DRINK LOCAL

Sustainability at Princeton

BOTTLED VS. TAP WATER: IMPACT ASSESSMENT

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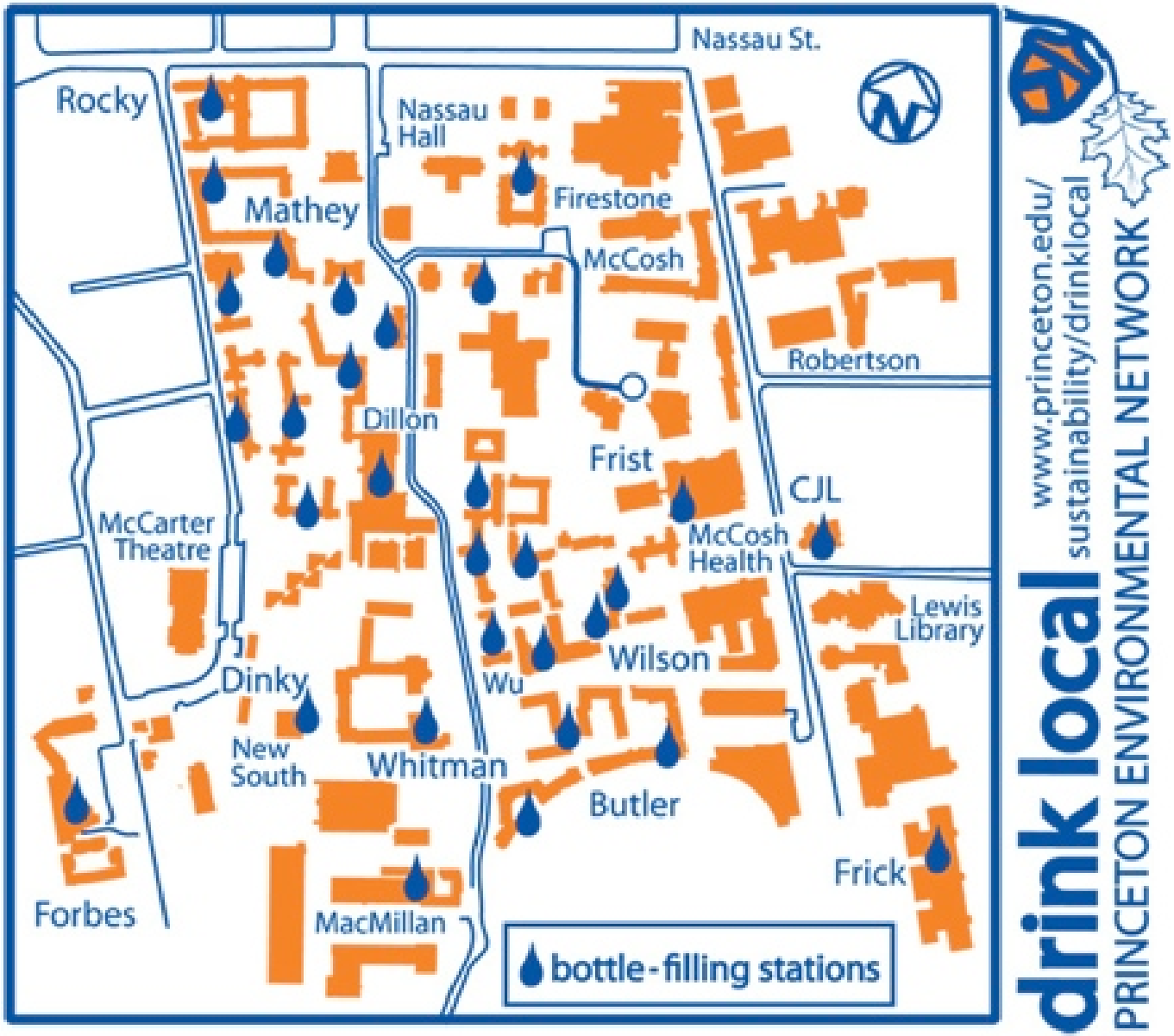
OVERVIEW

1. **Drink Local: Accomplishments to date**
2. **Environmental Impact**
3. **Health: Concerns and Regulations**
4. **Water Testing: Tastes and Preferences**
5. **Summary and Recommendation**

DRINK LOCAL ACCOMPLISHMENTS

- **190+ filtered bottle filling stations on campus:**
  - Residential college dorms
  - Athletic buildings
  - Academic & administrative buildings

- **All freshmen receive reusable water bottles at Move-In.**


Nassau St.
Rocky
Nassau Hall
Mathey
Firestone
McCosh
Robertson
Dillon
Frist
CJL
McCarter Theatre
McCosh Health
Lewis Library
Wilson
Dinky
Wu
New South
Whitman
Butler
Frick
Forbes
MacMillan
bottle-filling stations
drink local
PRINCETON ENVIRONMENTAL NETWORK
www.princeton.edu/sustainability/drinklocal

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ENVIRONMENTAL IMPACT
PRODUCTION

- It takes about **2,000x more energy** to produce bottled water than tap. (Gleick 2009)
- In the United States about **50 billion water bottles** are used annually. This requires:
  - **15–30 million barrels of oil**, which is equivalent to fueling 100,000 – 2 million cars for 1 year.
  - **100–150 billion L of water**.
  - **12 billion lbs. of CO_2** emitted.

ENVIRONMENTAL IMPACT

PRODUCTION

Table 5. Total energy requirements for producing bottled water. (Note: we assume here an average ratio of three kWh (thermal) per kWh (electrical) and 3.6 MJ kWh^{-1}.)

	Energy intensity ($MJ_{(th)}$ l^{-1})
Manufacture plastic bottle	4.0
Treatment at bottling plant	0.0001–0.02
Fill, label, and seal bottle	0.01
Transportation: range from three scenarios	1.4–5.8
Cooling	0.2–0.4
Total	5.6–10.2

ENVIRONMENTAL IMPACT

WASTE

- Only **23%** of disposable water bottles recycled.
- It takes **~700 years** for PET bottles to decompose.
- **At Princeton:**
  - Princeton brand water bottles are made with ENSO biodegradable plastic.
  - PET bottles are used in the Ustore, Frist Campus Center, and several other campus venues.

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HEALTH CONCERNS

Regulatory bodies:

- Bottled water – Food and Drug Administration (**FDA**)
- Tap water – Environmental Protection Agency (**EPA**)

Name of Substance	Raritan Water System (2013) (Princeton tap water)	FDA Standards for Bottled Water Quality: Allowable Levels
Iron	Not Detected	0.3 mg/L
Manganese	Not Detected	0.05 mg/L
Arsenic	0.0 to 0.002 mg/L	0.010 mg/L
Fluoride	0.6 - 1.0 mg/L	1.4 - 2.4 mg/L (temp. dependent)
Chloramine	0.8 mg/L	4.0 mg/L
Lead	0.005mg/L	0.005 mg/L
Copper	0.5 mg/L	1.0 mg/L
Nitrate	0.4-2.4 mg/L	10 mg/L

HEALTH CONCERNS

- Tap water quality at Princeton rivals that of FDA-certified bottled water.

- Princeton has 190+ filtered water stations that provide better water quality than tap water:
  - The filter removes chlorine taste and odor, dirt and rust.

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WATER TASTE STUDY

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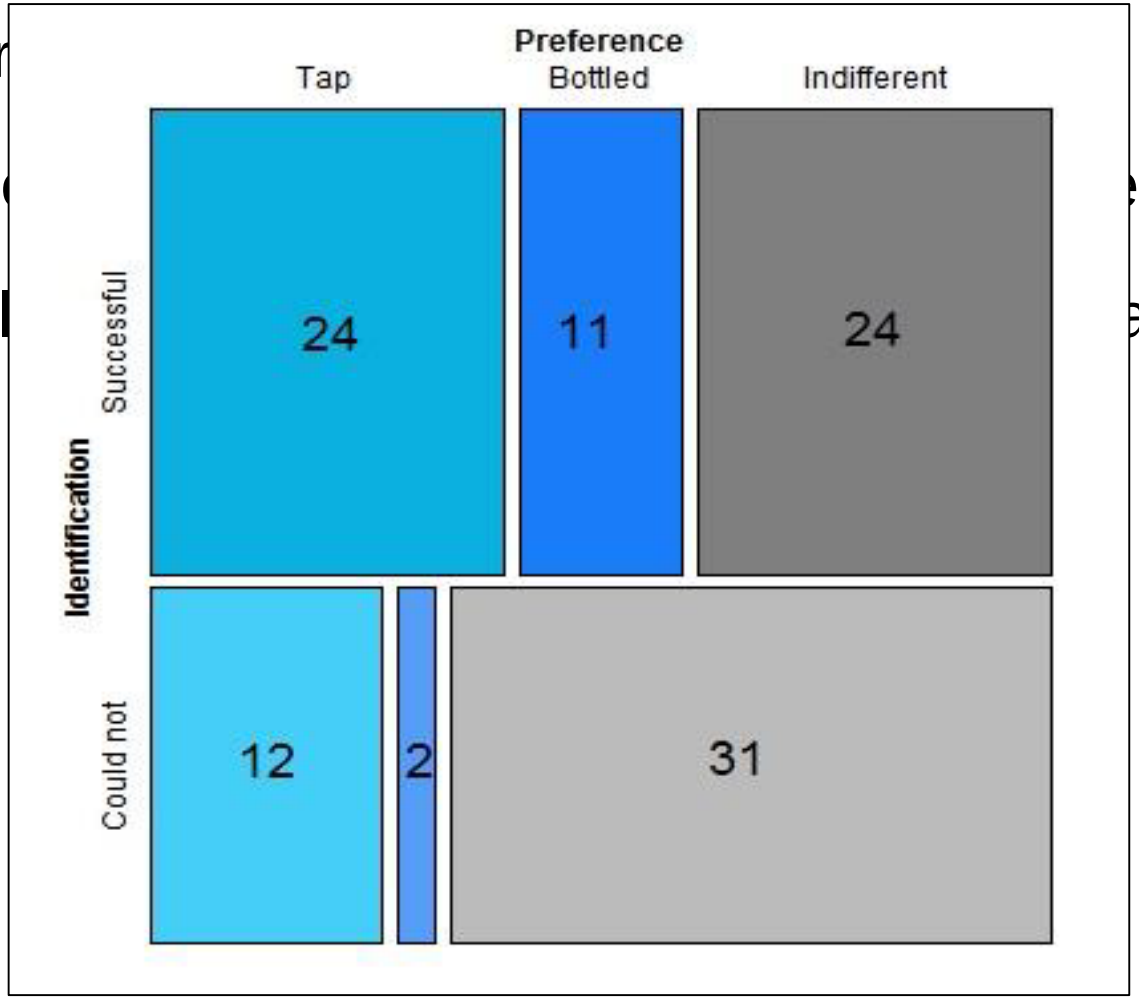

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SUMMARY

BOTTLED WATER	TAP WATER
Energy: ▪ 2,000x more energy intensive. ▪ Consider water use, oil use, and carbon emissions.	
Waste: ▪ Single-Use ▪ In 2013, the recycling rate for bottled water was **23%**.	
Health: ▪ Princeton tap water quality rivals that of bottled water.	
$1.22 - $7.50 per gallon	**$0.0004 per gallon**
NO discernable taste difference	

RECOMMENDATION

1. Discontinue the sale of bottled water in Frist cafeteria and C-store and replace with reusable “Drink Local” water bottles.
2. Discontinue the sale of bottled water in campus vending machines and the U. Store.
3. Increase the number and accessibility of bottle filling stations.
4. Replace bottled water at campus events with 5 gallon water jugs and reusable cups.

SOURCES

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2. **Fox, C. C. “Drinking Water: Bottled or from the Tap?”. National Geographic Kids. Accessed online at URL: http://kids.nationalgeographic.com/kids/stories/spacescience/water-bottle-pollution/**
3. **Gleick, P. H. and H. S. Cooley. “Energy implications of bottled water.” Environmental Research Letters 4 (January 2009): 014009**
4. **Leiba, N., Gray, S. and J. Houlihan. “2011 Bottled Water Scorecard”. Environmental Working Group.**
5. **CO2 emission: http://timeforchange.org/plastic-bags-and-plastic-bottles-CO2-emissions**
6. **EPA website: http://www.epa.gov/osw/conserve/materials/plastics.htm**
7. **Costs: http://www.slate.com/blogs/business_insider/2013/07/12/cost_of_bottled_water_vs_tap_water_the_difference_will_shock_you.html**