Water Quality Elicitation and Valuation

Jonathan Ursillo

Thesis Supervisor: Dr. Charles Towe

Honors Advisor: Dr. Jason Vokoun

Introduction

This study is a subset of *Valuation of Water Quality Change in Environment and Economy Context: Ecosystem Services Across Gradients of Degradation and Local Economic Interest*, a project led by P.I. Swallow in collaboration with Assistant Research Professor (ARP) Liu and Dr. Charles Towe. The objectives of P.I. Swallow's project are to measure the relative value or benefits of water quality investments and stream ecosystem restoration in sites that are heavily degraded versus sites that are only moderately degraded—the latter having the potential to produce a substantial set of ecosystem services. Further, the goal is to measure how the value or benefits of water quality and ecosystem restoration is affected by the context of the surrounding economic activity. Economic activities of particular focus include jobs in pollution-intensive versus clean-water-demanding industries and residential life. The study's results will utilize measures of personal environmental attitudes, measures of ecosystem/degradation context, and measures of local economic context to develop guidance for the transfer of benefits from the suite of primary studies to alternative sites not directly studied.

This thesis served to augment P.I. Swallow, ARP Liu, and Dr. Towe's efforts by assessing the applicability of Facebook's advertisement platform to recruiting survey participants for non-market water quality valuation. The primary goals of this study were to assess Facebook's ability to recruit a demographically diverse sample of survey respondents, determine the cost per survey response recruited through Facebook's ad platform, and evaluate the utility of Facebook's targeting feature within the context of water quality valuation research.

This study found Facebook's advertisement platform a quick, relatively inexpensive tool for conducting water quality valuation research, producing 30 responses at $11.89 per response

over a 15-day study period. Facebook's targeting feature offers an unprecedented ability classify survey non-respondents and vary advertisement delivery mechanisms, generating countless potential research questions for future water quality valuation studies. Given time limitations and novel design hurdles, the study did not produce enough data to perform a definitive assessment of the reliability and accuracy of Facebook's targeting feature for use in water quality valuation research, but the initial results show promise.

Background

In selecting a time to recruit survey participants through Facebook, website traffic was the most logical proxy. Using Google Trends for the search term "Facebook login," however, yielded output without correlation to a specific time of year (Figure 1; Google Trends, 2020a). The overall trend in searches was downward since 2016, presumably as the number of users accessing Facebook through the mobile application has grown (Figure 1; Google Trends, 2020a). Therefore, a more general proxy of internet traffic was needed. Google Trends for the search term "google" yielded results that followed a consistent yearly pattern, likely indicative of annual patterns in internet traffic (Figure 2; Google Trends, 2020b).

Each year, traffic peaked in late September and October before dropping significantly during the Thanksgiving, Christmas, and New Year's holidays (Google Trends, 2020b). The second highest period of annual traffic occurred from February through early May before decreasing during the summer (Google Trends, 2020b). The survey and research design were not yet completed during the October peak in internet traffic, so the research team decided to recruit survey participants during the spring semester to capture the second highest annual peak in traffic.

Additional evidence that Google Trends for the term "google" is an effective proxy for internet traffic is reflected in the all-time-high search interest during March and April 2020 (Google Trends, 2020b). The World Health Organization declared COVID-19 a pandemic on March 11, 2020. From March 11 to March 18, the United States average daily broadband usage per user increased by 27 percent compared to the average during January 2020 (Open Vault, 2020), which is reflected in the Google Trends data.

Facebook offered a variety of advantageous characteristics as a platform to recruit survey participants. Facebook's user base includes 69 percent of all Americans and is more demographically balanced and diverse than its peers (Figure 3; Pew Research Center, 2019). Nadarzynski et al. (2019) also found that Facebook was people's preferred social media platform and the primary occupant of their time as compared to other platforms. Furthermore, Adam et al. (2016) found Facebook as a relatively easier, cheaper, and more effective method of research recruitment as compared to traditional methods. Admon et al. (2016) echoed this praise, also expressing the advantages of targeting users by demographics or interests and commending Facebook's ability to recruit a demographically diverse sample. To incentivize Facebook users to complete their survey, Admon et al. (2016) utilized compensation rates of $5 and $10 per respondent. This study mirrored that approach and avoided lottery-style incentives, which have proven ineffective in other applications (Warriner et al., 1996).

Amazon e-gift cards were selected as the survey respondent compensation method in this study. Amazon e-gift cards allowed for fast delivery through email, eliminating the time and costs associated with physical mailing. Further, Amazon e-gift cards enabled for real-time compensation as respondents completed the survey. This flexibility facilitated efficient resource allocation, optimizing between spending on advertisement runtime and spending on survey

respondent compensation to achieve the maximum number of responses within the study period and budget. Absolute, real-time control over e-gift card purchases, as opposed to bulk pre-purchases, ensured that the study stayed within budget and avoided the potential of having an excess inventory of gift cards.

Methods

Five counties were chosen for this study from a subset of Northeastern U.S. counties selected by P.I. Swallow and his team. These five counties, Hampden County, MA, population of 470,406, Luzerne County, PA, population of 317,646, Lewis County, NY, population of 26,716, Putnam County, NY, population of 98,892, and Anne Arundel County, MD, population of 576,031 (U.S. Census Bureau, 2018), each represent five different county clusters. The county clusters were determined based upon demographics, bio-physical gradients, and local economic interests. These characteristics capture local heterogeneity and enable the transfer of valuation models to unstudied communities. The combined demographics of the five counties include a median household income of $71,905, median age of 41, gender profile of 51 percent female, and race/ethnicity of 77 percent White, 7 percent Black, and 13 percent Hispanic (U.S. Census Bureau, 2018).

P.I. Swallow and his team were the principal creators of the survey utilized in this study. The primary goals of the survey were to assess respondents' perception of their local water quality, determine a non-market valuation for improvements in water quality, and capture changes in that valuation based on shifting water quality baselines, outcomes, and locations of impact. Prior taking the survey, participants watched a five-minute educational video about water quality, which emphasized the determinants of water quality and the contribution of each household. The survey further reinforced these educational concepts (Figure 4).

To recruit survey participants, Facebook advertisements using movement through graphic interchange formats and messages of general empowerment, consistent with the findings of Nadarzynski et al. (2019), were distributed through the UConn Department of Agricultural and Resource Economics (ARE) Facebook account. Two advertisement types were created, a control ad and a water quality-themed ad. Figures 5 and 6 are still images of the advertisements. The advertisements also displayed the monetary incentive for completing the survey, the survey link, and a UConn ARE banner through the Facebook ad platform.

During advertisement delivery design, care was taken to incorporate Facebook's guidelines for image orientation and the preferred amount of text. An ad image orientation of 1:1 was chosen, which was optimal for both mobile and desktop feed placements. These placements offered the most exposure. Limiting text on the advertisements also improved ad reach. The advertisement campaigns were optimized to land page views on the survey website as opposed to other options, such as optimizing for the number of impressions. As a result, Facebook showed the advertisement to people who were more likely to click the link and visit the survey page.

Survey participants were recruited over two advertisement periods. The first period ran using the control ad and no interest-based targeting from April 5 to April 11 for two intervals of three days each. The Facebook ad platform distributed the advertisement only to adults over the age of 18 who resided in the five counties within the study set. Each county was randomly assigned an incentive value ($5 or $10) during the first three-day interval. The incentives flipped for the second three-day interval, so each county had equal time with both incentives. The incentives were distributed to respondents as Amazon e-gift cards based upon the contact

information they provided, which remained separate from their survey responses. This contact information was also used to prevent duplicate responses.

The second advertisement period ran from April 14 to April 20 in the same manner as the first period, but the second period used the water quality-themed ad and attempted to target environmentally-minded people based on interests in environmental protection, electric vehicles, environmental science, sustainability, environmentalists, natural environment, conservation biology, or environmentalism. All of these interests were provided and determined by Facebook.

After the study was complete, the survey responses from Qualtrics and the Facebook advertisement data, including the amount spent, the number of impressions, the number of people reached, and the number of survey link clicks, were exported to Microsoft Excel. The survey data analysis focused on questions relating to respondents' demographics, respondents' feelings on the importance of conservation, respondents' willingness to directly pay some of the costs of water quality improvement, and respondents' decision whether to refuse the incentive for completing the survey. Categorical responses were converted into dummy variables. Qualitative responses were converted into a quantitative gradient using the number of available choices (7), such that "strongly disagree" = 0/6, "disagree" = 1/6, "somewhat disagree" = 2/6, "neither agree nor disagree" = 3/6, and so on. Regression analysis of the survey data was performed using Stata/SE 16.0. Each regression isolated the impact of the variables of interest by controlling for other factors, such as respondents' income, education, or incentive amount.

Results

This study reached 13,386 people, produced 140 unique clicks on the survey link—1.05 percent click-through-rate (CTR), and yielded 30 complete survey responses—0.22 percent

response rate. The portion of the study without environmental interest targeting yielded a 0.71 percent CTR and a 0.15 percent response rate. The portion of the study with environmentally-minded targeting yielded a 1.64 percent CTR and a 0.35 percent response rate. The cost basis per completed response was $11.89. Out of the 30 total responses, three were from respondents who reported their zip code as outside of the five targeted counties, which left 27 responses from within the desired sample set—13 from Hampden County, 11 from Luzerne County, 2 from Anne Arundel County, and 1 from Lewis County. The cost basis per completed response within the desired sample set was $13.21.

These 27 responses from the desired sample set were the only responses analyzed for demographics. The median age of the respondents was 30 years old. Respondents reported their household income within ranges, which were smoothed into single integer values. The median smoothed household income of the respondents was $62,500. Of the respondents that disclosed their gender (25), 48 percent were female. Of the respondents that disclosed their race/ethnicity (23), 74 percent were White, 11 percent were Black or African American, and 11 percent were Hispanic.

Out of the 27 responses from the desired sample set, 17 respondents disclosed their education level, their household income range, and the coronavirus outbreak's impact on their employment. All of these variables were necessary for performing the subsequent regression analyses. The cost basis per completed response within the desired sample set and available for use in regression analyses was $20.98.

Regression analyses in Figure 7 and Figure 10 were designed to assess the effectiveness of Facebook's targeting algorithm in identifying individuals who were environmentally-minded. No statistically significant correlation was found between environmentally-minded targeting

through Facebook and respondents' self-reported conservation importance (Figure 7). While not significant, a slight negative correlation was present (Figure 7). No statistically significant correlation was found between the incentive amount and environmentally-minded targeting through Facebook (Figure 10). While not significant, a negative correlation was present (Figure 10). No statistically significant correlation was found between the incentive amount and respondents' self-reported conservation importance (Figure 10). While not significant, a positive correlation was present (Figure 10).

The regression analysis in Figure 8 was designed to assess the correlation between environmentally-minded targeting through Facebook and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive. No statistically significant correlation was found between environmentally-minded targeting through Facebook and respondents' willingness to directly pay some of the costs of water quality improvement (Figure 8). While not significant, a positive correlation was present (Figure 8). No statistically significant correlation was found between environmentally-minded targeting through Facebook and respondents' refusal of the incentive (Figure 8). While not significant, a positive correlation was present (Figure 8).

The regression analysis in Figure 9 was designed to assess the correlation between self-reported conservation importance and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive. No statistically significant correlation was found between self-reported conservation importance and respondents' willingness to directly pay some of the costs of water quality improvement (Figure 9). While not significant, a slight positive correlation was present (Figure 9). No statistically significant correlation was found between self-reported conservation importance and

respondents' refusal of the incentive (Figure 9). While not significant, a slight negative correlation was present (Figure 9).

The regression analysis in Figure 10 was designed to assess the correlation between the incentive amount and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive. No statistically significant correlation was found between the incentive amount and respondents' willingness to directly pay some of the costs of water quality improvement (Figure 10). While not significant, a positive correlation was present (Figure 10). No statistically significant correlation was found between the incentive amount and respondents' refusal of the incentive (Figure 10). While not significant, a negative correlation was present (Figure 10).

The regression analysis in Figure 11 was designed to assess the correlation between reduction in employment due to coronavirus and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive. No statistically significant correlation was found between reduction in employment due to coronavirus and respondents' willingness to directly pay some of the costs of water quality improvement (Figure 11). While not significant, a negative correlation was present (Figure 11). No statistically significant correlation was found between reduction in employment due to coronavirus and respondents' refusal of the incentive (Figure 11). While not significant, a negative correlation was present (Figure 11).

Discussion

This study's click-through-rate (CTR) of 1.05 percent was lower than Admon et al. (2016), which reported a CTR of 2.74 percent. This study's CTR and response rate improved

with interest-based targeting, however. Potential drivers behind the increases in CTR and response rate for the environmentally-targeted sample could include self-selection bias, differences in the attractiveness of the ad graphics, and repeated exposure as some individuals could have been in both target populations. Additionally, the potential drivers behind the higher CTR of Admon et al. (2016) compared to this study could include greater public interest in health as opposed to environmental topics and a direct relationship between sample population size and CTR. Further studies should attempt to determine the drivers behind CTR in water quality valuation research applications.

Due to a low CTR, Facebook's ability to target smaller populations and yield a sample size large enough to develop statistically significant conclusions is uncertain. The two smallest counties, Putnam and Lewis, only produced one click each for the entire study. Putnam yielded no responses and Lewis only one response. Facebook's uncertain effectiveness in sampling smaller populations could serve as a hinderance to its ability to answer specific research questions. Specific research questions may require targeting that shrinks the population below Facebook's threshold for yielding a relevant sample size. Further study is necessary to determine if and where such a threshold exists.

The cost basis per completed response for this study, $11.89, was lower than both Admon et al. (2016) and Adam et al. (2016), which reported cost per completions of $14.63 and $15.62, using a 0.77 CAD to USD conversion rate, respectively. Potential reasons for this study's lower cost basis are diminishing returns to advertising spending and lower data quality. After removing unusable data, this study's cost basis rose to $20.98 completion.

While gender and race/ethnicity of this study closely mirrored the U.S. Census data of the five sampled counties, the median age was significantly younger (U.S. Census Bureau, 2018).

Future studies should evaluate the ability to employ targeting to sample older respondents as water quality valuation studies progress. Inherent limitations of Facebook's platform and environmental subject matter may prevent adequate sampling of older respondents.

The applicability of Facebook's advertisement delivery algorithms for water quality valuation research applications remains uncertain. Three out of the 30 responses were completed by individuals who reported their zip code as outside of the desired study area. It cannot be determined whether the sampling of individuals outside of the desired study area was caused by an error in Facebook's algorithms or if the individuals were simply college students with multiple residences.

Furthermore, the absence of a statistically significant, positive correlation between the environmentally-targeted sample and respondents' self-reported conservation importance suggests that Facebook targeting using environmental interests may not actually recruit an environmentally-minded sample (Figure 7). Although neither correlation was statistically significant, the inconsistency of the negative correlation between environmental targeting and the incentive amount and the positive correlation between self-reported conservation importance and the incentive amount also supports concern over Facebook's ability to effectively target (Figure 10). Additional study with a larger sample and/or targeting with different interests should be conducted to further evaluate the applicability of Facebook advertisement delivery to water quality valuation research.

None of the correlations between the independent variables studied—environmentally-minded targeting, self-reported conservation importance, incentive amount, and reduction in employment due to coronavirus—and the willingness to directly pay some of the costs of water quality improvement or the refusal of the incentive were statistically significant. Additional

study to yield a larger sample size would certainly increase the probability of producing statistically significant results.

Despite the lack of statistical significance, the strongest positive correlations were between environmentally-minded targeting and respondents' willingness to pay and respondents' refusal of the incentive (Figure 8), which suggests environmentally-minded people may value water quality more and may be less motivated by an incentive to provide water quality valuation research data. The strongest negative correlations were between the incentive amount and respondents' refusal of the incentive and between reduction in employment due to coronavirus and respondents' refusal of the incentive (Figure 10; Figure 11). Potential implications of these findings for future water quality valuation research are the non-linear relationship between increases in the incentive amount and cost per completion and the need to assess recent employment history during sampling.

Overall, Facebook was a quick, relatively inexpensive method of conducting water quality valuation research. Facebook's targeting feature offered an unprecedented level of information about the population being sampled, empowering the researcher with knowledge about both respondents and non-respondents. The classification of non-respondents enables a more holistic analysis of survey data and a more efficient allocation of project resources. Furthermore, the ability to easily target specific populations and vary advertisement delivery on Facebook's platform generated countless potential research questions for future water quality valuation studies. However, a definitive assessment of the reliability and accuracy of Facebook's targeting feature for use in water quality valuation research requires further study.

References

Adam, L. M., Manca, D. P., & Bell, R. C. (2016). Can Facebook be used for research? Experiences using Facebook to recruit pregnant women for a randomized controlled trial. *Journal of medical Internet research*, *18*(9), e250.

Admon, L. K., Haefner, J. K., Kolenic, G. E., Chang, T., Davis, M. M., & Moniz, M. H. (2016). Recruiting pregnant patients for survey research: a head to head comparison of social media-based versus clinic-based approaches. *Journal of medical Internet research*, *18*(12), e326.

Google Trends. (2020a, April 25). *Facebook login search term*. Retrieved from https://trends.google.com/trends/explore?date=2016-01-01%202020-04-25&geo=US&q=facebook%20login

Google Trends. (2020b, April 25). *Google search term*. Retrieved from https://trends.google.com/trends/explore?date=2016-01-01%202020-04-25&geo=US&q=google

Moore, C., Guignet, D., Maguire, K., Dockins, C., & Simon, N. (2015). *A stated preference study of the Chesapeake Bay and Watershed Lakes* (No. 2168-2018-8163).

Nadarzynski, T., Burton, J., Henderson, K., Zimmerman, D., Hill, O., & Graham, C. (2019). Targeted advertisement of chlamydia screening on social media: A mixed-methods analysis. *Digital health*, *5*, 1-10.

Open Vault. (2020, March 19). *Comparison of average daily fixed broadband consumption per user in the United States in January and March 2020*. Retrieved from https://www.statista.com/statistics/1106765/covid-19-us-average-daily-broadband-usage/

Pew Research Center. (2019, April 9). *Use of different online platforms by demographic groups*. Retrieved from https://www.pewresearch.org/wp-content/uploads/2019/04/FT_19.04.10_SocialMedia2019_Useofdifferent.png?w=640

U.S. Census Bureau. (2018). *American Community Survey 1-year estimates*. Retrieved from https://censusreporter.org/profiles

Warriner, K., Goyder, J., Gjertsen, H., Hohner, P., & McSpurren, K. (1996). Charities, no; lotteries, no; cash, yes: Main effects and interactions in a Canadian incentives experiment. *Public Opinion Quarterly*, *60*(4), 542-562.

Figures

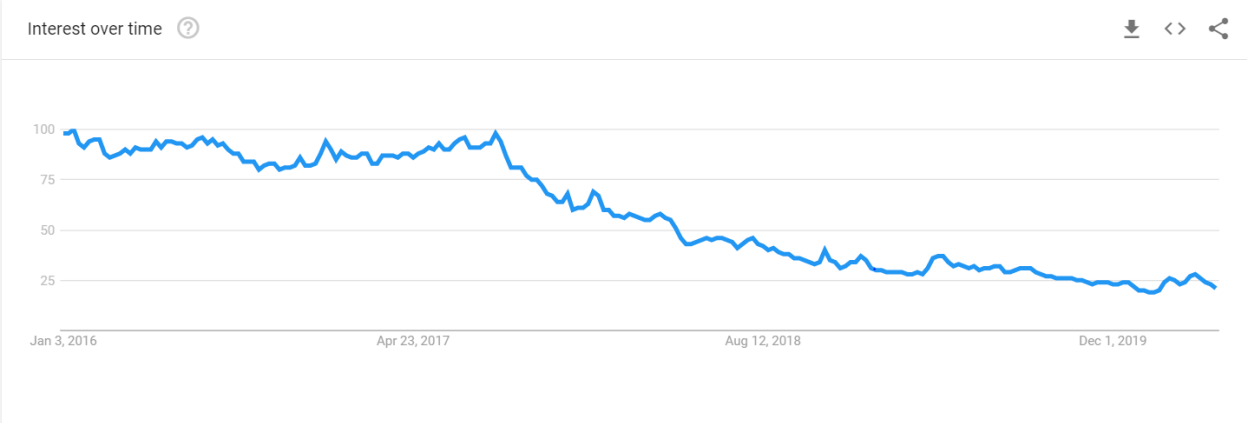

Figure 1. Google Trends for the search term “facebook login” from the beginning of 2016 to April 25, 2020 (Google Trends, 2020a)

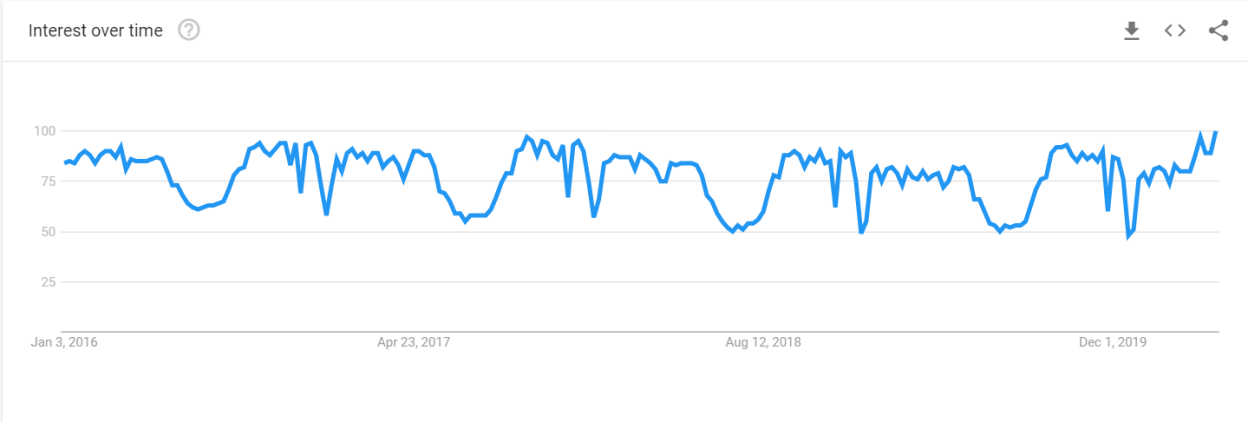

Figure 2. Google Trends for the search term “google” from the beginning of 2016 to April 25, 2020 (Google Trends, 2020b)

Use of different online platforms by demographic groups

% of U.S. adults who say they ever use the following online platforms or messaging apps

	YouTube	Facebook	Instagram	Pinterest	LinkedIn	Snapchat	Twitter	WhatsApp	Reddit
U.S. adults	73%	69%	37%	28%	27%	24%	22%	20%	11%
Men	78	63	31	15	29	24	24	21	15
Women	68	75	43	42	24	24	21	19	8
White	71	70	33	33	28	22	21	13	12
Black	77	70	40	27	24	28	24	24	4
Hispanic	78	69	51	22	16	29	25	42	14
Ages 18-29	91	79	67	34	28	62	38	23	22
18-24	90	76	75	38	17	73	44	20	21
25-29	93	84	57	28	44	47	31	28	23
30-49	87	79	47	35	37	25	26	31	14
50-64	70	68	23	27	24	9	17	16	6
65+	38	46	8	15	11	3	7	3	1
<$30,000	68	69	35	18	10	27	20	19	9
$30,000-$74,999	75	72	39	27	26	26	20	16	10
$75,000+	83	74	42	41	49	22	31	25	15
High school or less	64	61	33	19	9	22	13	18	6
Some college	79	75	37	32	26	29	24	14	14
College+	80	74	43	38	51	20	32	28	15
Urban	77	73	46	30	33	29	26	24	11
Suburban	74	69	35	30	30	20	22	19	13
Rural	64	66	21	26	10	20	13	10	8

Note: Respondents who did not give an answer are not shown. Whites and blacks include only non-Hispanics. Hispanics are of any race.
Source: Survey conducted Jan. 8-Feb. 7, 2019.

PEW RESEARCH CENTER

Figure 3. User demographics of Facebook and other social media platforms (Pew Research Center, 2019)

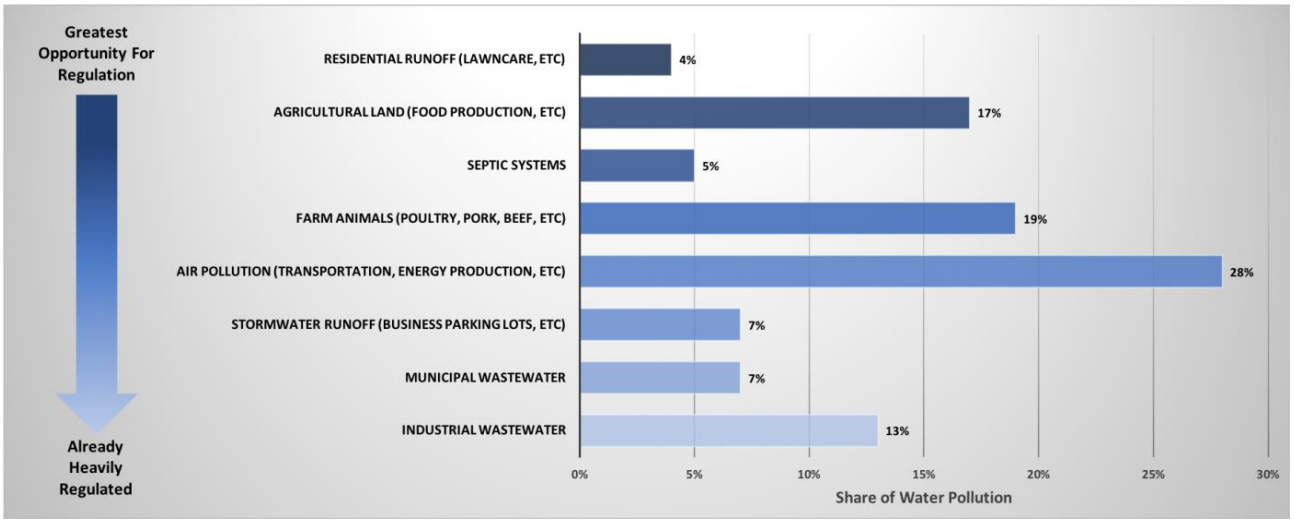

Figure 4. Sources of water pollutants by share of pollution contribution and extent of regulation from a Chesapeake Bay study (Moore et al., 2015)

Figure 5. Control ad

Figure 6. Water quality-themed ad

Source	SS	df	MS	Number of obs	=	27
				F(1, 25)	=	0.01
Model	.00194363	1	.00194363	Prob > F	=	0.9326
Residual	6.66472304	25	.266588921	R-squared	=	0.0003
				Adj R-squared	=	-0.0397
Total	6.66666667	26	.256410256	Root MSE	=	.51632

edum	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
consdum	-.0524781	.6145994	-0.09	0.933	-1.318269	1.213313
_cons	.5918367	.4363722	1.36	0.187	-.3068886	1.490562

Figure 7. Correlation between environmentally-minded targeting and respondents' self-reported conservation importance

Source	SS	df	MS	Number of obs	=	17
				F(7, 9)	=	0.98
Model	1.67797393	7	.239710561	Prob > F	=	0.4996
Residual	2.20437901	9	.244931001	R-squared	=	0.4322
				Adj R-squared	=	-0.0094
Total	3.88235294	16	.242647059	Root MSE	=	.49491

edum	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
refusal	.4202694	.3265484	1.29	0.230	-.3184343	1.158973
wtpdum	.4965118	.4363686	1.14	0.285	-.4906226	1.483646
incsmooth	-7.52e-06	4.38e-06	-1.72	0.120	-.0000174	2.38e-06
collegedum	.5892968	.4462327	1.32	0.219	-.4201518	1.598745
consdum	-.0146715	.7072828	-0.02	0.984	-1.614656	1.585313
incentive	-.040869	.0584346	-0.70	0.502	-.1730574	.0913193
clossdum	-.1508813	.298361	-0.51	0.625	-.8258208	.5240582
_cons	.4495331	.7705381	0.58	0.574	-1.293545	2.192611

Figure 8. Correlation between environmentally-minded targeting and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive

Source	SS	df	MS		
Model	.134588167	7	.019226881	Prob > F	0.9079
Residual	.489594772	9	.054399419	R-squared	0.2156
Total	.624182939	16	.039011434	Adj R-squared	-0.3944
				Root MSE	.23324

consdum	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
wtpdum	.006346	.2199344	0.03	0.978	-.4911802	.5038722
refusal	-.0792239	.1653628	-0.48	0.643	-.4533006	.2948529
clossdum	-.1207966	.1367909	-0.88	0.400	-.4302392	.188646
collegedum	.1561465	.2237999	0.70	0.503	-.350124	.662417
incsmooth	2.89e-07	2.38e-06	0.12	0.906	-5.09e-06	5.66e-06
edum	-.0032586	.1570882	-0.02	0.984	-.3586168	.3520997
incentive	.0055195	.0282174	0.20	0.849	-.0583127	.0693517
_cons	.6418093	.3018044	2.13	0.062	-.0409196	1.324538

Figure 9. Correlation between self-reported conservation importance and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive

Source	SS	df	MS	Number of obs	=	17
				F(7, 9)	=	0.72
Model	37.8496325	7	5.40709036	Prob > F	=	0.6632
Residual	68.0327204	9	7.55919116	R-squared	=	0.3575
				Adj R-squared	=	-0.1423
Total	105.882353	16	6.61764706	Root MSE	=	2.7494

incentive	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
wtpdum	.3219811	2.590487	0.12	0.904	-5.538107	6.18207
refusal	-1.657178	1.895135	-0.87	0.405	-5.94427	2.629915
clossdum	-1.916113	1.554826	-1.23	0.249	-5.433374	1.601147
collegedum	3.244848	2.483227	1.31	0.224	-2.372603	8.862298
consdum	.7669697	3.921011	0.20	0.849	-8.102974	9.636913
incsmooth	-.0000174	.0000274	-0.64	0.541	-.0000794	.0000446
edum	-1.261322	1.803441	-0.70	0.502	-5.340989	2.818345
_cons	8.047489	3.438191	2.34	0.044	.2697605	15.82522

Figure 10. Correlation between the incentive amount and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive

Source	SS	df	MS	Number of obs	=	17
				F(7, 9)	=	0.75
Model	1.55987834	7	.222839762	Prob > F	=	0.6401
Residual	2.67541578	9	.29726842	R-squared	=	0.3683
				Adj R-squared	=	-0.1230
Total	4.23529412	16	.264705882	Root MSE	=	.54522

clossdum	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
wtpdum	-.1816166	.5105743	-0.36	0.730	-1.336616	.9733827
refusal	-.3708492	.371426	-1.00	0.344	-1.211073	.4693748
incsmooth	-2.76e-06	5.48e-06	-0.50	0.626	-.0000152	9.64e-06
collegedum	.5936876	.4993404	1.19	0.265	-.5358988	1.723274
consdum	-.6600991	.7475011	-0.88	0.400	-2.351064	1.030866
incentive	-.075352	.0611442	-1.23	0.249	-.2136697	.0629658
edum	-.1831219	.3621155	-0.51	0.625	-1.002284	.6360402
_cons	1.660426	.6644655	2.50	0.034	.157301	3.163552

Figure 11. Correlation between reduction in employment due to coronavirus and respondents' willingness to directly pay some of the costs of water quality improvement and respondents' refusal of the incentive