Supplementary Data

Water end-uses and rainwater harvesting: a case study in Brazil

Gabriela Hammes, Enedir Ghisi, Liseane Padilha Thives

Federal University of Santa Catarina, Department of Civil Engineering, Laboratory of Energy

Efficiency in Buildings, Florianópolis, SC, 88040-900, Brazil

Table S.1. Water availability and population for the five geographic regions of Brazil.

Region	Water availability (%)	Population (%)	Water availability (m^3 per capita/year)
North	69	8	307,603
Northeast	3	28	3,900
Southeast	6	43	4,615
South	6	15	75,511
Central-West	15	7	33,762

Source: IBGE and ANA (2004) apud Ghisi (2006).

Table S.2. Potential for potable water savings for each geographic region in Brazil

Region	Specific volume of rainwater (m^3 per capita/year)	Potable water demand		Potential for potable water savings (%)
		(litres per capita/day)	(m^3 per capita/year)	
North	38.419	88	32.120	100
Northeast	21.457	97	35.405	61
Southeast	27.953	158	57.670	48
South	35.000	117	42.705	82
Central-West	32.608	120	43.800	74

Source: Based on Ghisi (2006).

Table S.3. Indoor water end-uses in houses in the USA and Canada

Activity	Water end-use (%)
Toilet flush*	24
Shower	20
Tap	19
Washing machine*	17
Leaks	12
Others	4
Bath	3
Dishwashing machine	1
Total	100
*Total non-potable	41

Source: Based on DeOreo et al. (2016).

Table S.4. Existing appliances in the house

Room	Appliance
Kitchen	Tap
Bathroom on the ground floor	Shower
	Tap
	Toilet flush
Laundry room	Washing machine
	Tap
Outdoor	Hose in front of the house
	Hose behind the house
Bathroom on the first floor	Shower
	Tap
	Toilet flush
Master bathroom	Shower
	Tap
	Toilet flush

Table S.5. Estimated water end-uses

Water appliance	Water end-use	
	Litres/day	%
Shower	97.2	36.6
Toilet flush*	82.6	31.1
Kitchen tap	30.8	11.6
Washing machine*	24.0	9.1
Hose*	15.5	5.8
Bathroom tap	14.2	5.3
Laundry tap*	1.1	0.4
Total	265.5	100.0
*Total non-potable	123.2	46.4

Table S.6. Input data used in the *Netuno* computer programme

| Input variable	Data
First flush	2 mm
Daily rainfall data	Variable
Rainwater catchment area	192.3 m^2
Number of residents	2
Total daily water demand	Variable
Non-potable water demand (% of daily potable water demand)	46.5%
Runoff coefficient	0.90
Maximum capacity of the lower rainwater tank	5,000 L
Interval between lower rainwater tank capacities	100 L
Upper rainwater tank capacity	250 L
Water volume in the upper tank below which rainwater is pumped	10%
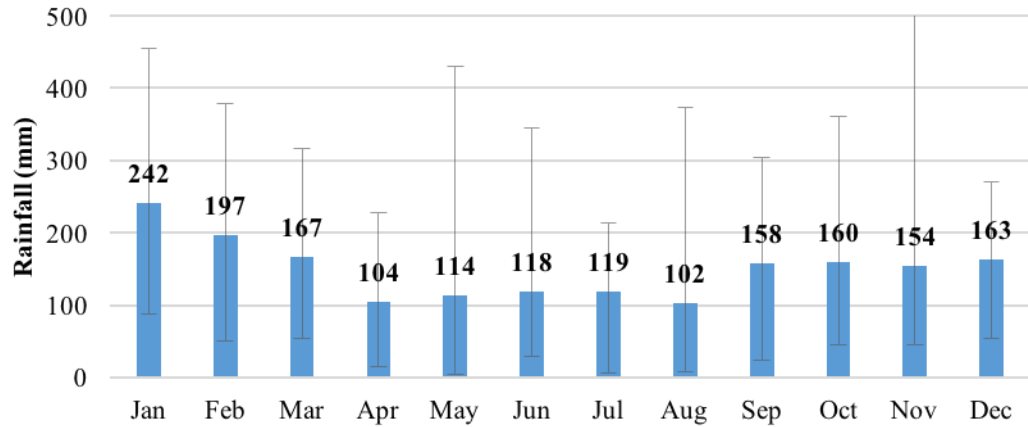
Fig. S.1. Monthly average rainfall from January 1990 to December 2017 in Blumenau
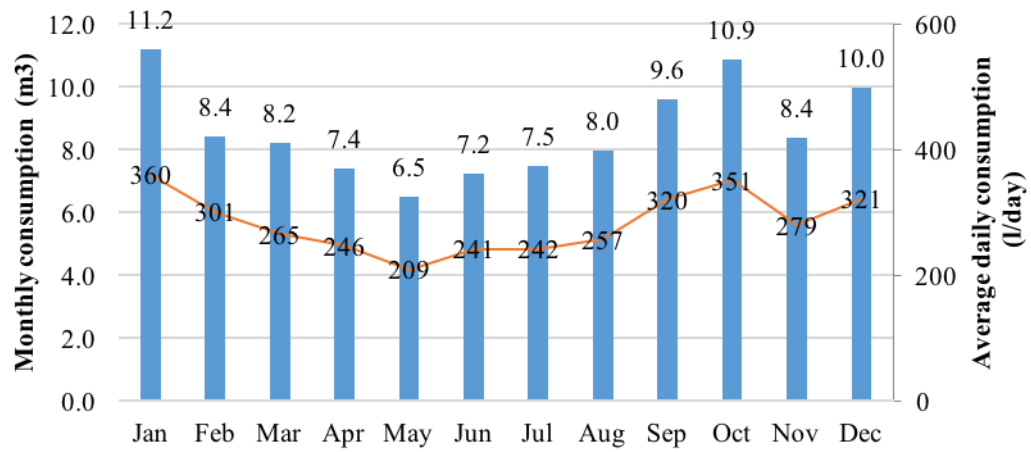

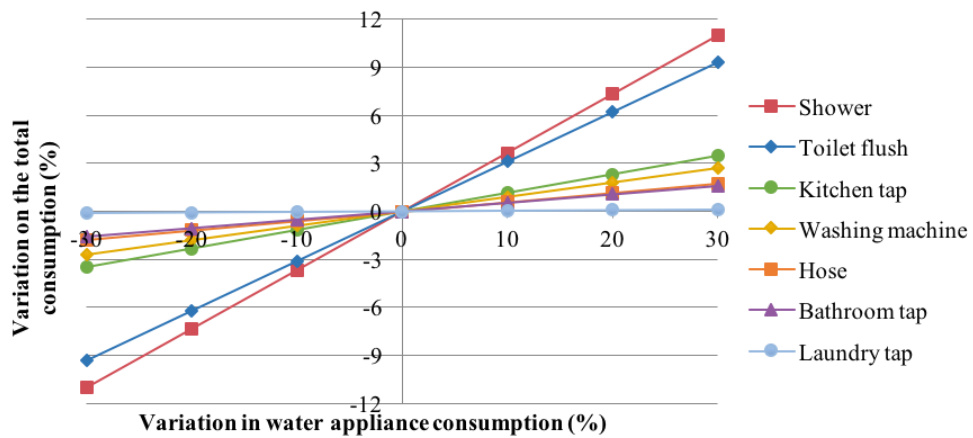Fig. S.2. Water consumption in the house over 2017

Fig. S.3. Variation of total water consumption according to variation in consumption of each water appliance
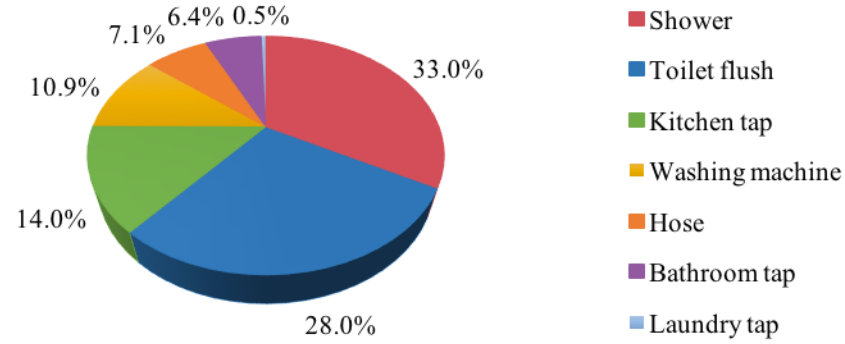
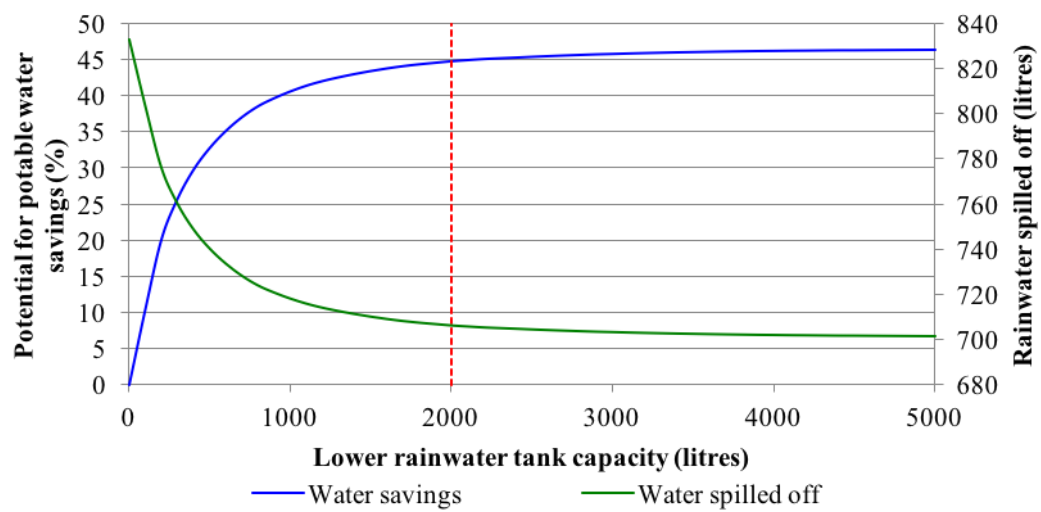Fig. S.4. Water end-uses after the sensitivity analysis

Fig. S.5. Potential for potable water savings and volume of water spilled off as a function of the capacity of the lower rainwater tank.
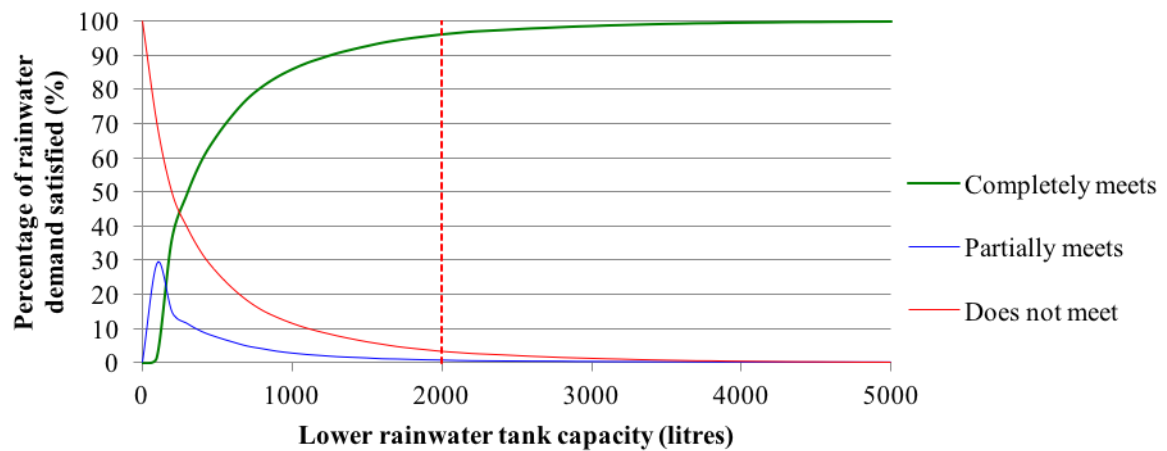

Fig. S.6. Percentage of days when the demand for non-potable water is fully, partially, and not met
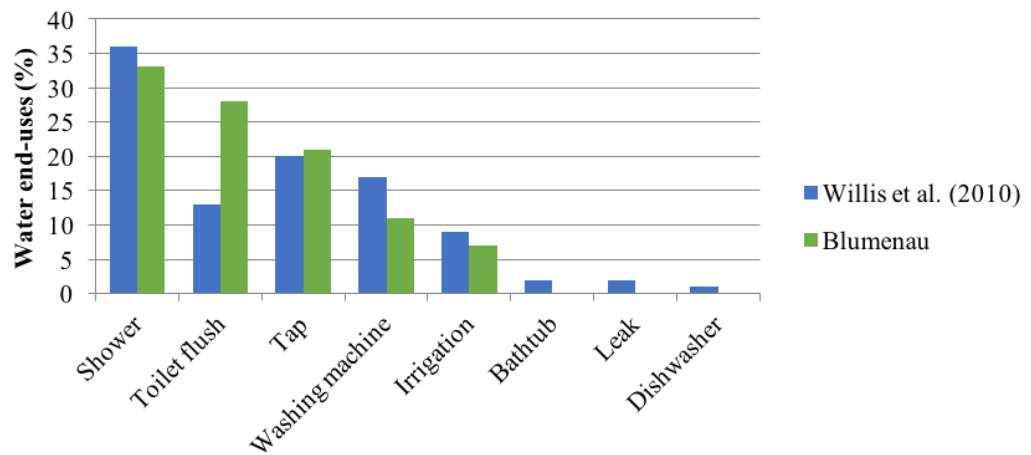
Fig. S.7. Water end-uses obtained in Blumenau (this study) and Australia (Willis et al., 2010)
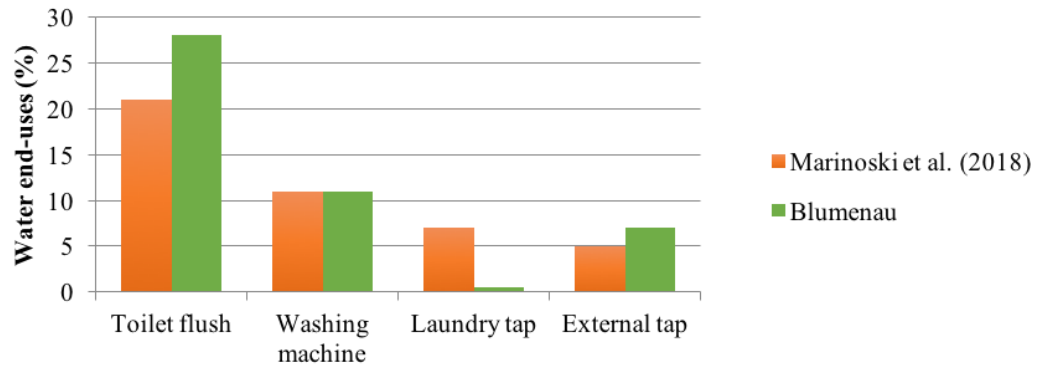

Fig. S.8. Non-potable water end-uses in Blumenau (this study) and the metropolitan area of Florianópolis (Marinoski et al., 2018)