

Messaging Sustainability for Environmental Health

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Executive Summary

The Montgomery County Department of Parks has asked our team of Environmental Science and Policy majors at the University of Maryland, to assist in developing creative ways to effectively message sustainability as a way to protect the health of County citizens. This paper highlights suggestions for ways to effectively do so. It focuses on the best communication channels, specifically comparing mediated vs. in-person modes of communication, and then dives deeper to examine specific demographic groups to reach the most diverse population possible.

The demographic groups targeted are various religious groups, the Hispanic community, lower-income communities, and waterfront communities. These specific demographic groups were chosen because, according to peer-reviewed research, they tend to be disenfranchised, and therefore, should be targeted and engaged in communication efforts. Analyzing these communities provided insight and novel ideas for connecting with a wide range of audiences with sustainability messages.

Ultimately, the Department of Parks should focus on creating an emotional connection with residents, incorporating a mediated mode with specific strategies to reach the largest number of people with high engagement, while using community events to reach a more targeted audience. In addition to connecting with residents, community events are extremely impactful for engaging Hispanic communities. Ensuring that a multicultural and empowering environment is created when organizing such events is critical. Similarly, the waterfront communities also respond best to community events because hearing a message in-person forms a connection.

It is also important to note the significant relationships between both poverty and religion with sustainability when considering ways to engage the County citizens; low income residents will respond well to community events because they will feel included as citizens in the County. Religion can play a large role in the sustainability movement, and the most effective ways to message sustainability to religious groups is to use techniques like message framing or to reach out to religious leaders and ask them to promote sustainability to their audience.

In conclusion, there are multiple messaging strategies that Montgomery County Parks could use to reach County residents, as well as more specific techniques reach targeted audiences and demographics that usually feel left out of environmental conversations.

Introduction

Description of Problem

Communicating environmental and sustainability topics is a difficult task because it's not always compelling for members of the targeted audience, especially those who aren't motivated by traditional environmental messaging. Montgomery Parks seeks an effective strategy for messaging environmental sustainability to a diverse audience, thus our group had to determine the best ways to motivate all County residents to live more sustainably. There is a need to determine the communities not being reached with current sustainable messaging, to distinguish which groups to focus on, how these groups prefer to learn about the environment, and potential sustainable messaging strategies that have been successful elsewhere. Knowing this will allow us to determine the best communication strategies for County Parks to effectively reach the majority of residents with sustainable messaging.

Central Goal, Objectives, and Main Research Approach

The central goal is to discover and apply the most effective ways to message sustainability to County residents. Specifically, with a message about the importance of sustainability and its impact on human health. Our team sought to accomplish this goal by creating, distributing, and analyzing a survey to assess the current reach of environmental messaging and preferences of certain demographics about how to receive a sustainable message. The team also conducted literature reviews about the best communication channels for sustainable messaging. Research focused on specific topics related to the County's population demographics, as well as the effectiveness of specific types of communication used for environmental messaging. These topics include the success rate of messages through different channels, auditory or visual, to impact behavior and the effectiveness of mediated versus in-person communication on messaging sustainability.

This work also considers the relationship between religion and sustainability, Hispanic communities and their engagement in sustainable initiatives, the relationship between poverty and sustainability, and messaging sustainability regarding the Chesapeake Bay and waterfront communities.

The relationship between religion and sustainability was analyzed for a number of reasons. First, County residents practice many different religions, each with their own appropriate messaging approach. Second, religion and religious communities have a lot to offer to the sustainability movement. Third, the role of religion has not yet been widely researched or fully incorporated into a broad sustainability approach.

In addition to religious communities, we focused on targeting Hispanic communities. According to the 2010 U.S. Census, 17 percent of the County's population is of Hispanic/Latino origin. This large demographic group is often disenfranchised, however their input and participation in sustainability initiatives should be a priority. To be successful and effective in messaging sustainability, it is important to engage this large, diverse demographic group because it will only add positivity to the sustainability movement. When considering ways to message populations in more specific contexts, we must consider those who either need to hear a message or need to take action.

Montgomery County is part of the Chesapeake Bay watershed, and the health of each are directly related. We chose to focus on Bay sustainability and messaging waterfront communities along County waterways because their actions affect the Bay's health and can provide some of the biggest health and economic benefits to Marylanders and County citizens. The Bay provides a chance to expand sustainably; educating the public through sustainability messaging is the best way move a positive change in Bay health and human sustainable lifestyles.

Focusing on park projects and waterfront communities allows an expansive audience to receive and participate in messaging that makes a difference in the wellbeing of all Marylanders. We will also connect survey findings to the literature review to find the best way to message sustainability to the public. The focus on low-income communities was inspired by the United Nations' Economic and Social Council's 2030 goal to eradicate poverty while maintaining environmental sustainability. While these goals are set forth by the UN Council communities such as Montgomery County must begin the work; it is a global effort that must start small and spread across the world. Montgomery County is making a ripple that will spread to other communities and help reach the UN goals. It may be the village that starts what must be carried out to help all peoples have environmentally sustainable communities.

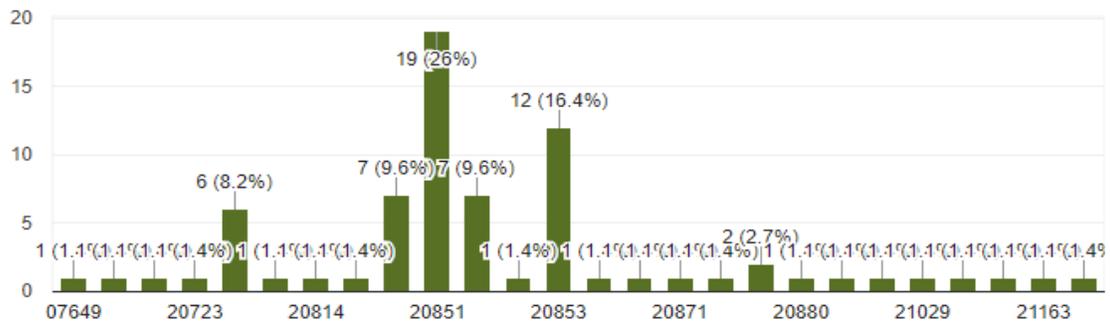
The Survey

Purpose

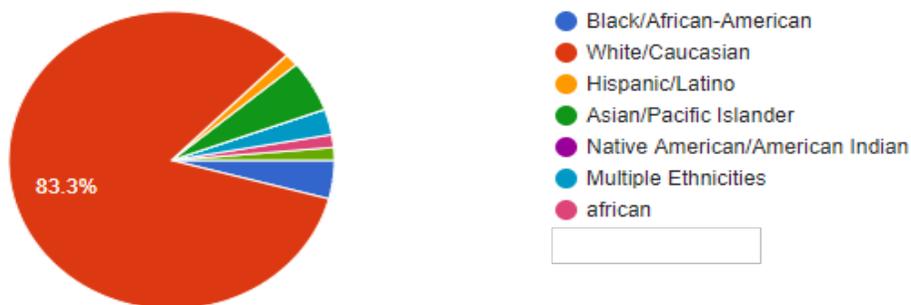
The team conducted research through a survey of County residents. Its purpose was to analyze the beliefs and tendencies of County citizens regarding human and environmental health. The survey was the best possible way to bridge the gap between the literature research and the specifics of Montgomery County. Some of the survey questions gave a sense of the respondent’s demographic data from questions that reveal the individual’s opinions about the environment, sustainability, and their lives. Although we didn’t receive as many responses as we’d hoped, we still received valuable data to use in support of the research, and we believe the survey has the potential to provide useful data from a wider audience. The next sections review the survey questions and responses, and discuss findings from the data.

Survey Questions

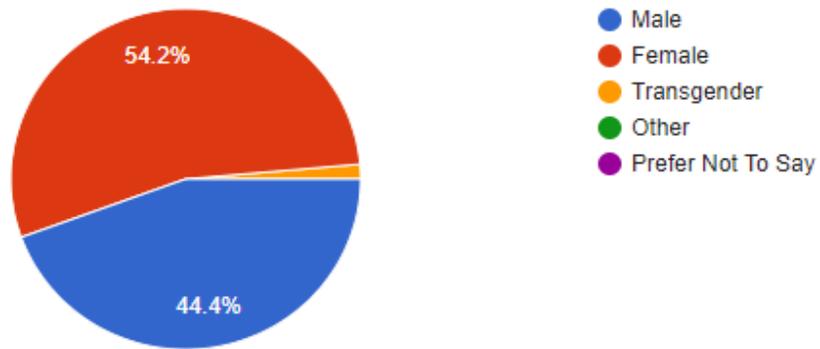
1. Please enter the zip code that best corresponds with your place of residence



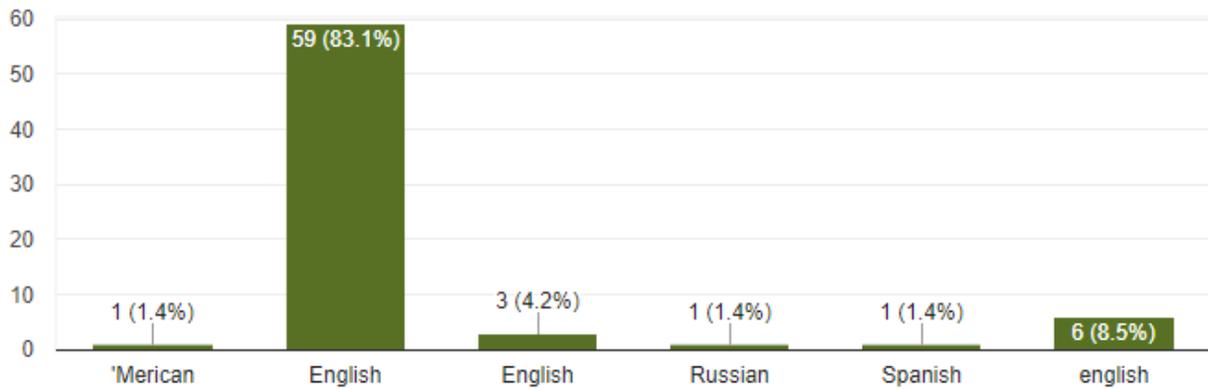
2. Please specify your ethnicity



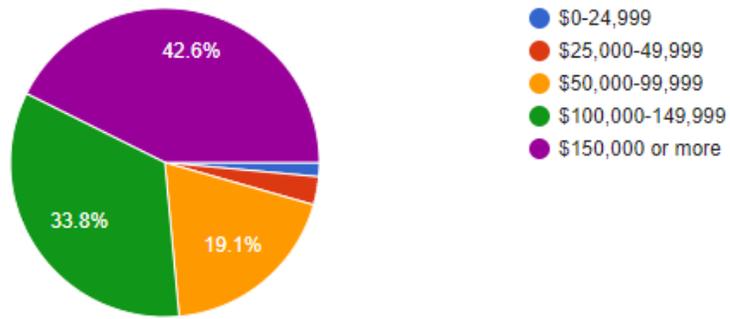
3. I identify my gender as:



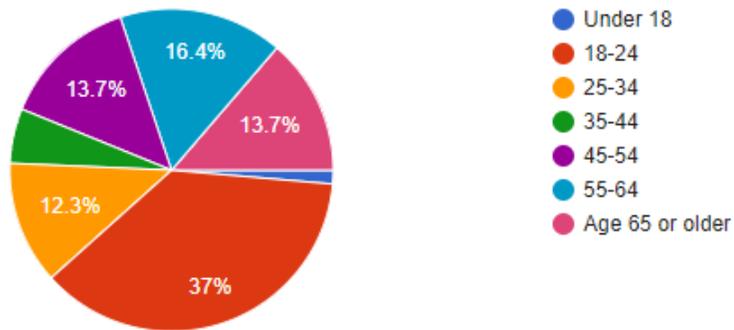
4. What is the primary language spoken in your household?



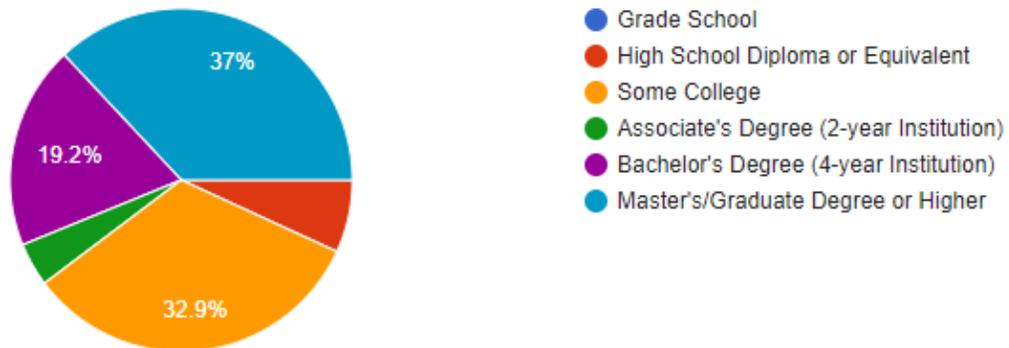
5. What is your total annual household income?



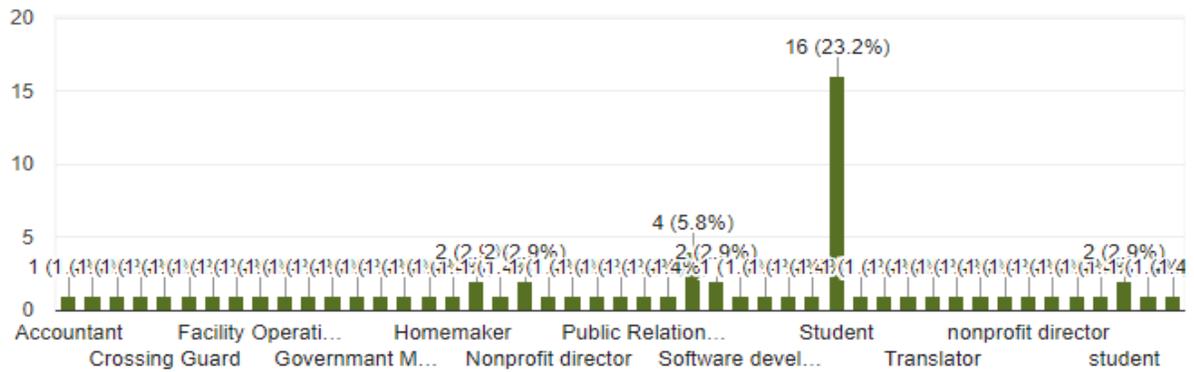
6. What is your age?



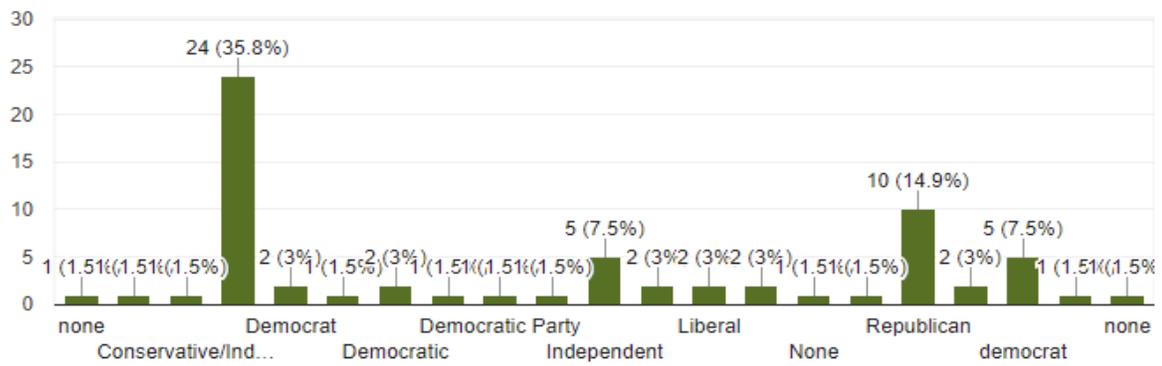
7. What is the highest level of education you have completed?



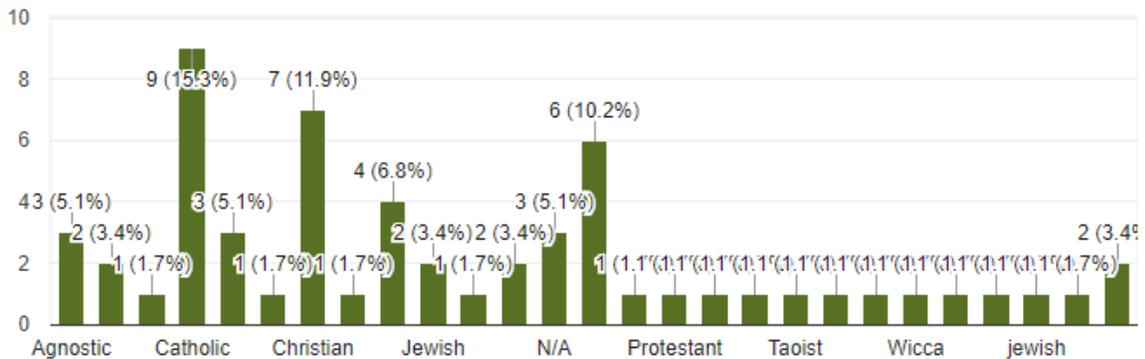
8. What is your occupation?



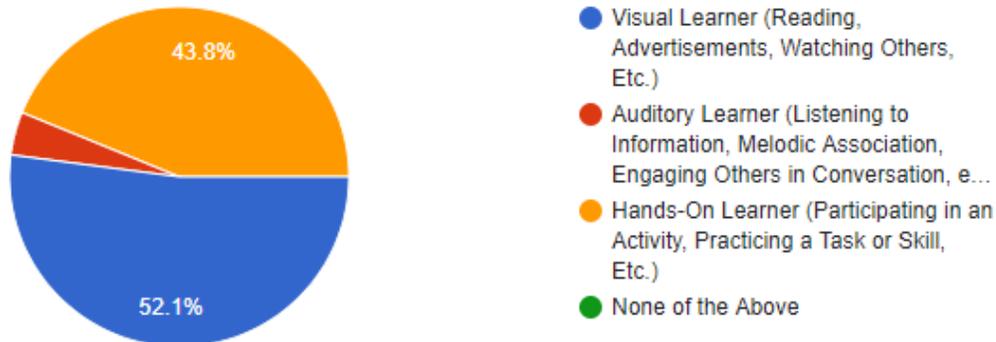
9. What is your political affiliation, if any?



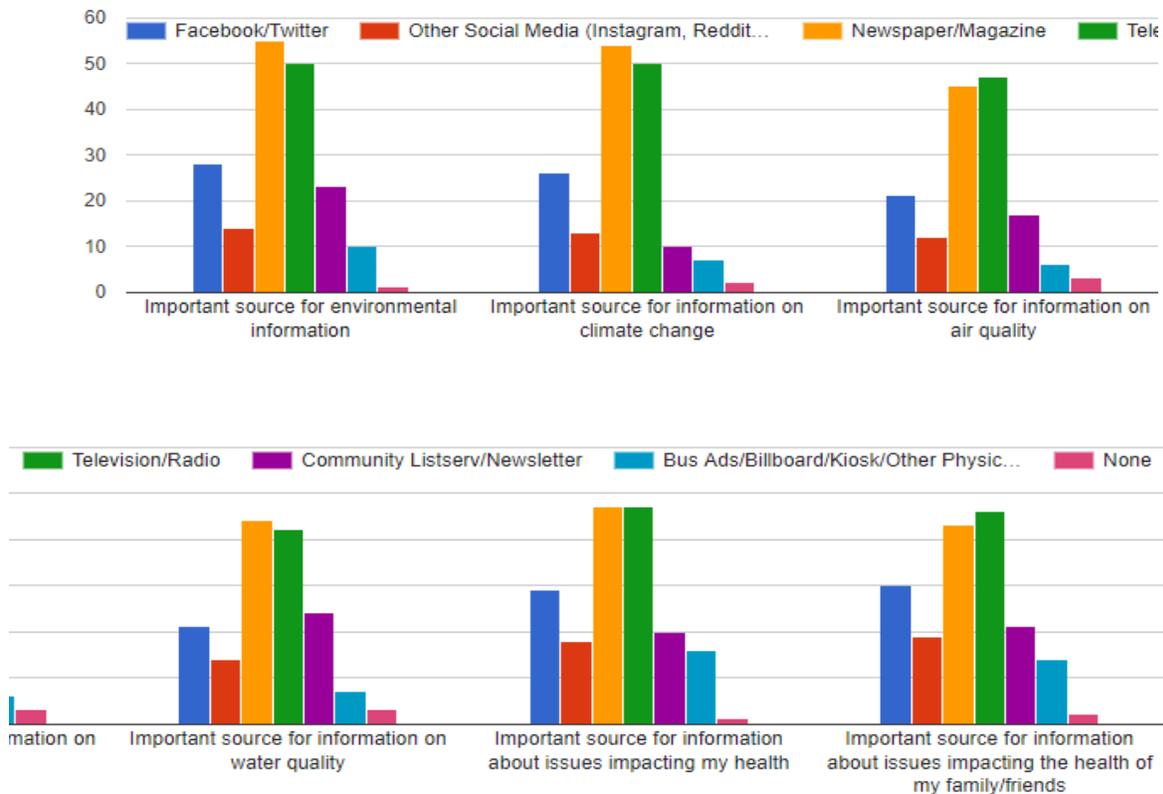
10. What is your present religion, if any?



11. What is the best way for you to learn and understand new information?

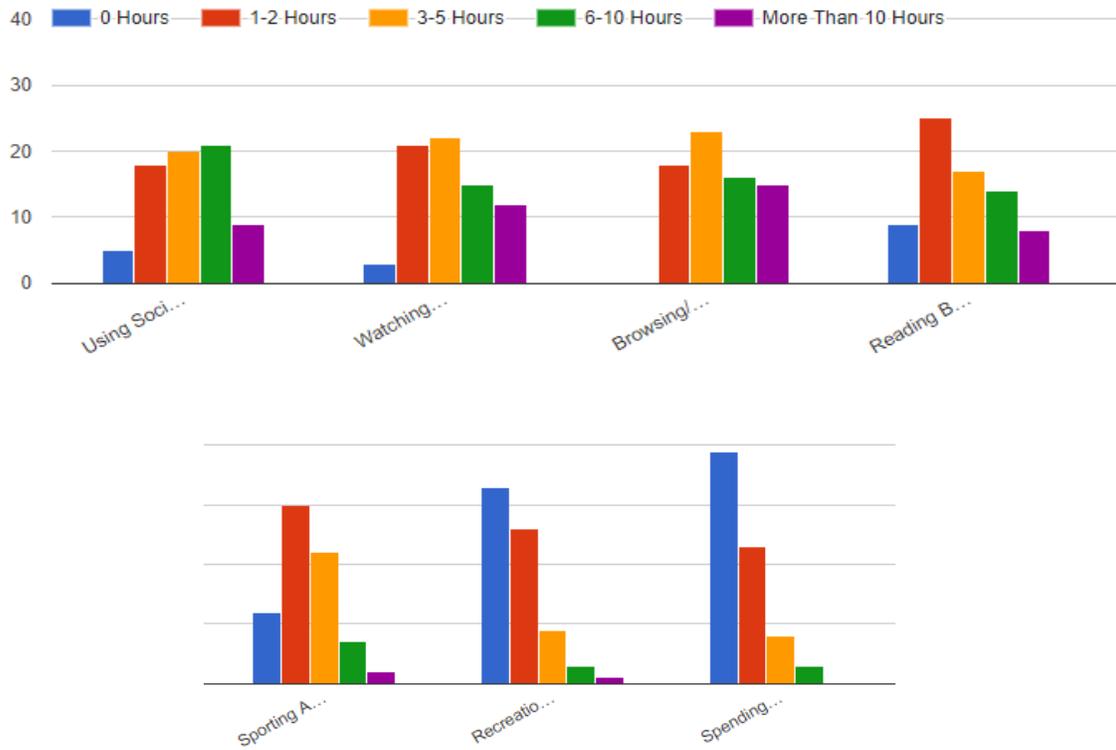


12. The following is a list of informational sources you might have used in learning about issues such as environmental health and/or human health. Regarding the statements below, please select the sources of information that you believe are most important for providing reliable information. Please select all that apply.

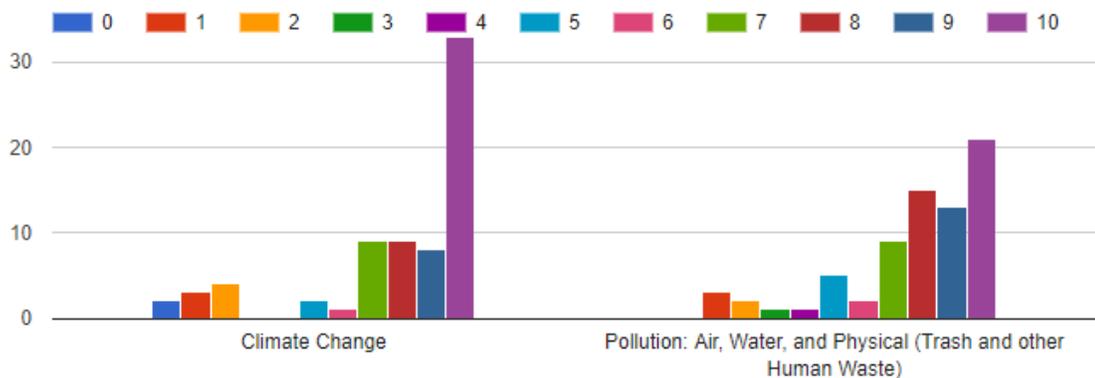


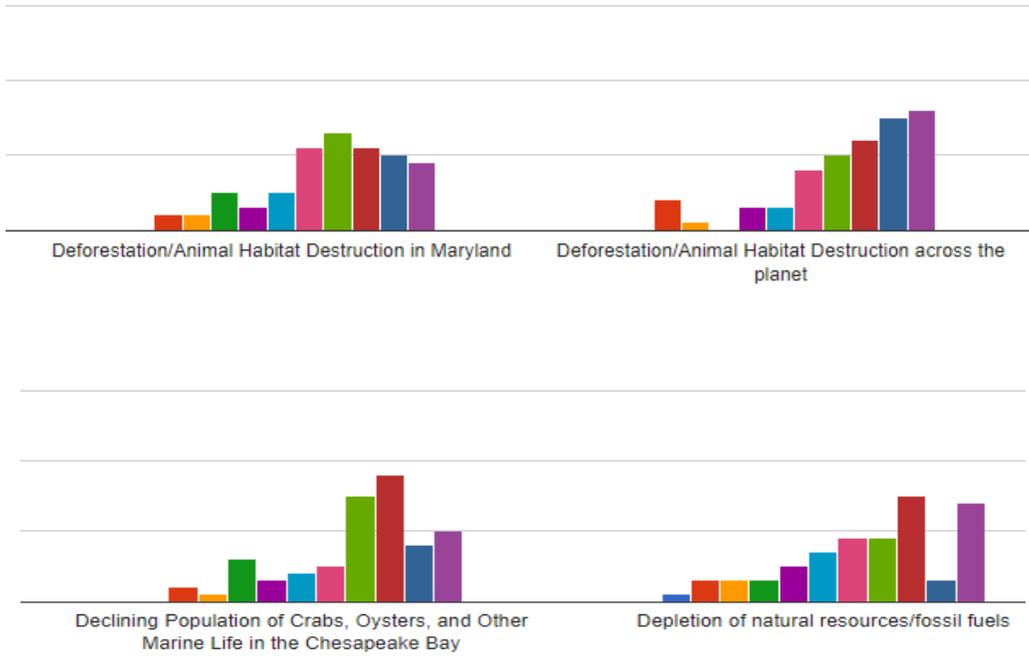
13. The following is a list of activities/hobbies that people may enjoy/participate in: using social media; watching tv; browsing the internet; reading books, newspapers, magazines; sporting activities;

recreational outdoor activities; spending time at a Montgomery County Park. Please mark the box that best matches how many hours per week you are most likely to engage in that activity.

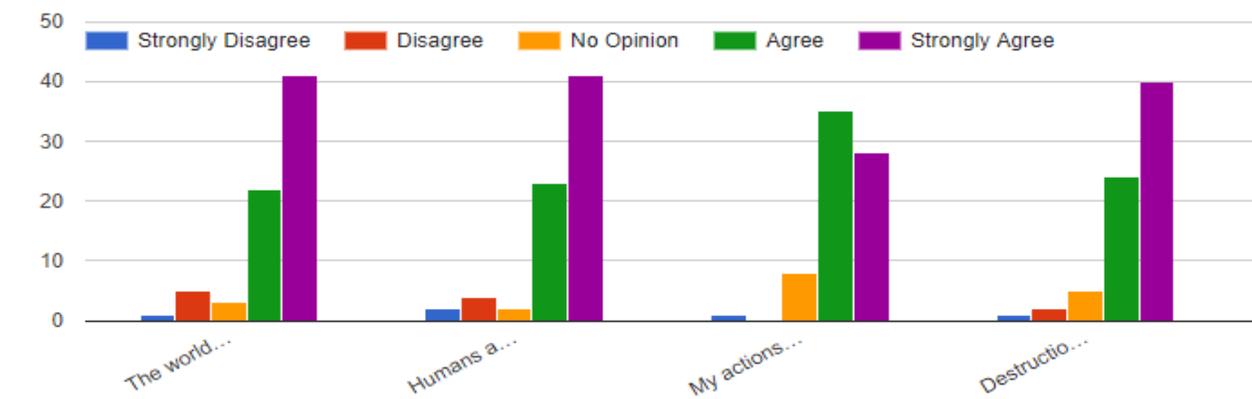


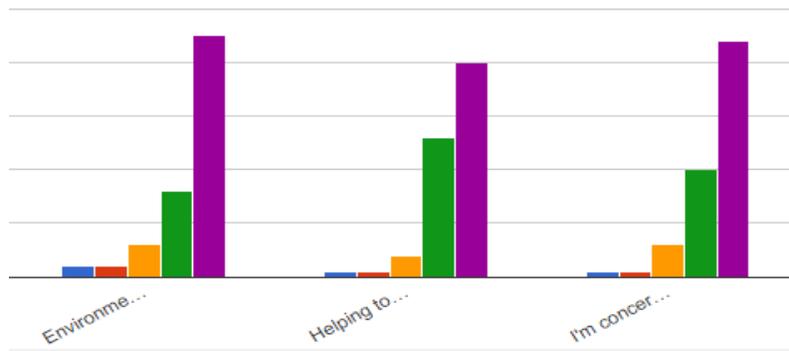
14. The following is a list of statements regarding current environmental issues. Please mark the level of concern you have with each issue presented (Scale: 0 is least concern, 10 is highest concern)



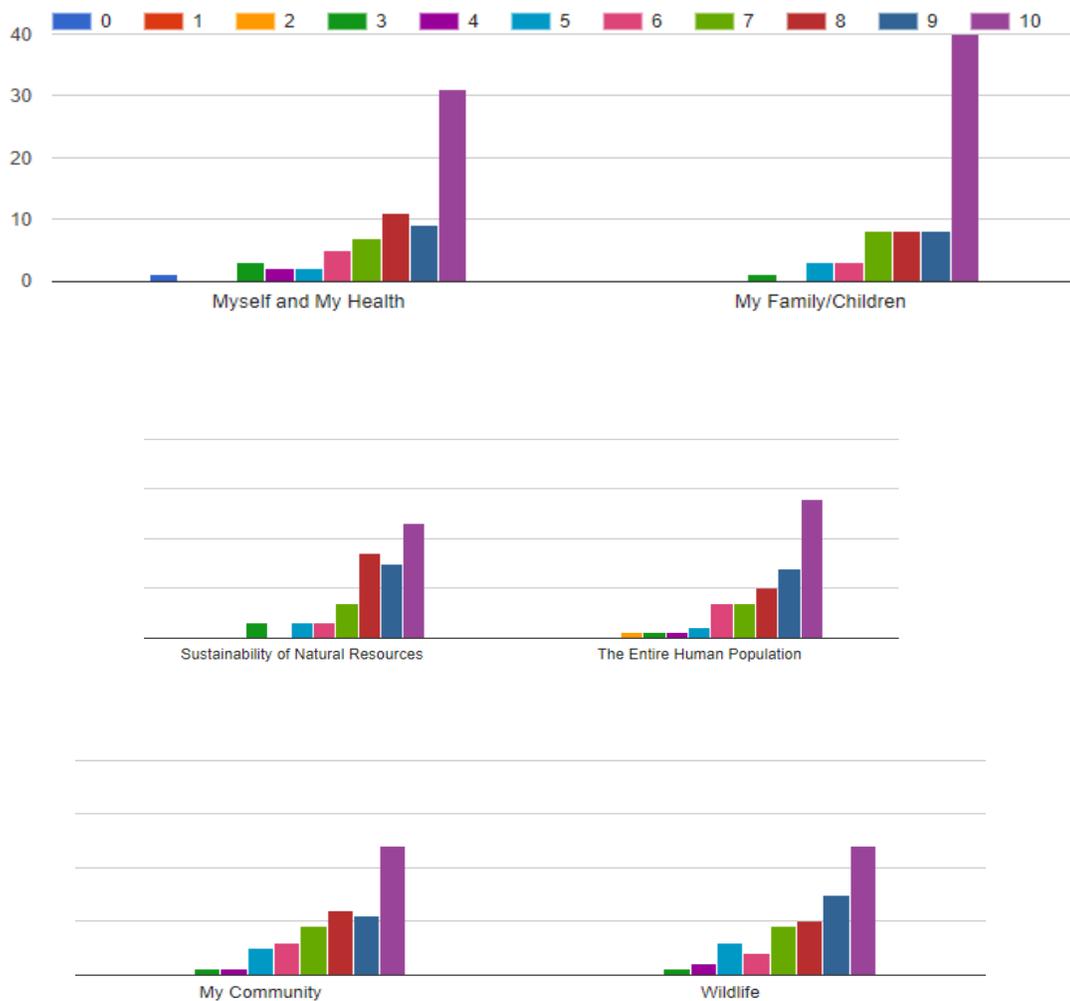


15. The following is a list of statements that combine environmental health issues with human impacts: The world climate is changing rapidly; humans are the main reason why the world climate is changing; my actions directly affect the health of the world around me; destruction of the environment around us will eventually lead to a decline in the condition of life for humans; environmental protection/conservation should be of higher importance in the political landscape of this country; helping to protect the environment is important to me; I'm concerned about the future of this planet's natural environment. Please mark how much you agree or disagree with each statement.



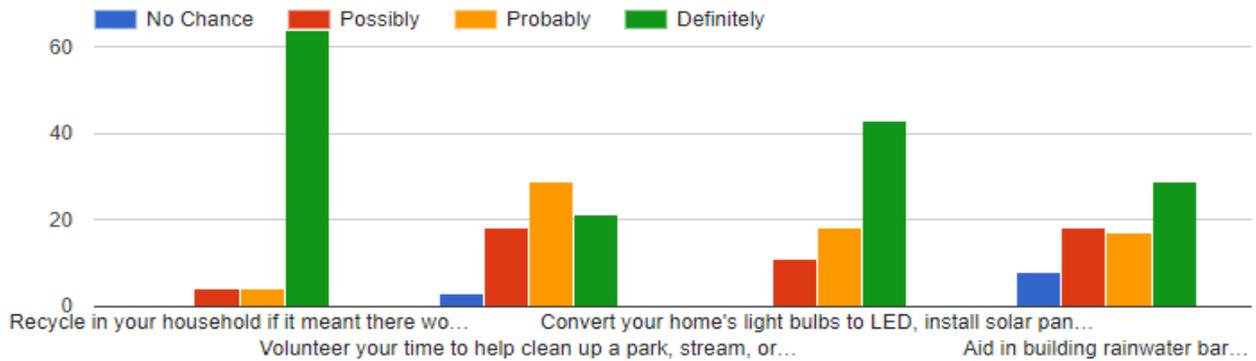


16. Concerning the aspects of the world around you, how important is providing a good future for each of the following (Scale: 0 is least importance, 10 is highest importance):



17. How likely are you to:

- Recycle in your household if it meant there would be less pollution in our world's oceans
- Volunteer your time to help clean up a park, stream, or aid in planting a rain garden if it meant there would be less pollution runoff in the Chesapeake Bay
- Convert your home's light bulbs to LED, install solar panels, or using another renewable source of energy if it meant your electricity bills would be lower
- Aid in building rainwater barrels for stormwater re-use if it meant your water bills would be lower



Discussion of Results

Before discussing some of these results, it's important to note that there were only 73 respondents, so the survey population is not large enough to imply true correlation. However, the data still points to some possible avenues of communication and supports data from the reviewed literature.

The first question regards language spoken in the household, a question that aided in the research on the County's Hispanic communities. It's clear that very few Hispanics heard about, or had access to, this survey, perhaps because it was only available in English. But other research on the Hispanic community suggests other methods of communicating with that population.

The data regarding yearly household income supports the finding that the County has many somewhat affluent communities. This finding compared to the data showing many of the respondents were somewhat young and had at least some level of college education. This data, compared to many of the findings from upcoming questions, show that youth seem to have a high level of concern for their future and the world's environmental condition. Approaching youth populations in general would likely have a greater response rate than some of the older populations. In addition, the youth populations will be the ones making decisions in the coming years so instilling a message in their minds could lead to more environmental consciousness in coming years.

Data on the best type of learning showed a somewhat evenly balanced distribution between hands-on learners and visual learners, which is consistent with data about the communication channels people use to learn about environmental and health information. The three most used channels are social media, television, and print newspapers. Although it isn't possible to say that youth prefer social media, and those

who are older prefer print, it is possible to say that print sources are still just as viable as online and social media channels for communicating ideas and broadcasting community outreach, while television ads may still be the best mid-point for broad outreach to audiences of all ages.

Regarding activities respondents participate in, it seems many people spend a large amount of time online, watching tv, and reading, so any of those three channels have a high volume of audience members. It is also important to note that many people indicate that they spend very little time in nature or at Montgomery Parks. However, the data shows most individuals have great concern for or interest in nature, and it is likely that citizens would participate in community park-hosted events that are broadcast through these communication channels.

The remaining survey questions all strongly indicate that the majority of individuals are concerned about the planet's future in regards to their own health and their ability to survive through environmental change. Using survey data and data from the literature review, we see that a very large proportion of the population would be more than willing to participate in sustainable projects or convert to sustainable lifestyles. The question is what exactly should be messaged to individuals to make them care enough to take action. Our team has provided some ideas, and our survey provides a base-layer of data to explore further possibilities that could open up more avenues for Montgomery Parks to reach out to its citizens and begin an inclusive movement toward environmental sustainability.

Key Findings

The Best Communication Channels

To effectively reach Hispanic, waterfront, low-income, and religious communities, we decided to develop research on how they want to hear messages, both broadly and narrowly. Therefore, we asked the question "What is the best communication channel to use to convey a message to an individual?" We began with a literature review of peer-reviewed journals to determine the most effective channel of communication. We chose peer-reviewed journals because we wanted to discern patterns of communication with a specific focus on new ideas. Review articles were selected using the University of Maryland Library Catalogue with a focus on nine U.S. journals, and one from Germany, to understand if different countries have different and successful communication methods. These were assessed to determine their relevance in five categories: 1) identified new forms of effective communication, 2) identified benefits of different forms of communication, 3) identified implications of using one type of communication, 4) compared one form of communication to another, and 5) identified remaining gaps in current forms of communication.

For the first category, one article introduced a form of communication called Kansai, which can be nonverbal (Nakatsu et al., 2006).

For the second category, we identified and analyzed the benefits of different communication forms in the ten peer-reviewed journals. Three articles stated that visual, auditory, and hands-on are the best forms of communication, respectively (“Litter,” 2017), (Hall and Sanders, 2015), (Swires-Hennessy, 2014).

The third category examined the implications of using one type of communication, which was discussed in two articles about the negative impacts of social media on persuasive communication, and the problems of using one type of communication to groups (Hill et al., 2013), (Brosig et al., 2003).

The fourth category compared forms of communication, which was discussed in three articles (“Litter,” 2017), (De Vries et al., 2009), (Stubblefield, 1997).

The final category addressed the overall complexity of communication along with remaining gaps, which was analyzed in five articles (Brosig et al., 2003), (Hall and Sanders, 2015), (Swires-Hennessy, 2014), (Willingham, 2015), (Etienne et al., 2011). Clearly, many of the articles fit into more than one category, which facilitated the comparison.

Three of the ten peer-reviewed journals identified emotional communication as the most effective means in conveying a message, so it ranks the highest in forms of communication. Emotional communication uses feelings about the subject and individual-to-individual persuasion. Its advantages include:

- 1) emotion doesn’t limit itself to one form of communication, it just improves the channel in which the message is conveyed (De Vries et al., 2009)
- 2) emotion allows message-receivers to form a trusting relationship with the individual giving the message (Stubblefield 1997)
- 3) an individual is more likely to change their habits if the message is communicated with self-disclosure (Nakatsu et al.. 2016)
- 4) it’s not difficult to include emotion in a message (Stubblefield, 1997). One study focused on how nurses convey messages to their patients, and the author found a positive correlation between a message’s level of emotion and the patient listening to the message (Id.).

Overall, the most frequently discussed benefit to emotional communication is that individuals feel a personal connection and form a trusting relationship with the communicator, which then motivates them to listen to the message and change their actions.

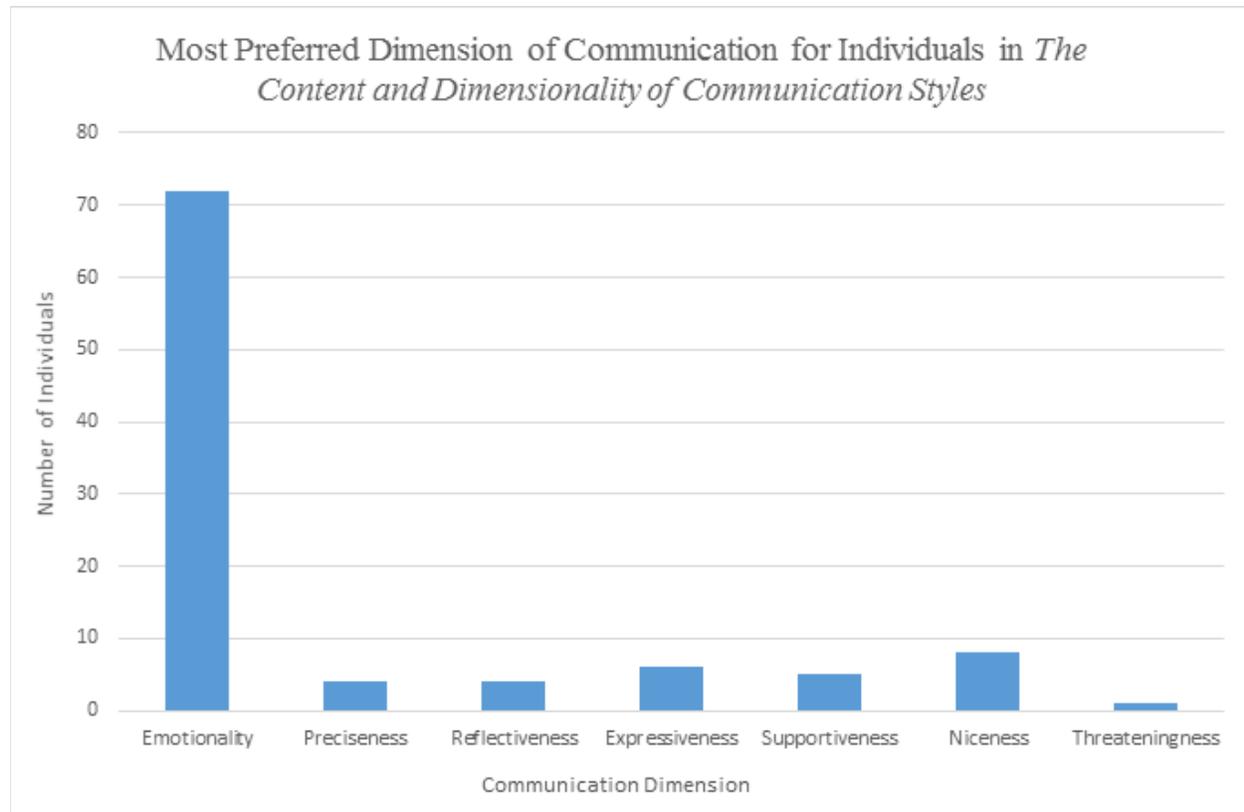


Figure 1: In a 2009 peer-reviewed journal article, “The Content and Dimensionality of Communication Styles” by De Vries, Bakker-Pieper, Van Gameren, and Vlug the authors conducted a study with 100 individuals who were asked to check a box next to their preferred communication dimension. As shown above, for 72 participants, emotionality was the most essential aspect of communication. The six other dimensions to communication: preciseness, reflectiveness, expressiveness, supportiveness, niceness and threateningness, were shown to be less important by a significant amount. Preciseness and reflectiveness had four votes each, expressiveness had six, supportiveness had five, niceness had eight, and threateningness had one vote.

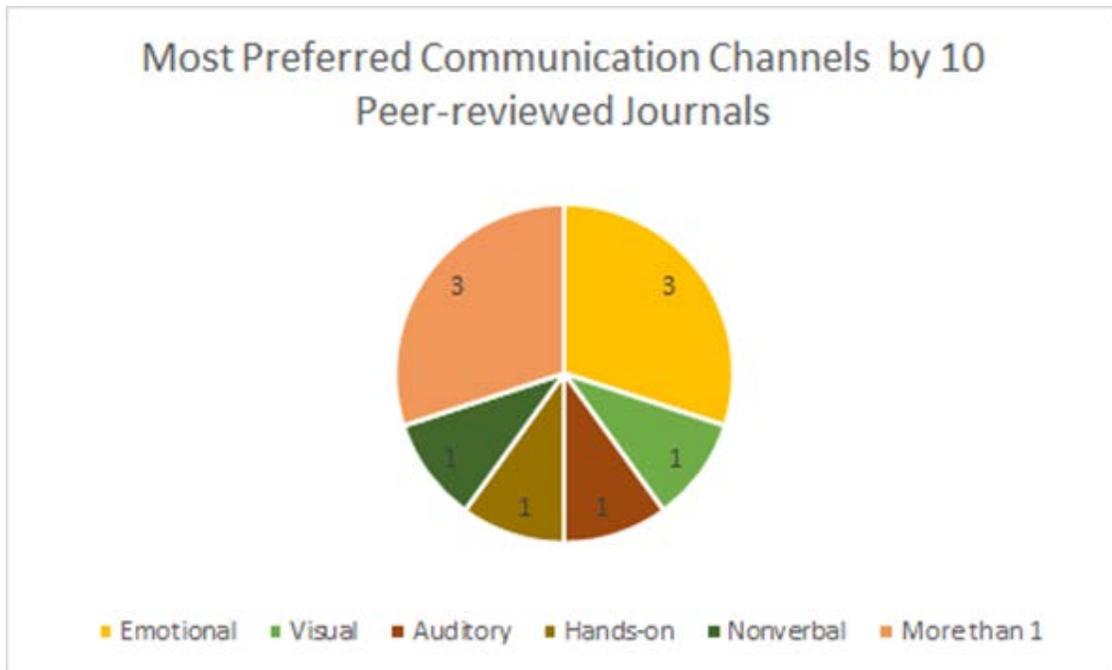


Figure 2. This pie chart highlights the findings of ten peer-reviewed journals. The authors examined the most effective form of communication. Six peer-reviewed journals found that emotional communication along with more than one channel were the most successful. Visual, auditory, hands-on, and nonverbal were the most popular in four studies.

In-Person versus Mediated Modes of Communication

To determine the most effective ways to message sustainability in Montgomery County, two main communication channels were analyzed and compared: in-person communication and a mediated mode of communication.

Some examples of in-person communication are one-on-one discussion with someone via a tabling event to promote composting, a park community event to teach recycling, and attending a conference and listening to a speech about climate change. Mediated modes of communication use the internet and technology to disseminate a message, and include a focus on social media like Facebook, Instagram, and Twitter. Our research found that mediated modes can reach a much larger audience due to the sheer amount of people using social media; currently 65 percent of American adults use social networking sites (Perrin, 2015). However, it has the potential to leave out key stakeholders like seniors who have a smaller presence on social media; only 35 percent of seniors aged 65 and older are on social media sites. But each year there's a significant increase in the amount of seniors using social media (Perrin, 2015) so the reach of mediated messages may shift in coming years. On the flip side, face-to-face communication has a very limited reach but has been shown as more impactful in changing behavior (Moser, 2010). The most effective sustainability messaging, in an ideal world, would include extensive reach and high audience engagement.

To determine the strategies that can best achieve extensive reach and high audience engagement we look at specific ways to increase engagement while still using a mediated mode of communication. One way to do this is to create a non-threatening representation of an environmental issue that connects to an individual's emotions and values, which data suggests can increase an individual's engagement because fear representations can attract people's attention to climate change, but that fear is an ineffective tool for motivating genuine personal engagement (O'Neill & Nicholson, 2009). This same study found that fear-based messaging can enhance an individual's feeling that the problem is a distant one that they don't have to worry about for a long time, an attitude that decreases their engagement (O'Neill & Nicholson, 2009). Thus, a sustainable message should connect with everyday life in spatial and temporal terms to impact on an individual's behavior.

Another study also found that connecting a sustainable message with everyday life can result in increased engagement because when individuals recognize that global climate change has local implications, they may become more averse to its risks and mobilize to act, thus increasing their engagement (Scannel & Gifford, 2013).

Lastly, a mediated mode of communication can result in high engagement with climate change issues and lead to a change in behavior when the message is interactive on social media (e.g., via a Facebook group) and allows for open communication with a topic (Robelia, Greenhow, & Burton, 2011). In conclusion, mediated and in-person modes of communication both have the potential to be effective channels for sustainable messages but research shows a mediated mode could be the most effective when paired with specific strategies.

Role of Religion in Sustainability

Literature review and statistical analysis of the survey, uncovered the role of religion in sustainability, as well as effective ways to message sustainability. The literature review showed the many ways that religion can influence sustainability. But first it was important to determine which religions are prevalent in Montgomery County. Although most County residents do not claim a religion (60.4 percent), 122,569 people (12.4 percent) are Catholic, 104,377 people (10.7 percent) are Evangelical Protestant, 73,637 people are Mainline Protestant, and 8,247 people are either Buddhist or Hindu (Montgomery County, MD 2017, see Figures 3 and 4). The next part of the team's research was to see how these religions impact sustainability. Understanding that political views, materialistic values, and religious socializations are usually good indicators of an individual's environmental concern (Cheng 2011), Montgomery County can consider religion when messaging sustainability and to promote environmental concern to the public.

We also found that the world's predominant religions such as Christianity, Buddhism, etc., promote a set of moral values and codes of conduct, have played a role in either supporting environmental conservation and sustainable development or not (Bhagwat 2011). For example, Christianity, Judaism, and Islam believe that humans hold a superior position to nature since God created it for them, whereas Buddhism and Hinduism follow a pantheistic view where God is in and through everything, including nature (Minton 2015).

After seeing how specific religion's influence an individual's opinions on sustainability, we wanted to look more broadly at how religion as a whole can impact sustainability. We found that the sustainability movement as a whole is making a global attempt to lessen the anthropological footprint and promote a more environmentally friendly standard of living, and has not put forward a broad picture transition process that includes specific social spheres such as religion. Just like politics or economics, religion can be conceived as a social subsystem that can potentially contribute to sustainable processes (Koehrsen 2015).

As well as the potential contributions religion can offer sustainability, we also found it can harm sustainability efforts. We found that the underlying contradictions in our society's attitudes, either local or worldwide, toward resource management and sustainability are due to social, economic, and religious forces that have imposed a taboo on discussion and implementation of appropriate action within society (Ludwig 1993). Therefore religion can serve as a positive influence in sustainability messaging, but also a deterrent.

Along with understanding the religions in Montgomery County, their influence on individual views about sustainability, and their broad impacts on the sustainable movement, a literature review also helped show effective ways to message sustainability to specific demographics. First it's important to see how and why individuals take in information—the codes, values, and societal norms that individuals use to select, prioritize, and take in information. That being said, no movement, including sustainability, can have an effect if it isn't communicated, thought, and lived through social actors, such as religion. Furthermore, a

successful social shift toward sustainability requires more than an education via T.V., arts, or different media and communication structures to message sustainability (Brocchi 2010).

These findings led to an examination of effective communication and messaging structures. One technique, used in social marketing to shape perceptions and construct meaning, and that can also effectively message sustainability, is message framing. Message framing presupposes the way an audience responds to a particular message; in the County, religious groups will be the audience and sustainability is the message. Message framing depends on how a message is composed, encoded, and received by the audience (Cheng 2011). The results and research findings indicated that role religion plays in sustainability, how it relates to Montgomery County, and an effective way to message to religious demographics; such as applying the technique of message framing to religious demographics.

The team received 70 responses to the survey and found that research question: 15.8 percent of people are Catholic, 12.3 percent are Christian, and 5.4 percent follow an eastern religion; most respondents cared about climate change, yet not so much about habitat destruction. Finally, most residents say that newspapers/magazines and radio/news shows are the best ways to communicate environmental information and sustainability, however social media outlets and newsletters were also said to be useful (see Figures 10, 11, and 12). In all, the survey helped to demonstrate the prevalent religions within or near Montgomery County; individual views about environmental issues such as natural resource depletion, sustainability, and air pollution; and the ways in which individuals best take in information.

The literature review findings show that religion does in fact play a significant role in sustainability by influencing it in either a positive or negative way. Religion's roles can be systematized into three potential uses: (1) campaigning and intermediation with the public, (2) materialization of sustainability in the form of participation in sustainable projects, and (3) the dissemination of values and worldviews that support environmentally aware attitudes and behaviors (Koehrsen 2015).

Religious actors can potentially have a strong impact and influence on Western societies. For instance, evangelical churches in the U.S. increasingly communicate their positions on climate change—it is real and human induced—to the public sphere and ask for action. Furthermore, religious organizations can also contribute to the sustainable movement by encouraging congregations to participate in sustainable actions such as lowering their CO2 emissions or recycling. A different way religion can materialize sustainability would be to attach solar panels to the place of worship. Lastly, from these systematized functions, religion can be used to promote sustainability as a moral and ethical duty (Koehrsen 2015).

Just as religions themselves serve a function in the sustainable movement, so do religious leaders who can be important actors in effectively communicating environmental and sustainability issues. Their support is often needed for a strong public outreach. Religious leaders are conversant with their respective groups' vocabulary and values, and by knowing what is important to their audience, can be effective in successful communication (Bhagwat 2011). For example, in 2012 the head of the Roman Catholic church, Pope Benedict XVI spoke of a new environmental awareness and called upon the believers of his faith to protect the earth from environmental degradation (Back 2012). Clearly, there is no religious leader as influential as the Pope in Montgomery County, but similarly the County can call upon religious organizations and leaders such as priests, rabbis, and monks, to advocate and promote a

culture of sustainability. Religious groups can take simple actions like lowering their collective footprint, recycling more, or cleaning up the environment, or can get involved with the policy decisions, acquire and promote the use of solar panels and/or wind farms, and replant forests and trees. For example, a group of Midwestern Catholic nuns promote and encourage people to convert to organic farming by connecting it to the Virgin Mary (Glaser 2012); religious communities can play a large role moving a society toward sustainability.

However, religious ideologies can also contribute to an individual's disregard for sustainable practices. The code of values a religion promotes or sustainable transitions asked for by religious leader do not mean much or have a strong impact if the religious communities themselves do not contribute.

It is key to link effective ways to message sustainability to religious communities. Besides creating targeted messaging toward specific religious demographics, such as message framing, sustainable change advocates and promoters should acknowledge and incorporate religious values (Minton 2015). The most effective ways to message sustainability to religious County residents would be not only to send messages that they can relate to and would feel obligated act on, but to also ask religious leaders to call on their congregations to become a more sustainable communities.

The small sample size, 70 responses, made it hard to connect the question about religion to the ones about the environment and sustainability. However, the survey did supply data about societal attitudes in the County that can be used for further analysis or more case studies. For example, the survey determined the best way to inform people about certain environmental issues and sustainability (see Figure 11), which can be useful in the second half of the research question. One reason why the religious influence on environmental attitudes was hard to correlate from the survey, was because this type of information is usually difficult to determine empirically (Minton 2015). In all, the survey conducted was not as useful in determining religion's role in sustainability, but was able to help by showing how individuals prefer to learn about issues.

Religion plays a large role within the sustainable movement, either through the religion's values or morals, through religious leaders who can promote sustainability to their congregations, or through religious communities that participate in sustainable actions. The most effective ways to message sustainability to religious groups would be to use techniques such as message framing to appeal to religious communities or via community religious leaders who can promote sustainability. For Montgomery County in particular, religious groups, leaders, and communities can potentially be a large factor in the environmental movement if messaged correctly. The County should work with local congregations, incorporating them into promoting the sustainable movement.

Religions Adherents In 2010

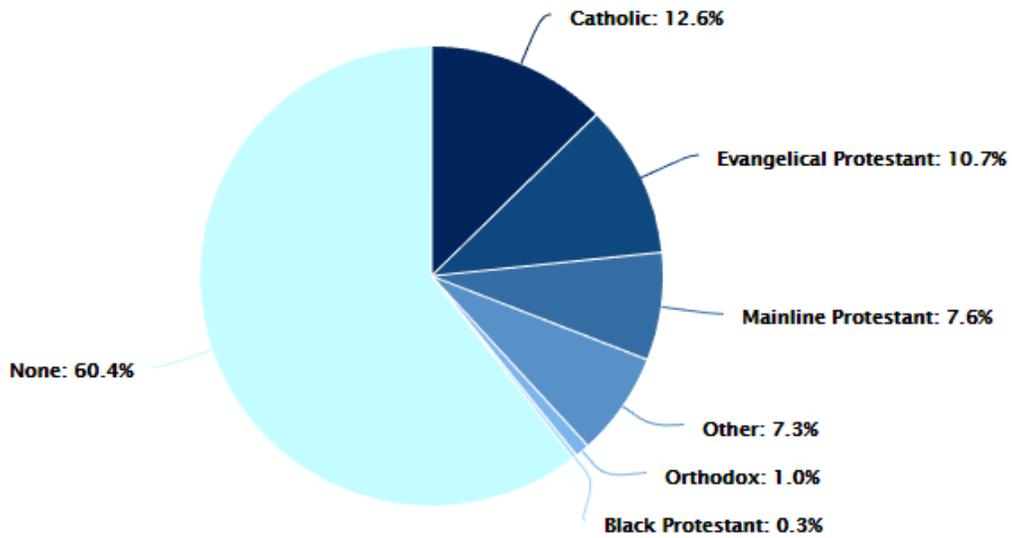


Figure 3. The proportion of individuals who follow major religions present in the County. (Montgomery County)

Year 2000 To 2010 Change

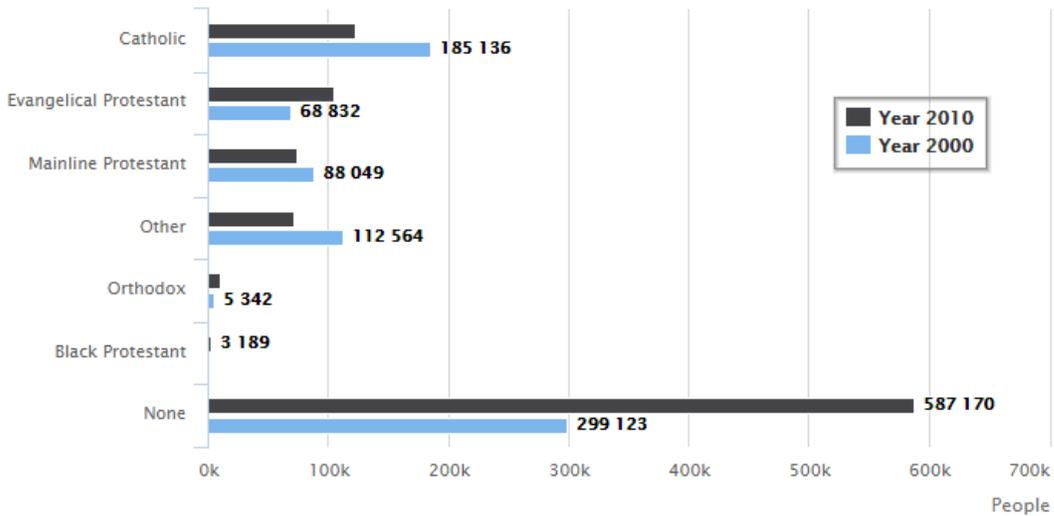


Figure 4. This chart, like Figure 3, shows the number of people associated with different religions, but it also shows how some religious groups have increased or decreased. (Montgomery County)

Hispanic Communities and Sustainability

The most common reoccurring themes that were heavily emphasized throughout the research was the importance of creating an emotional connection, and welcoming diversity, to best achieve high community engagement rates. Specifically, the most common finding was the importance of working with multicultural, multilingual organizations on community outreach programs to motivate Hispanic communities to be more involved and increase participation in local initiatives (Clark, 2002). As the survey shows, question 2 asked the participants to specify their ethnicity. Less than 2 percent of participants were of Hispanic/Latino origin. This low turnout reiterates the main findings of the literature review about methods to engage Hispanic communities. Several articles and case studies show the significance of bridging cultural gaps, especially when dealing with environmental initiatives, and that having empathy, being genuine, and trying to connect with the local Hispanic communities is also important when motivating communities to engage (Clark, 2002). Hispanic communities should have a voice and be empowered, this is the only way community engagement will be successful (Holmes, 2016).

Specifically, a case study about understanding environmentalism among Toronto's Hispanic communities suggests that having an event at a local park, including a community garden, was the most effective way to reach the City's Hispanic communities, and is the best way for the message to resonate (Gibson-Wood, et. al, 2013). Another case study of interviews within a Bureau of Land Management (BLM) area with a large Hispanic population, many of whom didn't speak English, concluded that when area managers involved the Hispanic community in agency decision-making it motivated their engagement in community initiatives (Ewert, 1993). The article found that building relationships with the locals, and using county personnel as connections between the Hispanic community and the agency was the most successful approach (Ewert, 1993). This approach can be applied in Montgomery County, specifically by working with Casa de Maryland, a local Latino immigration advocacy-and-assistance organization.

Lastly, the case study about the coastal crisis in the state of Louisiana focused on environmental psychology and concluded that the most prominent strategy for achieving targeted messaging of a known audience was to write and/or speak from a local angle, incorporating local concerns to the community, and understanding the motivations and culture of these communities (Jarreau, 2017).

These sources conclude that the most impactful way to motivate the Hispanic community to engage in local initiatives is to emphasize a multicultural and multilingual environment, build and instill empowerment and motivation amongst the people, and incorporate community events, blending all three components.

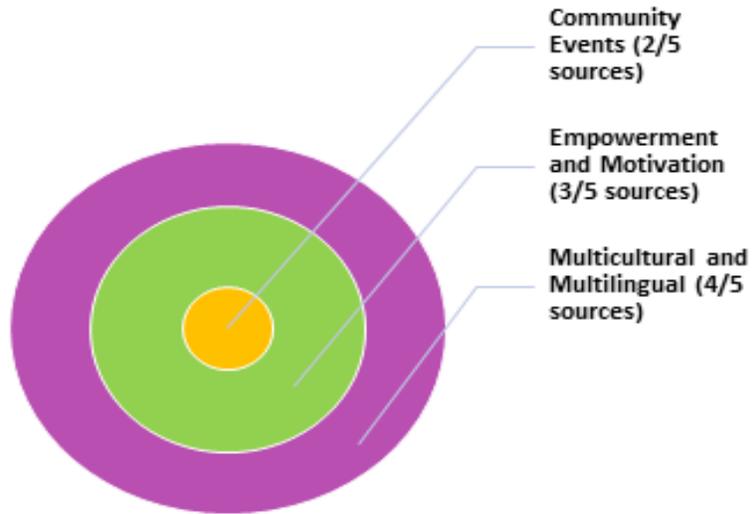


Figure 5. Shows the importance of intersecting all main findings for methods to best motivate Hispanic communities. Based on literature review, three of seven reviewed articles concluded that community events should be established. The articles also referenced the importance of weaving the other two main findings, and keeping them present throughout these community events.

Messaging Chesapeake Bay Sustainability

Of the many possible groups that could be targeted for sustainability messaging, waterfront communities can have some of the biggest impacts on environmental sustainability. Individuals who live close to or nearby waterways, can see and understand the damages being done. Within Montgomery County, the biggest waterway to target is the Potomac River due to its direct connection to the Chesapeake Bay. For the first time since its development, in the ninth State of the Nation’s Rivers report, the Potomac scored higher than a C rating, receiving a B-. As progress is made, now is the time to encourage residents to use sustainable water practices.

Research led to two findings: oyster gardening is a best practice to encompass both environmental and human sustainability practices, and the best way to convey this message is through community or group events.

Oyster gardening is the process of raising Eastern Oysters, the Bay’s native oyster species, in cages or floats attached to docks. These oysters are later returned to the Bay to replenish a once abundant population, decimated by disease, poor water quality, and over-harvesting. Through oyster gardening, individuals are not only replenishing the Bay’s oyster population, they are also replenishing the health of the Chesapeake Bay, which provides so many of the natural resources and ecosystem services that residents of the Bay Watershed depend on.

Research on the Benefits of Oysters

Some of the most important findings address the impact of oyster gardening on water quality; the most important statistic is that a single adult oyster can filter up to 50 gallons of water a day.

“With estimates that almost 50 percent of estuarine areas have impaired water quality, man-assisted “oyster-terrace” can be a solution that is low cost with high return. If done correctly, a reef with the measurements of 10 to 20 feet long and 5 to 10 feet wide could be built and installed for the price of....well, almost nothing” (Green 2011).

A current shellfish-based restoration program is the *Mercenaria mercenaria* aquaculture in lower Chesapeake Bay, which appears to be enhancing seagrass abundance due to the consumption of algae by the oysters, which are filter-feeders. The activities of these and other filter-feeders enhance seagrass production through a positive feedback loop that increases dissolved oxygen content in the water, levels that had decreased because of algal blooms (Coen 2007).

Over the past 10 years, Virginia has instituted a state run oyster restoration project that has increased the annual oyster harvest from 23,000 to 250,000 bushels, adding nine million dollars of revenue to the state economy (V.O.G.G). This state-wide adoption of what is essentially oyster gardening, emphasizes its effectiveness.

Prerequisites for Successful Oyster Growth

These findings were formulated from both Virginia’s and the CBF’s oyster gardening guidelines, as well as personal field research.

1. Correct water salinity range

Water’s salinity influences the oyster’s growth rate and their vulnerability to diseases. Oysters require a salinity of at least 8 ppt. to grow; oyster growth increases with increased salinity. Below 10 ppt. salinity oyster growth rates are generally reduced; some oysters show intermediate growth rates at salinities between 10–20 ppt., with the highest growth rates at high salinities above 20 ppt.

2. Minimum water depth

water depth must be at least one foot at the lowest tide for two reasons: 1) oysters can only filter water and grow when they are submerged and 2) in the winter, when tides and winds may cause oysters to be exposed, they may freeze.

3. Adequate oxygen

Oysters need water with dissolved oxygen levels of at least 3.2 milligrams per liter, but 5.5 mg/l or more is best for survival and growth.

4. Adequate algae

Considering oysters’ food source is algae they need to have a sustainable source to thrive.

Findings on the Connection between the Environment and Human Health/Human Cooperation

A National Academies of Sciences, Engineering and Medicine report, *Rebuilding the Unity of Health and the Environment*, emphasized that the environment should be understood as the interplay between ecological (biological), physical (natural and built), social, political, aesthetic, and economic environments

(Institute of Medicine, 2001). Thus, expressing that each aspect of the entire 'environment' can equally affect all other aspects of the world around it.

Community-based participatory research (CBPR) has evolved as a popular new practice in public health research (Flicker 2008). This study showcased the benefits of community-based projects including: better group decision-making, community ownership, cultural and social change, and an increased community value both economically and morally.

Discussion of the Benefits of Oyster Gardening

Presently, the Bay has been over-enriched with nutrients from human-produced pollution; perhaps the most immediate human health threat we've created (Burke 144). Preserving the Chesapeake watershed is essential to protecting public health throughout the region. The Bay has profound impacts on life in Maryland from both the human health standpoint and economic market standpoint. Protecting the Bay and its resources will require participation and involvement from both the scientific/legislative community and the residents of the Bay area.

Based on research, the best way to intertwine the messages and values of human health and environmental sustainability is by implementing oyster gardening. A National Oceanic and Atmospheric Administration (NOAA) study of the Potomac River found that oyster aquaculture in the estuary could significantly improve water quality. This would in turn lead to a better quality of life due to reduced bacteria build up in water sources and more resources that can be obtained from the Bay, mainly food. According to the study, 100 percent of the nitrogen pollution levels in the Potomac River estuary could be removed if 40 percent of its river bed were used for shellfish cultivation (NOAA). While this level of aquaculture may be extremely unlikely, the report also concluded that if only 15 to 20 percent was cultivated these shellfish and filter-feeders could remove almost half of the excess nutrients from pollutants.

Considering the Potomac River is the fourth largest river on the Atlantic coast, with more than six million people in its watershed, the Potomac is a perfect place for Montgomery County Parks to direct its oyster gardening sustainable outreach programs and projects.

Not only do oyster gardens replenish the health and water quality of the Bay as a whole, but they restore economic value to a fishery industry that has experienced massive revenue decline in the past decades. According to NOAA, the Bay currently generates an annual revenue of 3.39 billion dollars and supports 34,000 jobs (NOAA). This significant value is generated by a poorly performing fishery industry in a Bay with mediocre water quality, and could grow rapidly if efforts are made to combat the declining water quality.

Why Not a Project Other Than Oyster Gardening?

There is one other pollution mitigation strategy applicable to Montgomery County that could be done at an individual or community level, and would made enough of an impact on pollution levels that it warrants analysis.

Rain Gardens, which consist of heavy grasses, shrubbery, and tree cover (all local species), could be built on to soak up water runoff and absorb excess nutrients that would otherwise make their way into the Bay watershed. However, the impacts of these gardens is too inconsistent, and they are also too expensive. According to 2011 estimates by the Maryland Department of the Environment, it costs an average of \$50,000 to \$187,000 to build enough rain garden to drain and treat stormwater from one acre of pavement (Strain 2012). And that price only considers installation and initial fees, completely ignoring upkeep and mulching fees. On the other hand, oyster gardening can have a total cost as low as \$100 per year per cage, including all equipment and oyster spats (babies).

Additionally, according to Strain, "Plants will take up nitrogen, but if you don't remove the plants, then the nitrogen doesn't really go anywhere (Strain 2012)." Once rain gardens die, all the nitrogen they absorbed essentially releases back into its natural path, which generally leads it back into the watershed it was originally headed for. Oyster gardening on the other hand can lead to a completely self-sustaining colony that survives and filter-feeds on its own without human interference or upkeep. As seen in Figure 6, if humans encourage oyster growth, rather than decimate their populations, it could create a much cleaner and productive Bay ecosystem.

Why Oyster Gardening Would Work for Montgomery County

Montgomery County is one of the nation’s more affluent counties with a median household income of \$98,917 (Data USA). The Potomac River borders the County’s southern edge, the location of two of the County’s four wealthiest census centers with median incomes ranging from \$138,31, to \$245,870 per year (see Figure 7) (Data USA). A waterfront community of affluent households who can be targeted to implement a community-based oyster gardening campaign could easily support implementation costs of \$100-200 per year, especially if they believe in the cause and the benefits of this activity.

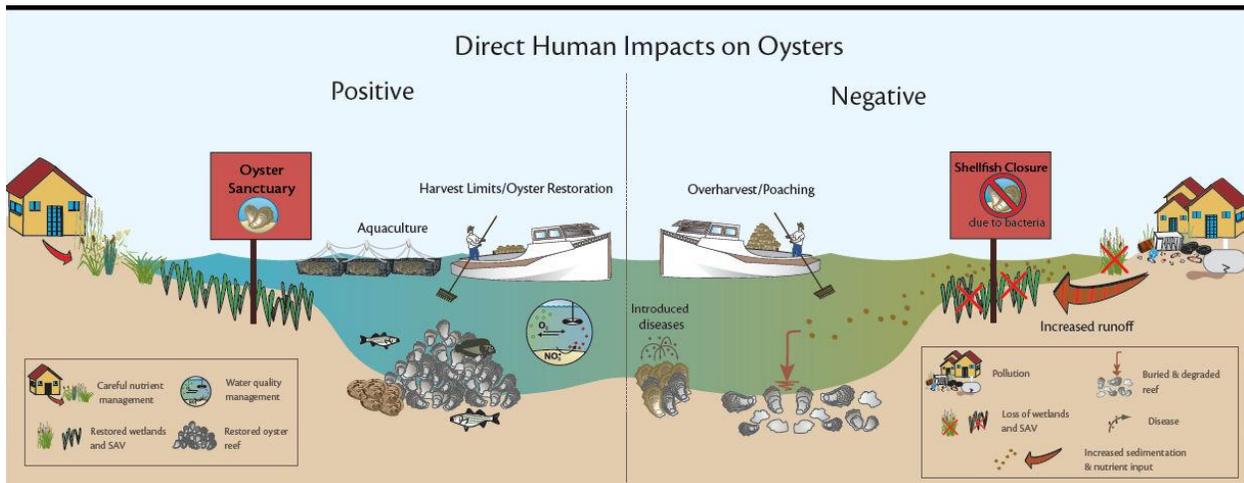


Figure 6. This diagram displays Bay health both with and without oysters

Source:http://www.oyster-restoration.org/wp-content/uploads/2012/06/Oyster_human_impact_diagram_LG.jpg

Income by Location in Montgomery County, Md

The closest comparable data for the county of Montgomery County, MD is from the state of Maryland.

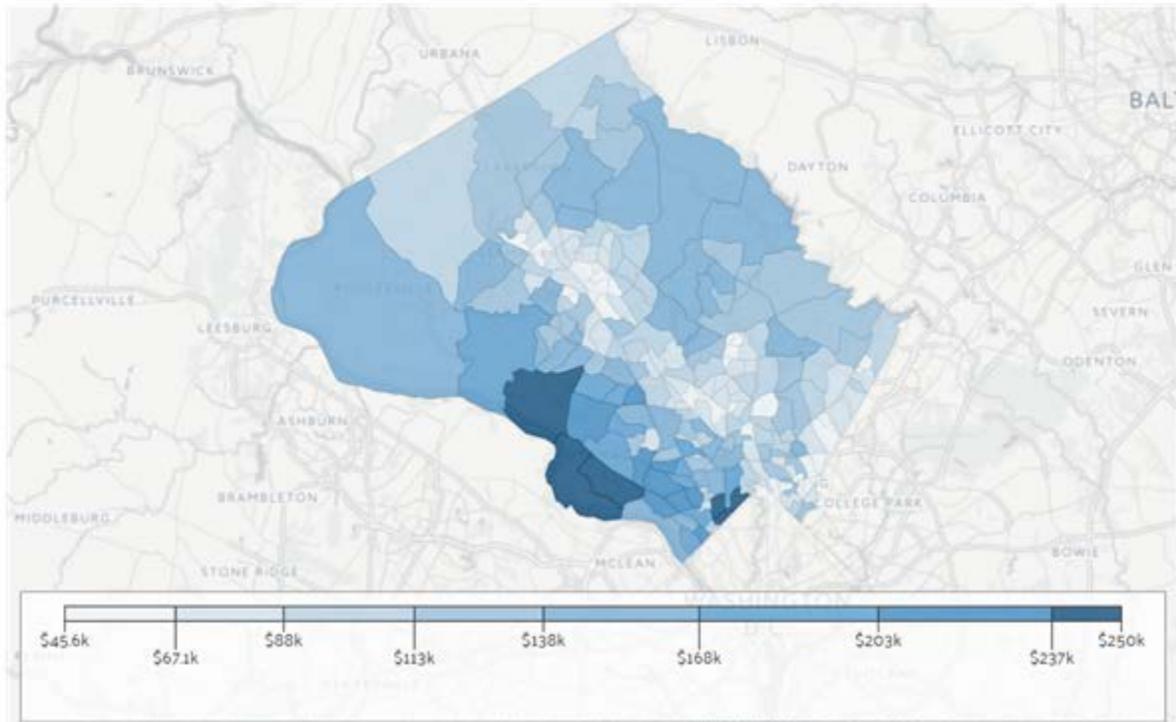


Figure 7. Average yearly household income by census region in Montgomery County

Source: "Montgomery County, MD Demographics." DataUSA, datausa.io/profile/geo/montgomery-county-md/.

Environmental Sustainability and its Relationship to Poverty

Poverty and environmental sustainability are a world-wide concern. The United Nations will hold its 4th International Conference on Poverty and Sustainable Development (ICPSD 2017) in December 2017. Its primary goal is to eradicate poverty, a secondary goal is to promote sustainable agricultural, with the last in a list of 17 goals being to strengthen implementation of and revitalizing the global partnership for sustainable development. This meeting underscores the topic's worldwide importance. A social issue such as poverty encourages stakeholders in environmental sustainability to share ideas and interventions that can benefit all parties (<https://povertyconferences.com>).

Poverty occurs in all societies and certainly exists in Montgomery County. Poverty is an economic issue, but its eradication should while continue to protect the earth's sustainability. According to the World Conservation Union, "sustainable development is that which is economically viable, socially acceptable and environmentally sound." Montgomery County has a relationship with Habitat for Housing, which brings affordable housing to those who need it with the goal of a household not having to spend more than 30 percent of its income on housing. The United Nations recognize that poor housing and

transportation increase carbon footprints, which is detrimental to the environment, and its goal is to ensure that housing problems are well on their way to being obliterated by 2030.

Residents of the County’s low-income communities need to know that their communities are important to the County; they help to make up the whole of Montgomery County, therefore community engagement is vital to their well-being as well as to the County as a whole.

Poverty can have a great impact on the environment; many positive and negative actions to eradicate poverty affect environmental sustainability. A global example would be poverty stricken areas that are depleted of water often also have overworked land, possibly arid, along with other activities that increase carbon footprint such as burning trash, and unregulated emissions from vehicles and factories.

Montgomery County has over one million residents, with about 7 percent of the population below the federal poverty line and about 18.7 percent of its population at 200 percent below the poverty line. Montgomery County has a group of seniors that live at 300 percent below the poverty line.

These data assist Montgomery County in determining who is eligible for and in need of poverty assistance while maintaining environmental sustainability.

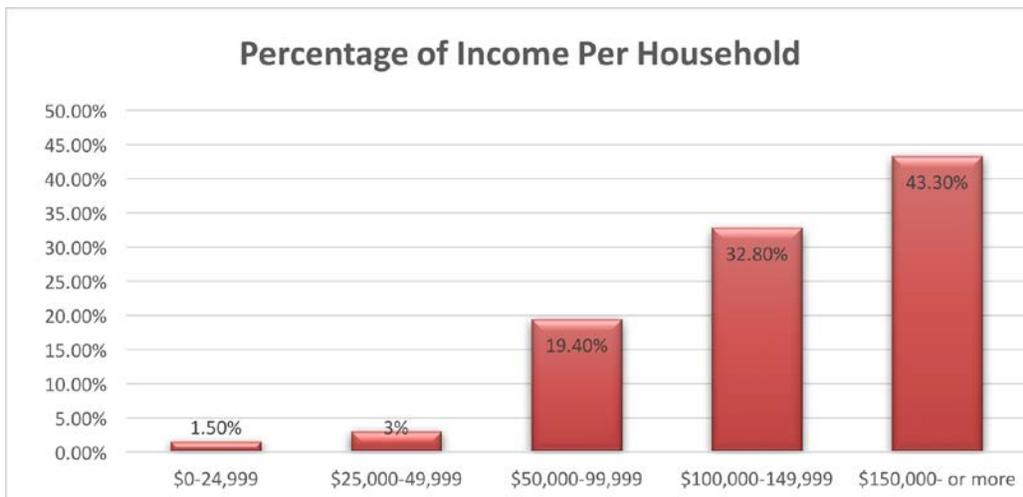


Figure 8. Percentages of income and households in Montgomery County at each level.

(Montgomery County Survey Results conducted by our Student Team)

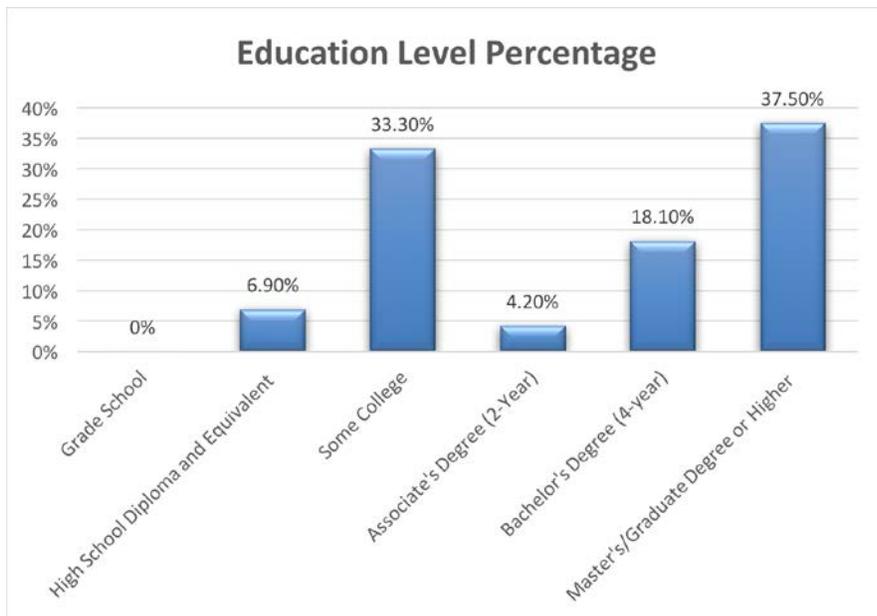


Figure 9. Educational levels of Montgomery County citizens per survey data.

(Montgomery County Survey Results conducted by our Student Team)

Recommendations

For Montgomery Parks to effectively message sustainability to the public, including the non-environmentally inclined, we have multiple recommendations:

First, we suggest that if Montgomery Parks wants to focus on reaching the largest amount of people while still keeping a high audience engagement, then the distribution of a sustainable message should be through a mediated mode (i.e., social media channels) while the message itself is non-threatening, speaks to an individual's emotions and values, has a place attachment specific to Montgomery County, and has a connection with everyday life by relating it to public health.

These recommendations are based on research that has shown that a mediated mode of communication has a wide reach but usually a low impact on behavior, so if we included key components of messages that have effectively increased audience engagement and paired it with a mediated mode to improve both the message's engagement and reach. Specifically, Facebook has the most users and its users have a diverse age range making it potentially the most efficient form of mediated communication to communicate a sustainable message from Montgomery Parks. Additionally, threatening messaging has often been paired with environmental messages but has not been effective at motivating personal engagement; people are more receptive to non-threatening images that also speak to their emotions and values. Crafting a message that is specific to Montgomery County and connected with everyday life allows individuals to feel connected with the message and therefore is more likely to motivate them to act and engage.

Second, in addition to speaking to the residents' emotions and values, Montgomery Parks should ensure that the sustainability message is being communicated to not just a large amount of people online but to

a diverse population as well. The best way to do this is by organizing a community event, the most impactful way to effectively message sustainability to the public. When organizing this event, it is essential to incorporate a multicultural and multilingual environment to engage a diverse group of people. The planning of a community event can be done by working with other credible, local County organizations such as Casa de Maryland, a Latino and immigration advocacy and assistance organization. Working with groups like Casa ensure that the Department of Parks is using valuable community resources to best engage a range of demographic groups to be most effective for the County and the sustainability movement as whole. In addition to collaborating with local organizations, the County should continue to ensure that affordable housing and assistance is made available to eradicate poverty while also continuing to uphold environmental sustainability. The County should continue involve the community in the quest to eradicate poverty and maintain environmental sustainability. This would ensure that everyone in Montgomery County is included and empowered to make decisions about Parks' sustainable initiatives.

Third, supporting and conducting park-sponsored oyster gardening in the Potomac River is one of the best ways to message and educate about sustainable practices not only to waterfront communities, but to all citizens who participate. Montgomery County is the perfect place to expand this growing shell aquaculture movement not only because of its population size, but also because of the number of parks located near the Potomac waterway. The Parks Department could target specific waterfront communities for shell aquaculture and host oyster garden communities itself. Through a partnership with the Chesapeake Bay Foundation's oyster gardening initiative, the County could receive free oyster cages and spats on a yearly basis with the promise that after a year, the adult oysters will be returned to the CBF and relocated to designated oyster preservation areas (otherwise the county could invest in its own equipment). If even 75 oyster cages were housed in a water-adjacent park program, and each cage raised 1,000 oysters, nearly four million gallons of Chesapeake water would be filtered every day. This could have an immensely positive effect on the Bay ecosystem. The parks best suited to house these projects are: Berryville Road Neighborhood Conservation Area, Adventure Conservation Park, Battery Bailey Park, and Booze Creek Stream Valley Park. These projects could be announced via social media or through ad campaigns in flyers or newspapers. With even minimal involvement, Montgomery County Parks could make a huge impact on the Bay ecosystem, which would directly improve human health within the Bay watershed area.

Finally, It is very important for Montgomery Parks to recognize that religion plays a large role in the sustainability movement, either through the morals and values of the religion itself, through religious leaders promoting sustainability to their congregations, or through religious communities participating in sustainable actions such as using solar panels or recycling. The most effective ways to message sustainability specific to religious groups is with techniques such as message framing or reach out to community religious leaders to ask them to promote sustainability to their audience. Involving religious leaders with Montgomery Parks sustainable initiatives would be a good idea because they are trusted messengers and pillars of their communities, that would encourage their audience to engage with the message. For Montgomery County in particular, religious groups, leaders, and communities can potentially be a large factor in the environmental movement if messaged correctly. The County should take advantage of the religions presence and incorporate them into promoting sustainability.

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