Supporting Information

Attari 10.1073/pnas.1316402111

SI Text

Data Sources and Values of Actual Water Use

The estimation process and the data sources for actual water use for the 17 activities are detailed below. The data reflect the best available information at the time of analysis.

Estimation for actual water use for all of the end-uses and activities shown in Fig. 3:

i) Flushing a low-flow toilet one time: as per the Environmental Protection Agency (EPA) (1), the current federal standard for low-flow or efficient toilets is **1.6 gallons per flush or less**, even though there are models that currently exist that both provide superior performance and use less water that are rated as WaterSense toilets that operate at 1.28 gallons per flush (1).

ii) Flushing a standard-flow toilet one time: Mayer et al. (ref. 2, p. 96) found that for the majority of the 348,345 toilet flushes recorded in their 12 sites, the range for water use fell into 3–5 gallons per flush, with **3.5 gallons per flush** dominating. Another source from the EPA confirms that pre-retrofit, the average flush volume is 3.68 gallons per flush (3, p. 37), which is an average from three study sites. The Mayer et al. (2) estimate was used as the actual value because it covered 12 study sites.

iii) Washing one load of dishes with a high-efficiency home dishwasher: efficient dishwashers are rated at less than or equal to **4.25 gallons per load** by the Department of Energy (4).

iv) A leaking faucet (1 drip per 1 s) for 1 d (24 h): this was calculated and verified; 1 drip per s produces 60 drips per min. Multiplied by 1,440 min/d gives 86,400 drips total. One gallon has 15,140 drips as per the US Geological Survey (5), giving **5.7 gallons per d.**

v) Washing one load of dishes with a standard home dishwasher: in their water trivia facts, the EPA estimates that the average dishwasher uses between 9 and 12 gallons of water per load. The arithmetic average of **10.5 gallons per load** was used as the actual number.

vi) Running a high-efficiency bathroom faucet for 10 min at its maximum flow rate: The EPA WaterSense specification for low-flow/high-efficiency faucets is set at a maximum of 1.5 gallons per min (6). Therefore, 10 min at the maximum flow rate is **15 gallons** of water.

vii) Using a high-efficiency, front-loading home washer for one load of laundry: as per the Energy Star Department of Energy rating, "a full-sized Energy Star certified clothes washer uses **15 gallons of water per load**" (7).

viii) Taking a low-flow shower for 10 min at its maximum flow rate: EPA WaterSense standards for low-flow showerheads must use no more than 2 gallons per min (8), giving **20 gallons of water** for a 10-min shower.

ix) Running a standard bathroom faucet for 10 min at its maximum flow rate: the EPA specification for standard faucets is 2.2 gallons per min (6), giving **22 gallons of water** for 10 min.

x) Taking a standard-flow shower for 10 min at its maximum flow rate: EPA-regulated standard showerheads use 2.5 gallons per min (8), giving **25 gallons of water** for a 10-min shower.

xi) Filling one typical bathtub: as per the California Energy Commission, an average bath requires 30–50 gallons of water (9). An arithmetic mean on the range gives about **40 gallons of water.**

xii) Using a standard, top-loading home washer for one load of laundry: as per the California Energy Commission, older top-loading machines use about 40 gallons of water to wash a full load of clothes although newer standard models use about 27 gallons of water (10). An arithmetic mean on the range gives about **34 gallons of water per load.**

xiii) Washing a car at a drive-in, conveyor automatic car wash: a report prepared for the water utilities in El Paso, TX stated that in-bay automatic carwashes use about 50–60 gallons per vehicle (11). The arithmetic average of **55 gallons per vehicle** was used.

xiv) Watering a lawn with a garden hose at its maximum flow rate for 10 min: the volume of water used from a garden hose was determined based on hose size (5/8 inch), hose supply pressure (40 psi), and hose length (100 feet) will have a flow rate of 11 gallons per min, leading to **110 gallons of water** for 10 min (12).

xv) Filling one hot tub ("Jacuzzi") (six-person capacity): there is no standard hot tub dimension that fits six people. To estimate this activity's water use, many sources were found online via retail stores selling the product and water-use specifications were averaged providing an estimate of **405 gallons of water**. These estimates were from 260 gallons (13) to about 550 gallons (14).

xvi) Filling one typical backyard in-ground pool ($5 \times 15 \times 30$ feet): these dimensions give a volume of 2250 cubic feet or **16,831 gallons of water.**

xvii) Filling one Olympic-sized competition swimming pool: the dimensions of an Olympic-sized pool are $50 \times 25 \times 2$ m (15), giving 2,500 m^3 or about **660,000 gallons of water.**

Data Sources and Values of Embodied Water Use

The data sources for embodied water content (alternatively "water footprint") were used from the Waterfootprint.org website. They state that the "Water Footprint of a product is the volume of freshwater appropriated to produce the product, taking into account the volumes of water consumed and polluted in the different steps of the supply chain."

i) One pound of sugar: it takes about 1,782 L of water to produce 1 kg of sugar from sugar cane and about 920 L of water to produce 1 kg of sugar from sugar beets (16). In the United States, which is the world's largest sugar producer, sugarcane accounts for about 45% of the total sugar produced domestically, and sugar beets for about 55% of production (17). Thus, the weighted average is $(0.45 \times 1782) + (0.55 \times 920) =$ 1,308 L of water to produce 1 kg of sugar or about **157 gallons of water per pound of sugar.**

ii) One pound of rice: it takes about 2,497 L of water to produce 1 kg of rice (16, 18) or about **299 gallons of water per pound of rice.**

iii) One pound of cheese: it takes about 5,060 L of water to produce 1 kg of cheese (16, 19) or about **606 gallons of water per pound of cheese.**

iv) One pound of coffee: it takes about 18,900 L of water to produce 1 kg of roasted coffee (16) or about **2,264 gallons of water per pound of coffee.**

Order Effects of First Two Open-Ended Questions

To explore order effects, Fig. 2 can be divided into two 3×3 tables (self/American vs. American/self), with the following categories: curtailment, efficiency, and other. Fig. S1 shows the relative joint percentage distribution of responses for self and for Americans using these three categories. Fig. S1 also displays a marginally significant asymmetry as highlighted by the arrows, indicating that participants are somewhat more likely to recommend curtailment actions for themselves and efficiency actions for others than vice versa. Note that the two tables are fairly similar and the hypothesis of identical joint distributions cannot quite be rejected: $\chi^2 = 13.63$ (likelihood-ratio test, 8 df).

Multilevel Regression Results

To investigate individual differences in accuracy, 10 centered individual difference variables [e.g., numeracy, proenvironmental attitudes as measured by the New Ecological Paradigm (NEP) scale, age] were added as predictors in the multilevel regression model. The result of the extended model (using all 10 centered individual difference variables) appears in the Table S1, and is not appreciably different from the simple model presented in the current paper.

1. Environmental Protection Agency (2013) WaterSense: Water-Efficient Toilets. Available at www.epa.gov/WaterSense/products/toilets.html. Accessed August 7, 2013.
2. Mayer, PW, DeOreo WB (1999) *Residential End Uses of Water* (American Water Works Assoc, Denver).
3. Environmental Protection Agency (2005) Water and Energy Savings from High Efficiency Fixtures and Appliances in Single Family Homes. Available at www.allianceforwaterefficiency.org/uploadedFiles/Resource_Center/Library/residential/showers/Aquacraft(2005)EPA-Single-Family-Retrofit-Studies-Combined-Report.pdf. Accessed August 16, 2013.
4. Department of Energy (2013) Dishwashers Key Product Criteria. Available at www.energystar.gov/index.cfm?c=dishwash.pr_crit_dishwashers. Accessed August 7, 2013.
5. US Geological Survey (2013) Drip Accumulator: How much water does a leaking faucet waste? Available at http://ga.water.usgs.gov/drought/dripcalculator.html. Accessed August 16, 2013.
6. Environmental Protection Agency (2013) WaterSense Labeled High-Efficiency Lavatory (Bathroom Sink) Faucet Specification. Available at www.epa.gov/WaterSense/pubs/faq_bs.html. Accessed August 7, 2013.
7. Department of Energy (2013) Clothes Washers. Available at www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=CW. Accessed August 18, 2013.
8. Environmental Protection Agency (2013) WaterSense: Water-Efficient Showerheads. Available at www.epa.gov/WaterSense/products/showerheads.html. Accessed August 7, 2013.
9. California Energy Commission (2013) Shower vs Bath. Available at www.consumerenergycenter.org/myths/shower_vs_bath.html. Accessed August 16, 2013.
10. California Energy Commission (2013) Clothes Washers. Available at www.consumerenergycenter.org/home/appliances/washers.html. Accessed August 16, 2013.
11. Rittman D (2002) *Commercial Car Wash Industry Survey Report* (El Paso Water Utilities, El Paso, TX).
12. Washington State University Extension (2013) Garden Hose Flow Rate and Time Calculator. Available at http://irrigation.wsu.edu/Content/Calculators/Residential/Garden-Hose-Flow.php. Accessed August 16, 2013.
13. Sears (2013) Atlantic Outdoor 6 Person 18 Jet, 110 V Spa - Color: Silver, Type: Deluxe. Available at www.sears.com/atlantic-outdoor-6-person-18-jet-110-v/p-SPM7629397910?prdNo=1&blockNo=1&blockType=G1. Accessed August 16, 2013.
14. The Home Depot (2013) QCA Spas Athens 6-Person 144-Jet Spa (2) 5.2 HP BT Pumps Ultra Wave Lounge and HydroMax Seat FREE ENERGY and ENTERTAINMENT PACK. Specifications. Available at www.homedepot.com/p/QCA-Spas-Athens-6-Person-144-Jet-Spa-2-5-2-HP-BT-Pumps-Ultra-Wave-Lounge-and-HydroMax-Seat-FREE-ENERGY-and-ENTERTAINMENT-PACK-Athens-24SM-PU/202712554. Accessed August 16, 2013.
15. FINA (2013) FR 3 Swimming Pools for Olympic Games and World Championships. *FINA Facilities Rules 2009-2013*. Available at www.fina.org/project/index.php?option=com_content&task=view&id=51&Itemid=119. Accessed August 16, 2013.
16. Hoekstra AY, Chapagain AK (2013) Water Footprint. Available at www.waterfootprint.org/?page=files/productgallery. Accessed August 16, 2013.
17. US Department of Agriculture (2013) Sugar and Sweeteners. Available at www.ers.usda.gov/topics/crops/sugar-sweeteners/background.aspx. Accessed August 16, 2013.
18. Chapagain A, Hoekstra A (2011) The blue, green and grey water footprint of rice from production and consumption perspectives. *Ecol Econ* 70(4):749–758.
19. Mekonnen MM, Hoekstra AY (2012) A global assessment of the water footprint of farm animal products. *Ecosystems (N Y)* 15(3):401–415.

		Americans					
		Order: Self/Americans (*N = 515*)			Order: Americans/Self (*N = 505*)		
		Curtailment	*Efficiency*	*Other*	*Curtailment*	*Efficiency*	*Other*
Self	*Curtailment*	55.2	8.4	11.5	60.8	6.7	9.1
	Efficiency	4.9	2.7	2.7	3.2	4.2	1.8
	Other	4.3	1.4	9.1	6.5	1.6	6.1
	Diagonal asymmetry	$\log_e(8.4/4.9) = 0.54 \pm 0.37$			$\log_e(6.7/3.2) = 0.74 \pm 0.38$		

Fig. S1. Joint distributions (percentages) of endorsement categories for self and for Americans from the first two open-ended questions by order. Tests of the asymmetry in response shifts from self to Americans, indicated by the arrows, are given as estimated log odds with estimated SEs.

Table S1. Results of multilevel regressions for predicting individuals' perceptions of water use including all 10 centered individual difference variables

Parameters	Elevation, slope, and main effects (effects on elevation)	Interactions (effects on slope)
Intercept (elevation)	−0.31***	—
Within-participant (level 1) predictors		
Actual water use, log10*Actual*	0.70***	—
Quadratic term, $(\log10 Actual)^2$	−0.031***	—
Between-participant (level 2) predictors		
Numeracy (0–3, $\alpha = 0.42$)	0.019	0.050***
NEP (0–6, $\alpha = 0.89$)	0.034	−0.0047
Drought past year (1–6)	−0.013	0.0048
Pay attention to cost	0.043	0.0075
Efficient appliances at home[a]	0.0077	0.011
Political views (1–7)	0.012	0.0036
Male	−0.0088	0.035**
Age, y	0.0042***	0.0028***
Income (1–8)	−0.0077	0.0024
Education (1–6)	0.0032	−0.0031

Elevation and slope are reported at the relevant mean of log10*Actual*, the *x* axis variable in Fig. 3. In Fig. 3 elevation varied, and it was tested against the relevant mean of actual water use. The slope was tested against the correct slope of 1. *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

[a]The components of "Efficient appliances at home" were the sum of having any of the following low-flow or high-efficiency appliances: toilet, shower, bathroom faucet, dishwasher, and clothes washing machine.

Other Supporting Information Files

Dataset S1 (PDF)