Supplementary Material

Under-sink activated carbon water filters effectively remove lead from private well water for over six months

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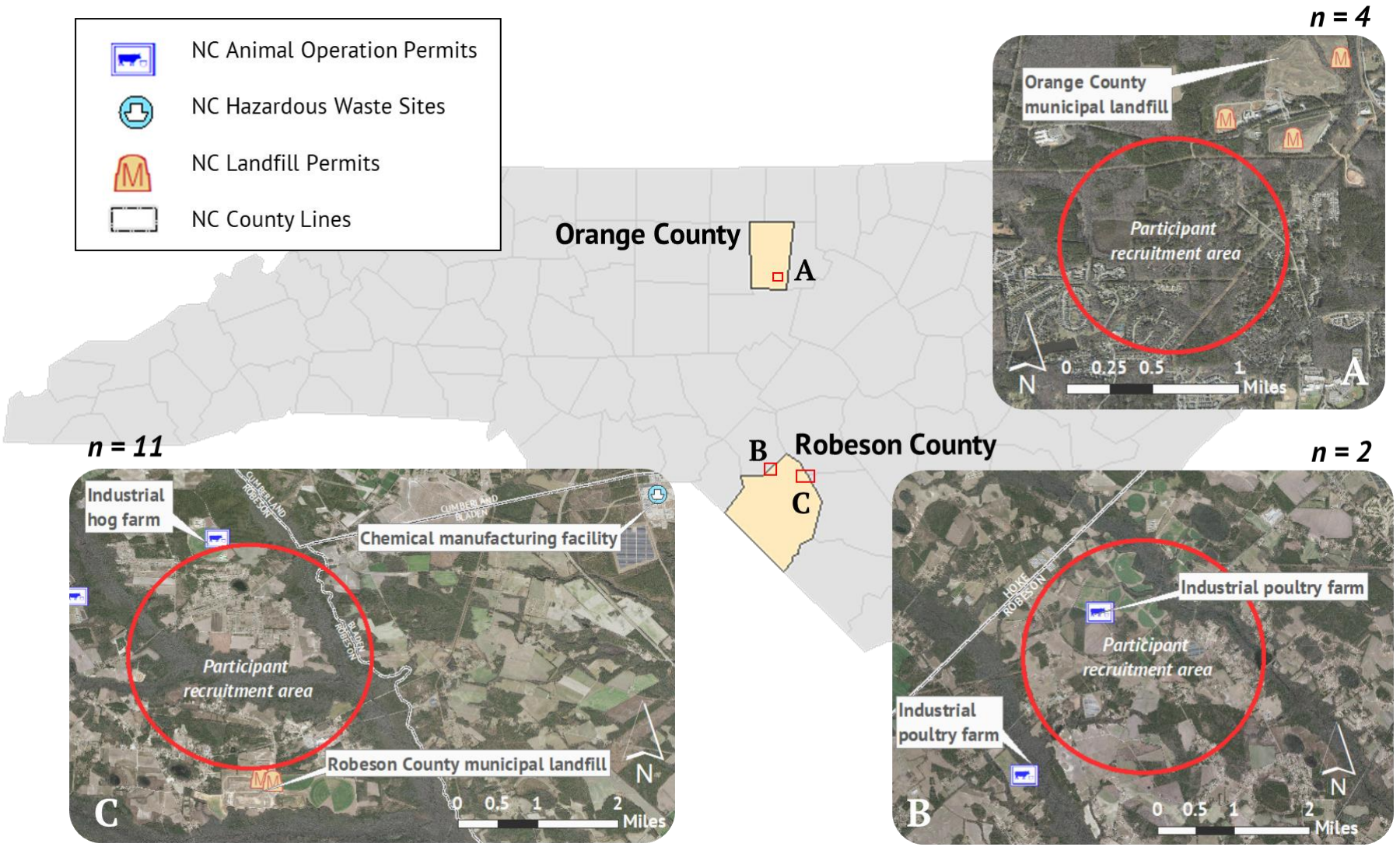

Figure S1.*Map of study participant recruitment areas across three geographic clusters (A, B, and C) in Orange County and Robeson County, North Carolina*

Table S1. *Household-specific information of study participants within each geographic cluster.*

House ID	House type	Year of home construction	Year of well construction	Well depth (ft)	Baseline Pb – 250 mL first draw from faucet (µg/L)	Preexisting treatment
Cluster A						
5	Single family home	1985	Unknown	Unknown	2.72	Water softener
8	Single family home	1985	Unknown	Unknown	1.57	Water softener
9	Single family home	1987	1987	145	0.13	None
10	Single family home	1990s	Unknown	Unknown	0.41	None
Cluster B						
19	Single family home	1972	Unknown	25-30	34.33	None
21	Single family home	1955	1955	26	0.40	None
Cluster C						
1	Manufactured home/trailer	10	Pre-2000	35	9.93	None
2	Single family home	2000	2000	Unknown	26.26	None
3	Manufactured home/trailer	1993	1996	35 ft	7.99	None
4	Manufactured home/trailer	1990s	2000	35	14.00	None
7*	Manufactured home/trailer	1976	Pre-1995	Unknown	0.69	None
11	Manufactured home/trailer	2002	Unknown	Unknown	2.83	None
13	Manufactured home/trailer	2018	2000	25-30	5.47	None
14	Single family home	1998	2014	75	8.46	None
15	Single family home	1997	Unknown	Unknown	20.27	None
16*	Manufactured home/trailer	1970s	Pre-1995	Unknown	-	None
17	Single family home	1983	1986	Unknown	9.36	None

*Two homes connected to the same well

Table S2. *Influent groundwater quality of each participating household compared to the required water quality conditions for POU lead removal certification according to NSF/ANSI 53. pH, electrical conductivity, temperature, DOC, and alkalinity measurements are averaged from monthly influent samples from each household. [Ca2+], [Mg2+], [Cl-], and [SO42-] show single baseline measurement values.*

House ID	pH	Electrical conductivity (µS/cm)	Temp. (°C)	DOC (mg/L)	Ca2+ (mg/L)	Mg2+ (mg/L)	Hardness (mg/L CaCO3)	Cl^- (mg/L)	$SO4^{2-}$ (mg/L)	CSMR	$HCO3^-$ (mg/L)	$CO3^{2-}$ (mg/L)	Carbonate Alkalinity (mg/L CaCO3)	Langelier Saturation Index
NSF/ANSI 53	6.5 ± 0.25 8.5	<180	20 ± 2.5 20	>1.0	-	-	10-30 100	-	-	-	-	-	10-30 100	
Cluster A														
5	6.73	212	17.2	0.75	29.9	1.35	80.2	5.45	7.64	0.71	75.48	0.0	61.9	-1.6
8	7.78	457	17.1	1.46	15.3	5.30	60.0	17.9	2.66	6.73	196.38	0.6	162.1	-0.5
9	7.09	452	17.7	1.64	70.5	3.88	192.1	14.8	9.20	1.61	197.44	0.1	162.2	-0.5
10	6.75	281	17.0	0.78	35.9	4.90	109.8	14.2	8.59	1.66	82.43	0.0	67.6	-1.5
Mean	**7.09**	**350.24**	**17.23**	**1.16**	**37.89**	**3.86**	**110.54**	**13.10**	**7.02**	**2.68**	**137.93**	**0.20**	**113.47**	**-1.05**
SD	0.43	107.01	0.25	0.40	20.25	1.54	50.32	4.63	2.58	2.37	59.03	0.25	48.71	0.54
Cluster B														
19	4.29	359	18.0	0.44	10.4	3.20	39.1	36.7	1.08	34.04	0.12	0.0	0.1	-7.3
21	6.56	76	18.5	1.88	5.54	1.85	21.4	4.49	3.00	1.50	17.70	0.0	14.5	-3.1
Mean	**5.43**	**217.30**	**18.25**	**1.16**	**7.96**	**2.52**	**30.25**	**20.59**	**2.04**	**17.77**	**8.91**	**0.00**	**7.31**	**-5.23**
SD	1.13	141.55	0.23	0.72	2.42	0.68	8.84	16.10	0.96	16.27	8.79	0.00	7.21	2.12
Cluster C														
1	4.90	76	17.6	0.34	2.73	0.627	9.4	3.42	1.53	2.23	0.44	0.0	0.4	-6.7
2	4.48	169	19.1	0.79	8.40	2.15	29.8	12.4	9.23	1.34	0.18	0.0	0.1	-7.0
3	4.23	115	18.4	0.28	5.62	3.81	29.7	8.60	1.05	8.19	0.04	0.0	0.0	-8.1
4	4.41	124	21.5	0.22	4.10	3.11	23.0	6.60	1.17	5.62	0.05	0.0	0.0	-7.9
7	4.26	134	18.4	3.40	2.48	1.21	11.1	11.8	28.5	0.41	0.13	0.0	0.1	-7.9
11	4.30	118	18.5	0.37	5.95	2.38	24.6	13.7	1.05	13.09	0.09	0.0	0.1	-7.7
13	4.70	54	18.6	0.36	3.66	1.46	15.1	6.87	1.24	5.52	0.16	0.0	0.1	-7.2
14	4.25	89	18.3	0.27	3.45	1.90	16.4	9.50	1.62	5.85	0.07	0.0	0.1	-8.0
15	4.55	54	20.0	0.32	2.92	1.68	14.2	6.98	1.21	5.77	0.43	0.0	0.4	-7.0
16	4.71	130	17.7	0.29	2.48	1.21	11.1	11.8	28.5	0.41	0.19	0.0	0.2	-7.3
17	3.93	131	17.6	0.32	2.61	1.47	12.6	9.48	12.7	0.75	0.03	0.0	0.0	-8.9
Mean	**4.43**	**108.66**	**18.68**	**0.63**	**4.04**	**1.91**	**17.92**	**9.20**	**7.99**	**4.47**	**0.16**	**0.00**	**0.13**	**-7.62**
SD	0.26	34.51	1.12	0.89	1.80	0.87	7.19	2.94	10.37	3.76	0.14	0.00	0.11	0.61

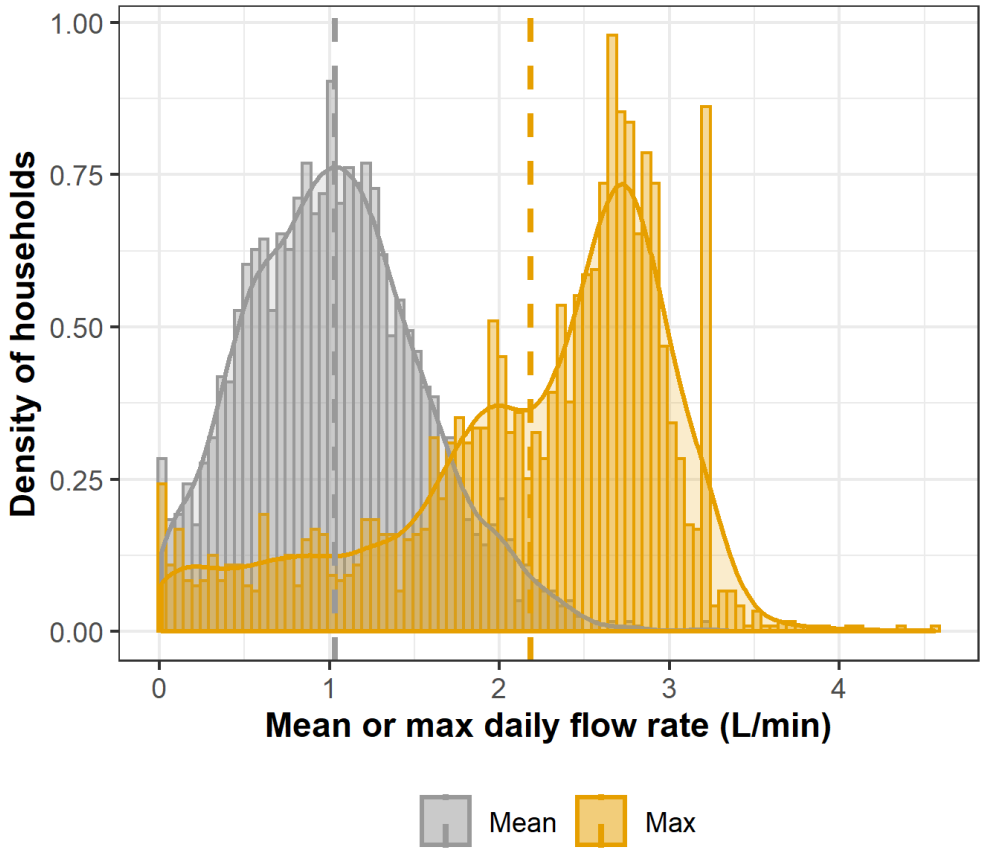

Figure S2. *Histogram of the daily mean and maximum flow rates among all participating households over the course of the study. Vertical dashed lines show the average mean and average max daily flow rates, respectively.*

***Table S3**. Range of removal performance observed for various metals for all households over the entire study period.*

	Mean	***Med***	***Min.***	***Max.***
Al	4%	91%	-2213%	100%
As	50%	61%	-57%	97%
Cd	66%	85%	-171%	99%
Cu	90%	100%	-13%	100%
Fe	-43%	93%	-3873%	100%
Mn	-92%	-6%	-2326%	100%
Ni	14%	10%	-233%	96%
Pb	98%	100%	65%	100%
Sn	20%	0%	0%	99%
U	75%	93%	0%	99%
Zn	34%	93%	-1448%	100%

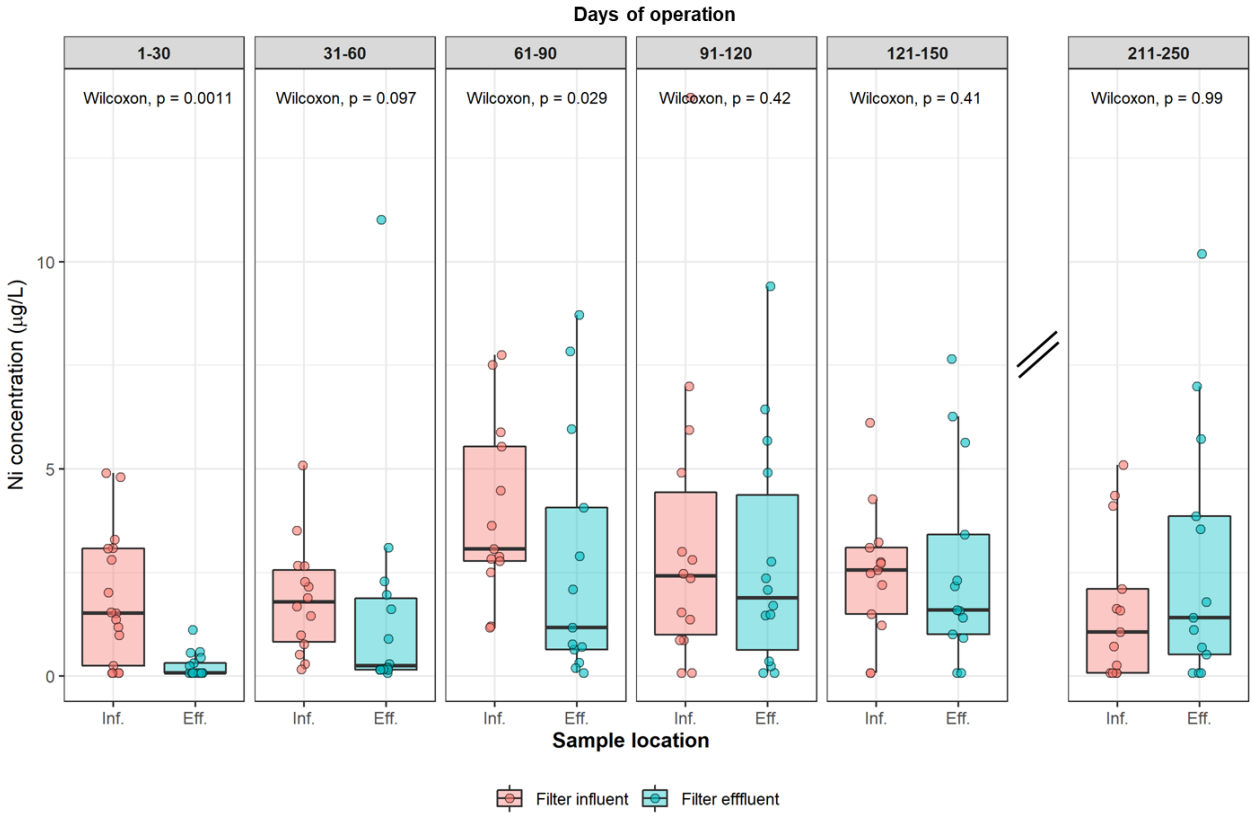

Figure S3. *Influent and effluent nickel concentrations over time showing median effluent concentrations approaching and surpassing median influent concentrations after approximately four months of use.*

Table S4. *Pb results in baseline samples collected from each house (250 mL first draw without filter) compared to the average filter influent at each household during the study ± one standard deviation. All results in µg/L.*

House ID	**Baseline sample (250 mL first draw from faucet)**	**Average filter influent (1 L first draw from beneath the sink)**
Cluster A		
5	2.72	2.24 ± 1.4
8	1.57	0.29 ± 0.1
9	0.13	0.13 ± 0.1
10	0.41	1.12 ± 0.8
Cluster B		
19	34.33	5.09 ± 3.6
21	0.40	0.42 ± 0.5
Cluster C		
1	9.93	8.36 ± 0.8
2	26.26	6.93 ± 2.6
3	7.99	4.13 ± 0.8
4	14.00	4.71 ± 0.7
7	0.69	3.45 ± 1.8
11	2.83	2.56 ± 0.9
13	5.47	1.28 ± 0.3
14	8.46	4.31 ± 1.4
15	20.27	4.42 ± 2.8
16	-	5.09 ± 3.6
17	9.36	4.90 ± 6.9

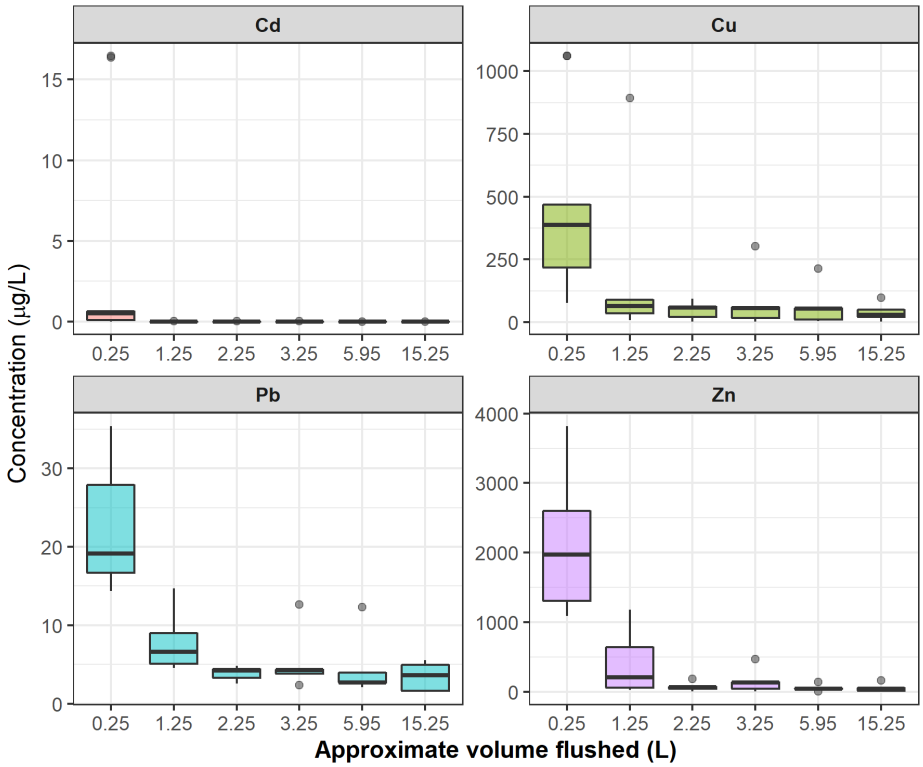

Figure S4. *Distribution of Cd, Cu, Pb, and Zn concentrations during first-draw sequential profile sampling in five homes before the filter was installed highlighting elevated concentrations in the first 250 mL of the profile due to interaction with the faucet fixture.*

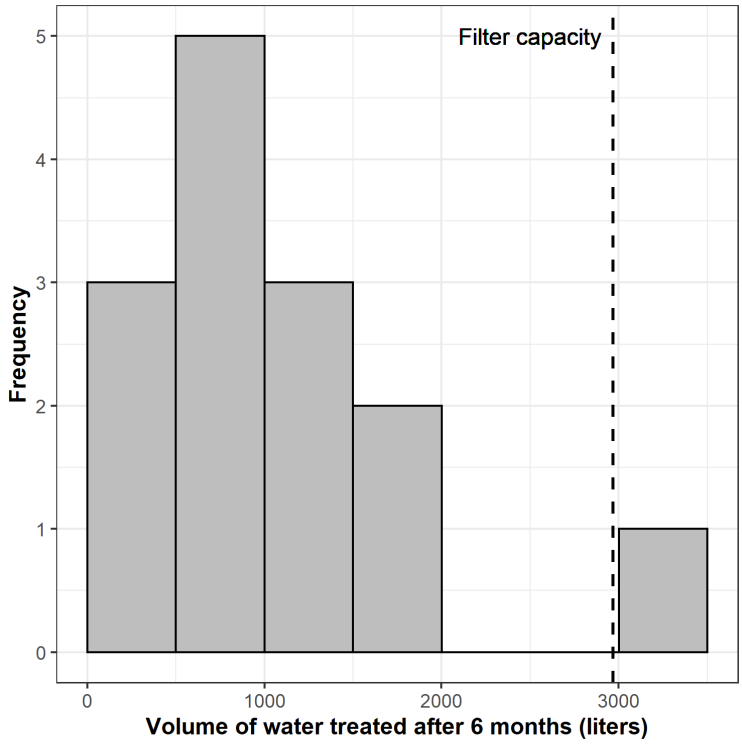

Figure S5. *Histogram of cumulative water usage after six months of use (excluding three households where the filter clogged before the six-month mark was reached).*

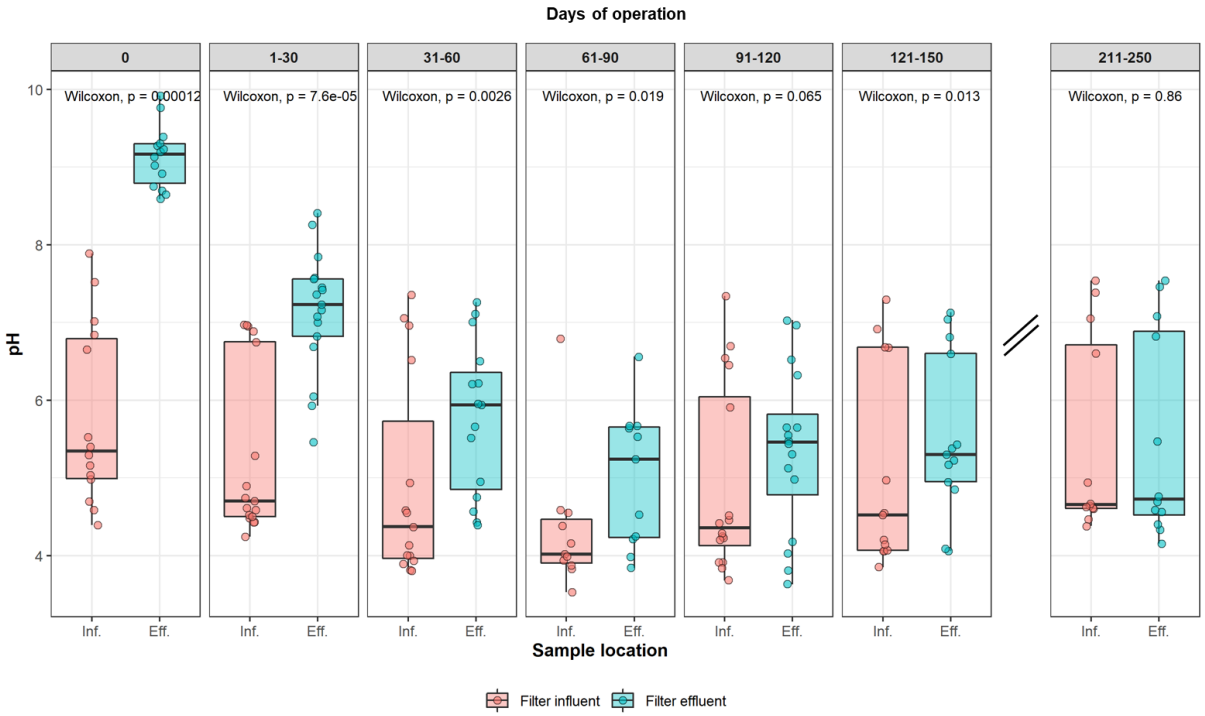

Figure S6. *Distribution of pH levels in the filter influent and effluent samples at each sampling month.*