at 16 Latin American beverage plants in 2009, and the rollout continues
  - Mexico
  - Colombia
  - Peru
  - Venezuela

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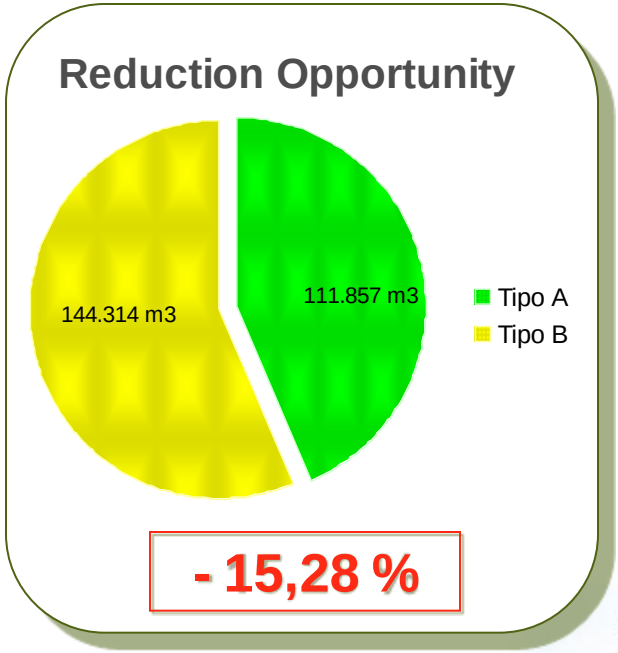
Example: Beverage Plant Hotlist

Opportunity	Type	m3/año	% Consumption
Dry lubrication	**B**	**71.114**	**4,24%**
Rinser Recovery	**B**	**57.098**	**3,41%**
R.O Rejected	**A**	**43.200**	**2,58%**
Bottler Washer Line 3	**A**	**27.349**	**1,63%**
Recovery CIP 4 y 5	**A**	**14.007**	**0,84%**
Cut Valve form Rinser	A	12.593	0,75%
Air Rinser for Can	B	10.596	0,63%
General Rinse	A	8.064	0,48%
Cases washer recovery	B	5.507	0,33%
Recovery condensate	A	4.704	0,28%
Backwash Sand Filter	A	1.594	0,10%
CIP optimization	A	345	0,02%
Raise Awareness	C		
Total reduction		**256.172**	**15,28%**

ROI: 9 meses

Invest: Bolivar Strength 418.320

Saving: Bolivar Strength 541.618



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Hardware's Important – Team Engagement is Critical

- A little friendly competition never hurts!
- Example: Water Loss Lottery
  - Held over a single 24-hour period
  - Small prizes
  - Management support and followthrough is critical

WATER LOSS LOTTERY

How many leaks, drips, and other water wastes (big or little) can you find?

Name_____Shift_____

Leak/drip/waste description (be sure to give details so we can find it and fix it):

Every find = 1 entry!

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ReCon Water Stage 2: Critical

- A plant that has completed ReCon Water 1
  - Understands where it's using water
  - Is tracking its progress toward water efficiency
  - Has taken the easy steps
- The next step is to optimize the major water users – the critical systems
- ReCon Energy 2 is modular
  - Compressed Air
  - Refrigeration
  - Combustion
  - Boilers

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ReCon Water Stage 2 Content

- ReCon Water 2 is also modular, designed to complement ReCon Energy 2

Basic Knowledge: Meters, Utilities, Relationship between Energy and Water, Plant 'Infrastructure'	
Water Treatment	Potato Chip Manufacturing
CIP	Tortilla Chip Manufacturing
Container Washing	

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Field Exercises Provide Hands-on Practice

- Each team is assigned a manufacturing process or a production line
- Water use is
  - Observed
  - Quantified
  - Analyzed
- Teams identify saving opportunities
  - Volume and cost

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Outcome

- Course provides students with tools to improve plant water efficiency
  - Avoid water use
  - Reduce water use
  - Reuse water
- These principles can be applied throughout the plant as it exists now and as it evolves
  - New equipment and processes
  - New products
  - Changes in product mix

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ReCon Water Stage 2 Example: Water Treatment System Optimization

- Water treatment systems are major water users in beverage plants
  - Potable water may not meet ingredient standards
  - Treatment steps can include filtration and membrane processes
- Significant savings (time, water, money) can be achieved by optimizing these systems
  - Backwash frequency and duration
  - Backwash capture and recirculation
  - Backwash/backpulse sequence and frequency
  - Concentrate capture and treatment
- An inhouse Treated Water Efficiency tool provides a stage-gate approach to reducing water lost in treatment systems while maintaining quality standards

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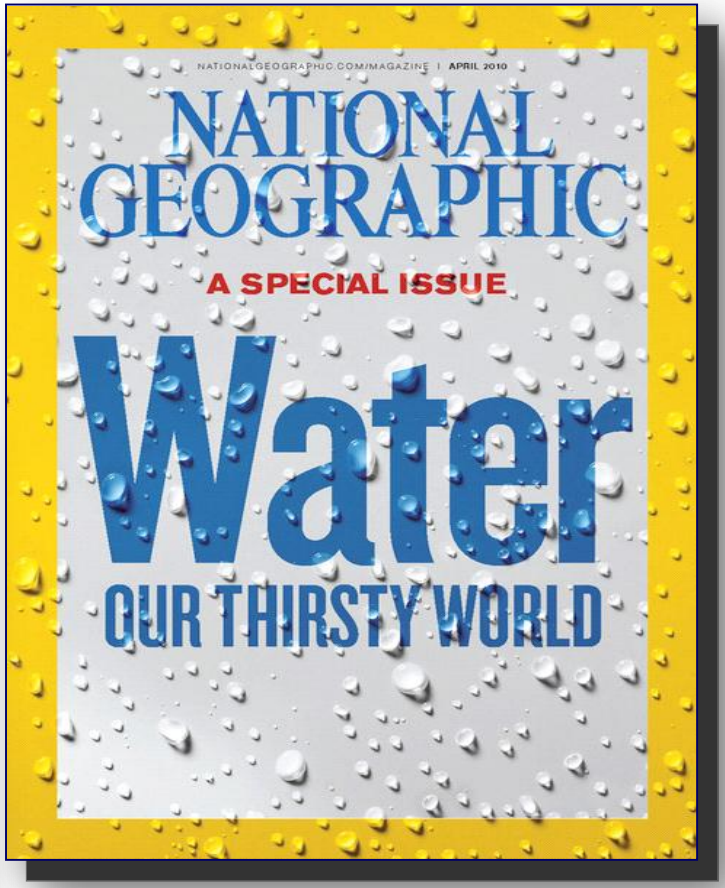
ReCon Water also Looks Outside our Manufacturing Operations

We as a company are striving to achieve positive water impact

… but how?



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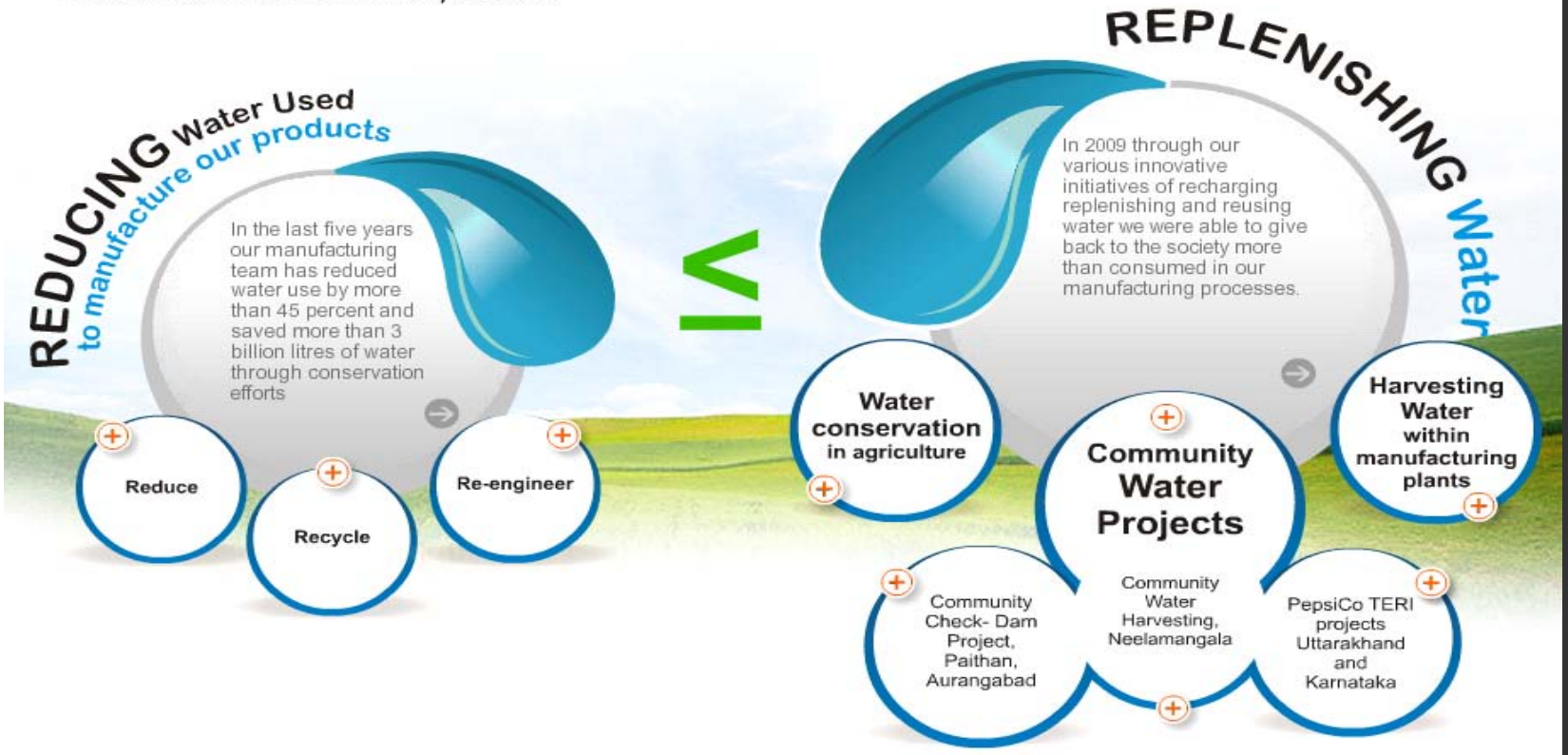
ReCon Water Stage 3: Catchment

Positive Water Balance

In 2009, through our various innovative initiatives of recharging, replenishing and reusing water we were able to give back to the society more than consumed in our manufacturing processes.

Which means PepsiCo achieved
Positive Water Balance in the year 2009

Water used to manufacture beverage products ≤ Water conserved, recharged and Replenished to nature



This is a Great Accomplishment … and a Great First Step

- Two facts direct our further development
  - Water is fundamentally local
  - Quantity isn't the only thing that's important
- These statement lead us from Positive Water Balance to Positive Water Impact

Internal Working Definition

- Achieving Positive Water Impact means that we will make more and/or better water available to the environment and the communities where we and our suppliers operate.
- Our first and most important focus is on water-stressed or water-scarce locations, but we aspire to integrate Positive Water Impact principles throughout our business.

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The Difference between Positive Water Balance and Positive Water Impact

Positive Water Balance

requires that the volume of water we use to replenish watersheds is greater than or equal to the volume of water we withdraw. In order to directly mitigate our impact, this replenishment should occur in the watersheds from which we obtain water.

Positive Water Impact

expands on Positive Water Balance by using our restoration efforts to address specific water-related business risks or impacts – for example, scarcity, flooding, community access, poor intake or discharge quality.

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Breaking New Ground with The Nature Conservancy and LimnoTech

- We are developing a robust method for identifying, evaluating, and designing watershed remediation strategies
  - This method will be applicable across PepsiCo, covering snack and beverage plants in a variety of environments
- Our partners, TNC and LimnoTech, have expertise in evaluating restoration options – but previous work was on pre-defined projects. Development of a method to select restoration projects appropriate to specific locations and business needs is a new effort for all of us.

The Nature Conservancy
Protecting nature. Preserving life.™

LimnoTech
Water | Environment | Scientists | Engineers

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Local Participation is Critical to Project Success … Starting with Site Selection

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Pilot Process

Identify
"Area of Influence"

Understand
Impacts and Risks

Identify Optimal
Watersheds for
Restoration

Identify
Restoration Activities

Calculate Benefit
Associated with Each
Restoration Activity

Estimate Costs
Associated with Each
Restoration Activity

PepsiCo / TNC /
LimnoTech
Positive Water
Impact pilot

Previous TNC
projects

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Local Data Are Needed to Identify Area of Influence, Risks and Impacts

- Information is collected though discussions with local TNC and/or PepsiCo team representative, GIS, public sources, water company, local NGOs, …

- From the local water supplier and environment agency
  - Where does water comes from?
  - What challenges and issues does the watershed face?
  - What is the impact of wastewater discharge?

- From local community, NGOs, peer companies, etc.
  - What issues exist?
  - Are there local water initiatives – e.g., cleaning up rivers/streams?
  - Are there clues suggesting that there's a problem ?

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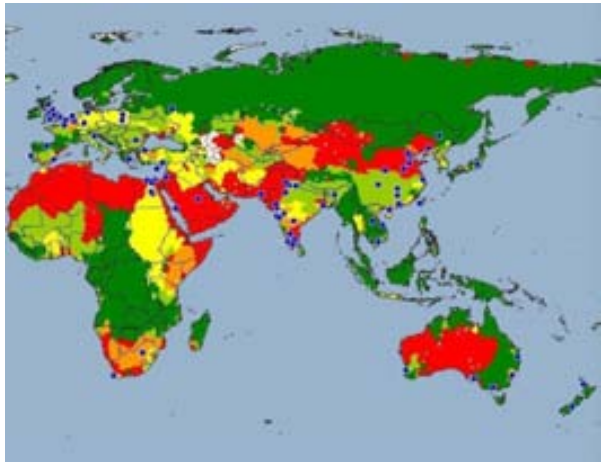
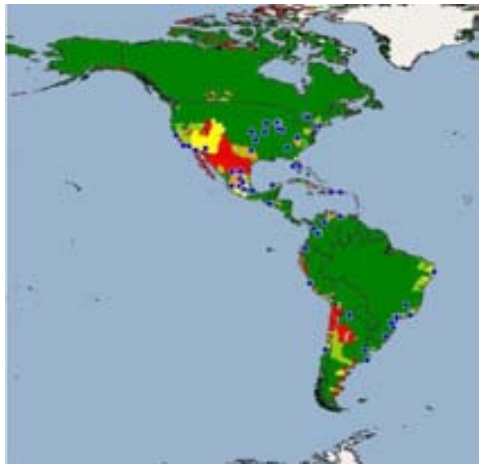
Questions to be Answered Include "Is This Site at Risk for Water Stress or Scarcity?"

- Watershed Diagnostic follow-on to WBCSD global water tool will be developed
  - WBCSD scarcity map is an initial screen and prioritizing tool
  - A small number of focused questions will provide better understanding of local risk
  - Watershed Diagnostic will be the foundation of ReCon Water Stage 3





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Number One Question

- Where does the site's water come from?

  Without a clear understanding of the source, there's no way to determine stress or to identify candidate actions!

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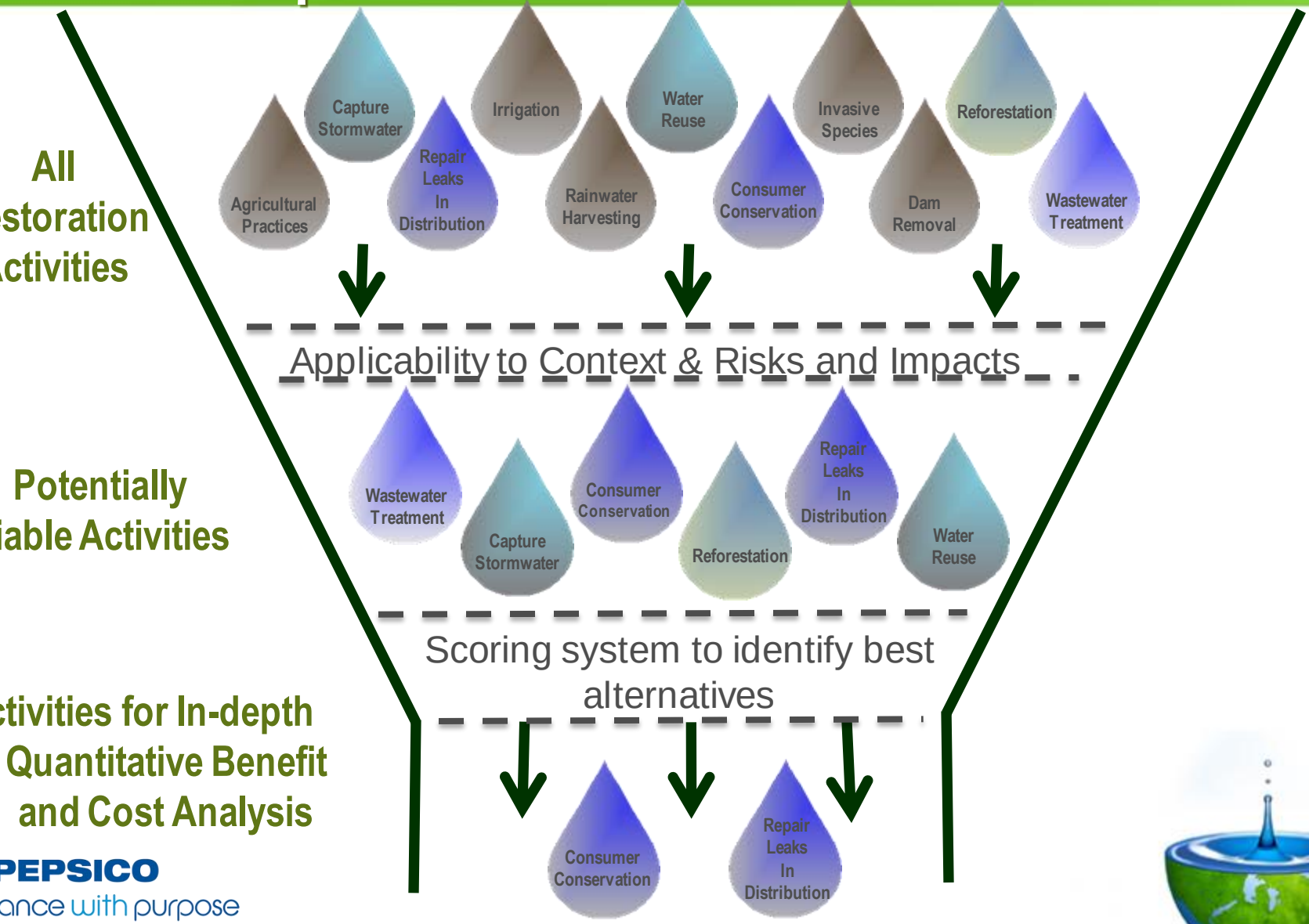
How are Potential Activities Selected for a Specific Site?



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How are Potential Activities Selected for a Specific Site?

- Criteria include
  - Does the activity address a specified risk or impact?
  - Has the activity previously been considered locally?
  - Will the benefit be local to where consumption occurs?
  - How efficient is this activity on a cost-per-liter basis?
  - What percentage of consumptive use will be restored?
  - Does this activity provide benefits beyond water restoration?
  - Are there any social or political concerns that might hinder implementation of this activity?
  - What is the time frame (long- vs short-term) of this activity?

Local PepsiCo team has veto power on any proposed activity

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Pilot Deliverables

- Watershed Diagnostic
  - Provides an assessment of short- and long-term water stress
    - Physical, economic, regulatory, …
- Rearview Mirror: Roadmap
  - Describes challenges faced (and solutions found) by pilot sites
- Forward View: Restoration Toolkit
  - Provides guidance for identifying, evaluating, and designing watershed restoration strategies
    - Applicable to large, small, urban, rural, snack, beverage, developed, developing, …
- Benefits to Pilot Sites
  - Comprehensive water scarcity assessment
  - Guidance on restoration activities that make sense locally
  - Cost-benefit analysis for restoration options

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ReCon Water Stage 4: Comprehensive

- PepsiCo has conducted a pilot study focusing on 1L Tropicana Pure Premium

  made from oranges grown and extracted in Brazil

  and packaged at Zeebrugge, Belgium
- Local impact and risk are associated with each step – operational and supply chain

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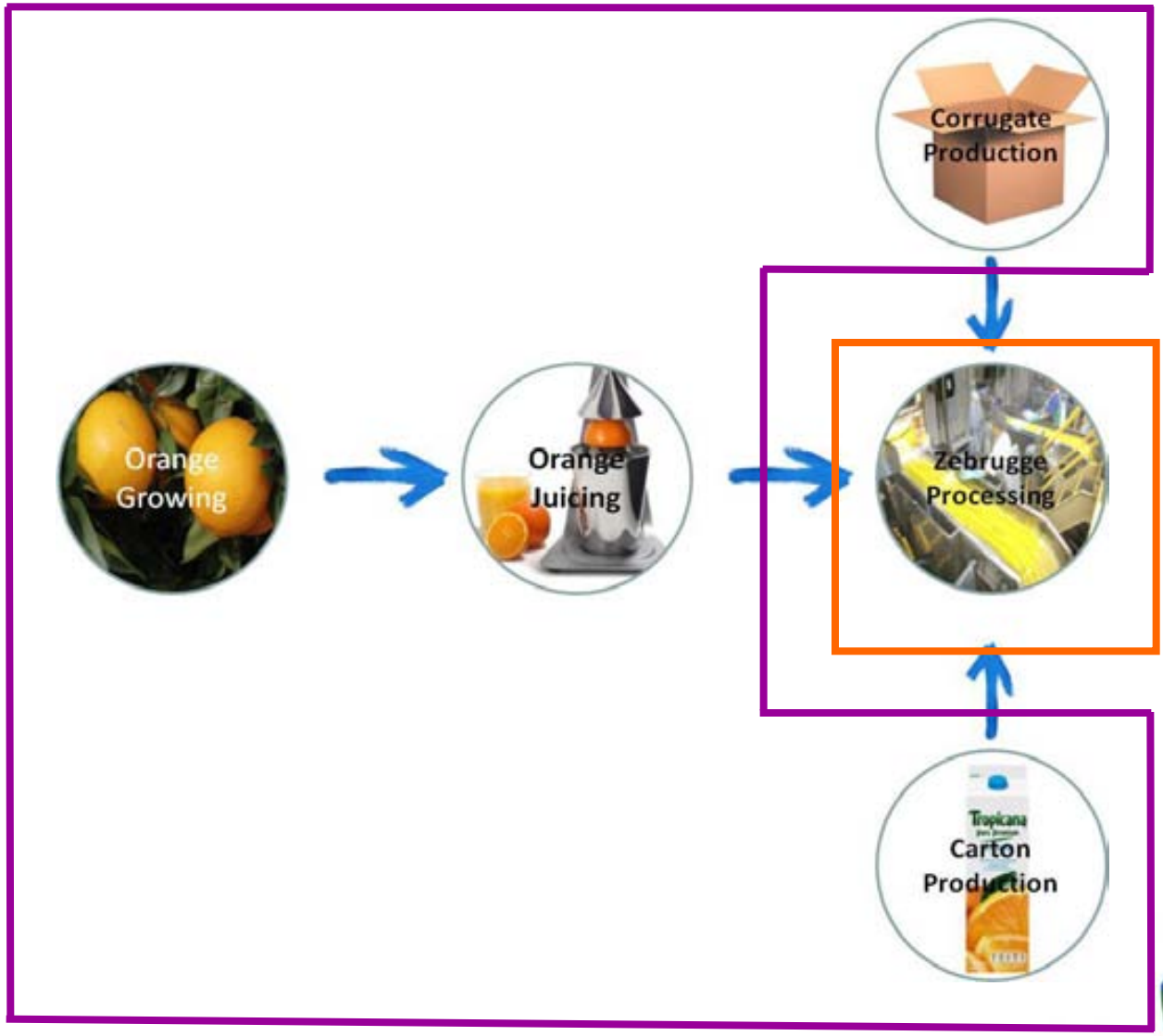
Scope:
Supply Chain and Operational



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The Communications Challenge: If it Works for Carbon…

- There's a general understanding that carbon footprint represents the (global) effect of emissions
  - CO2e converts quantities of different gases to a common (additive) basis

$$1\ CH_4 = \begin{array}{ccccccc} CO_2 & CO_2 & CO_2 & CO_2 & CO_2 & CO_2 & CO_2 \\ CO_2 & CO_2 & CO_2 & CO_2 & CO_2 & CO_2 & CO_2 \\ CO_2 & CO_2 & CO_2 & CO_2 & CO_2 & CO_2 & CO_2 \end{array}$$

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… Does it Work for Water?

- How does this understanding influence expectations for water footprint?
  - Does providing an aggregate number lead to the assumption that reducing that number is the end goal?
- How can a water footprint be used to drive local decision making?
  - Is an aggregate number a useful tool for developing site-specific strategies?

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Footprint depends on shoe size and weight.
Weight depends on where and when you tread.

WEIGHT

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Water is Used in a Specific Time and Place

$1L \neq 1L \neq 1L \neq 1L \neq \ldots.$

Brazil floods in 2009

Drought in Argentina 2009

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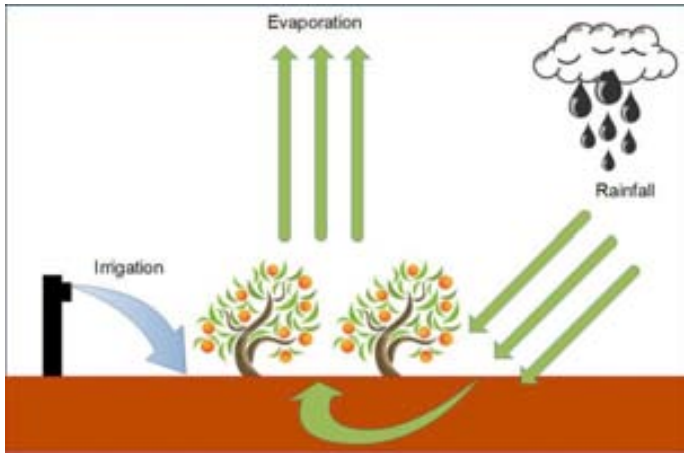
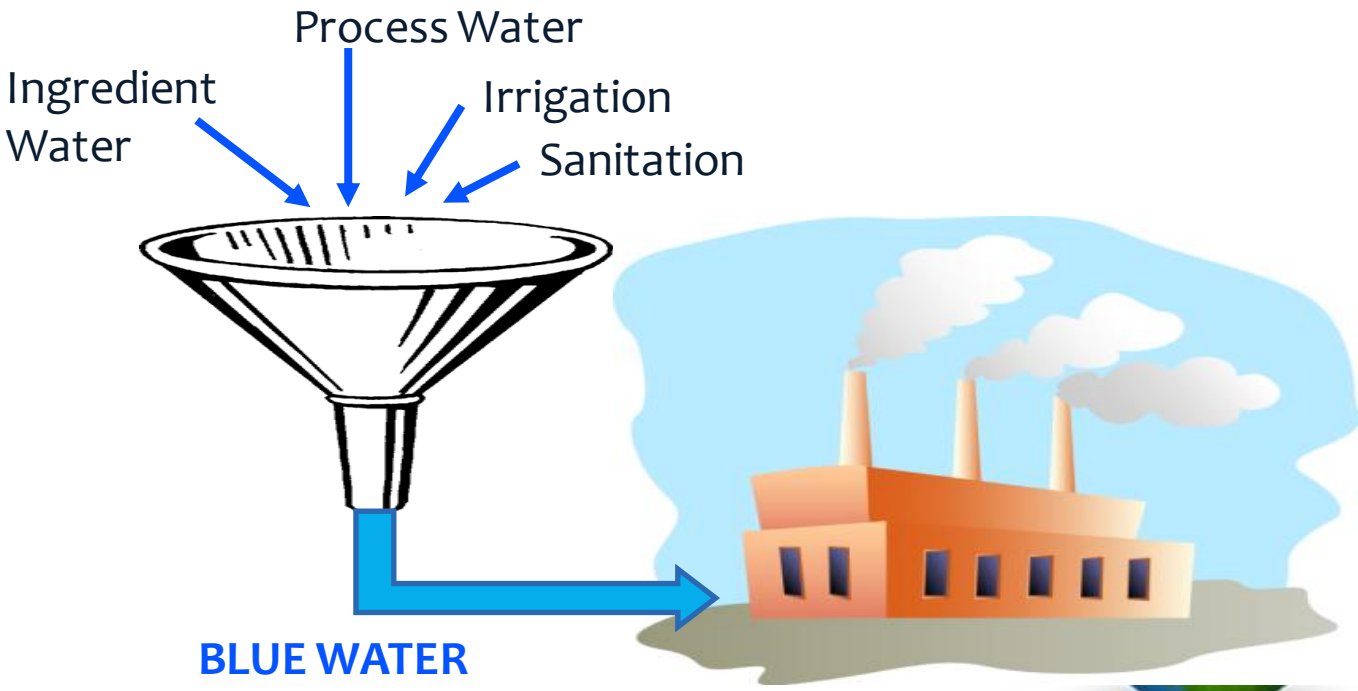
In the Context of Water Footprint, There Are Different Kinds of Water

- *Blue water* is withdrawn but not discharged to the same watershed
- *Green water* is extracted from soil by plants



Crop blue WF = irrigation from ground or surface water
Green WF = water from rainfall stored in the soil then evaporated by the plant



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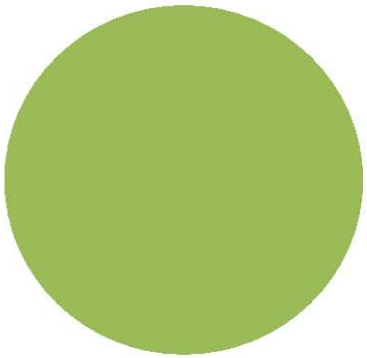
Components of Pilot Water Footprint: Magnitudes and Locations

Orange Juicing

Orange Agriculture (Irrigation)

Orange Agriculture (Rainfall)



Carton Production

Carton board

Corrugate Case Outer

Corrugate Case (Primary Fibre Forestry)

Corrugate Case Recycled Fluting

Corrugate Case Inner

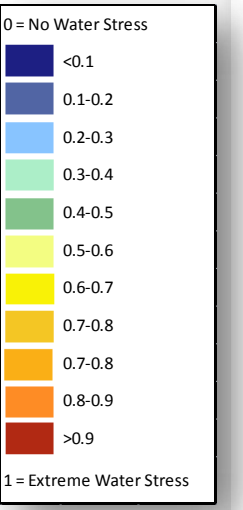
Carton Conversion

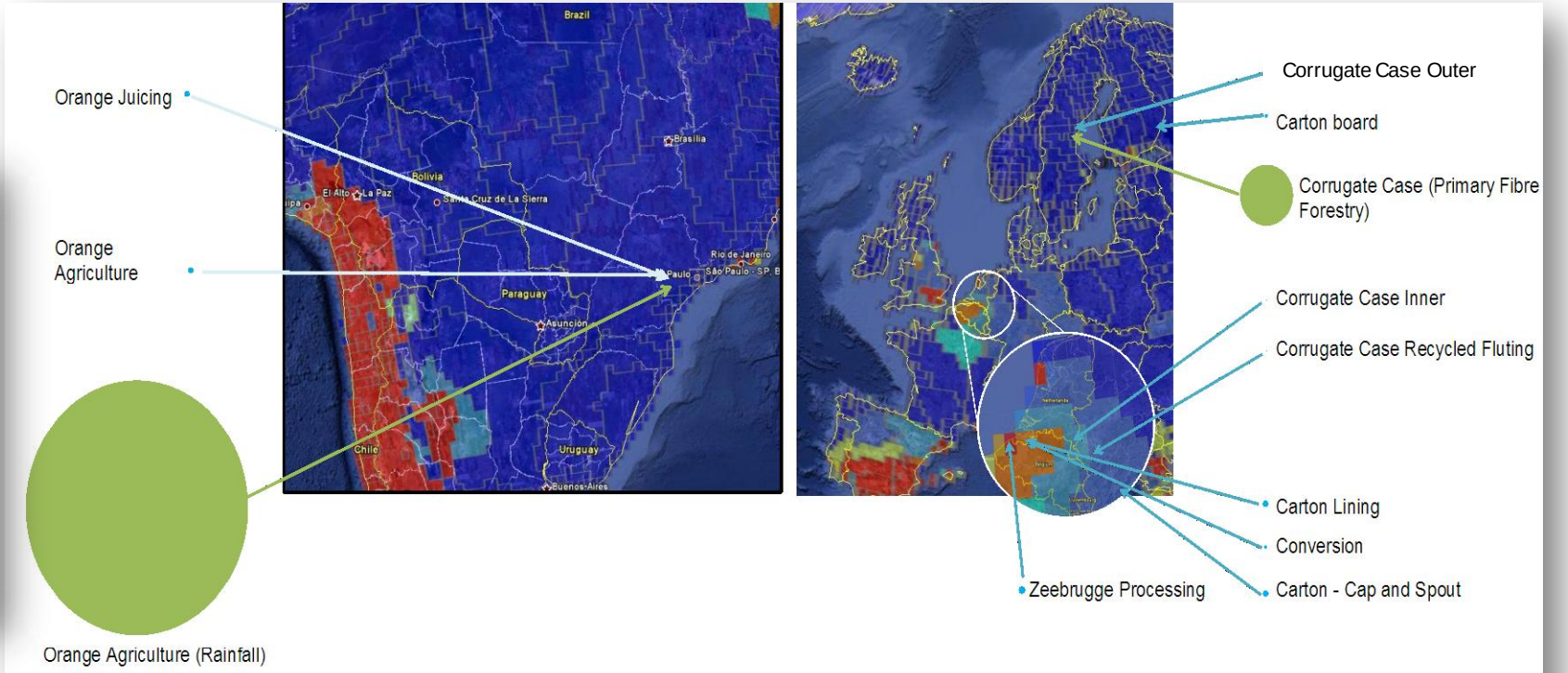
Carton Lining

Carton - Cap and Spout

Zeebrugge Processing

Consider Local Water Scarcity… and the Picture Looks Different





Context is EVERYTHING!

Greatest *impact* or *risk* is not necessarily equal to greatest *use*

A water footprint only provides <u>direction</u>; *a single, aggregated number is of limited value*

PepsiCo's Water Footprint Message

In order to ensure that our actions make a meaningful difference in areas that are water-challenged, we are focusing on reducing the components of our water footprint that are associated with the greatest local impact.

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Others are Reaching Similar Conclusions: Reports from World Water Week 2010

"…a single, aggregate number for a water footprint is of little material value. We believe … that what is truly important is the impact of our water use, which is why we are strongly advocating to evolve the discussion from 'water footprint as a number' to the 'components of a water footprint that have the most impact,' with clear distinction of where, how and when the water is sourced and used."
PepsiCo; Water Stewardship: Good for Business. Good for Society.

"In some ways the actual water footprint number is not the key finding, rather it is the breakdown of this number across the value chain that provides the necessary insights."
SABMiller, GTZ, WWF; Water Futures: Working Together for a Secure Water Future

"It is important to keep the components of a water footprint separate so that impacts can be assessed in the context of the local watersheds where the water is being sourced…. To really gain an understanding of whether water use is having an impact, the volume of water consumption must be placed in the context of the local watershed…"
The Coca-Cola Company, The Nature Conservancy; Product Water Footprint Assessments: Practical Application in Corporate Water Stewardship

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Deployment of ReCon Water

- Common
  - System-wide deployment is underway
- Critical
  - Course will be piloted in Venezuela in June
  - Implementation will be prioritized based on known water scarcity/stress and Stage 3 watershed diagnostic
- Catchment
  - Watershed diagnostic is being test-driven
  - Application of restoration strategy toolkit will be directed by diagnostic findings at individual plants
- Comprehensive
  - Risk and impact associated with operations and supply chain will be assessed
  - Initial focus will be on stressed locations as identified by watershed diagnostic

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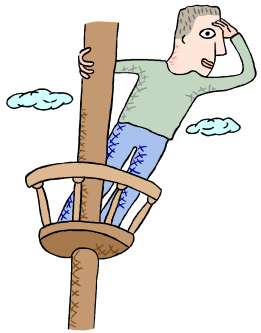
ReCon Uses Complementary Perspectives to Promote Stewardship of Water Resources

- ReCon Water looks inward to drive operational savings
  - Stage 1: Profiler and Diagnostic identify, prioritize, and implement water saving projects
  - Stage 2: Detailed analysis of critical systems provides guidance on steps to take after low-hanging fruit has been 'harvested'



- ReCon Water's outward focus provides strategic impact
  - Stage 3: Watershed Diagnostic and restoration roadmap identify locally appropriate actions to preserve water resources
  - Stage 4: Water Footprint accounting and impact assessment inform sourcing and operations decisions, reducing water-related risk

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