

Evaluation of volunteer programs in non-profit organizations dedicated to
urban river protection in the U.S. and China:

The Huron River Watershed Council and The Protect Environment Together
Association.

by

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Abstract

The Huron River Watershed Council (HWRC) in Ann Arbor, Michigan, and The Protect the Environment Together Association (PETA) in Beijing are two environmental non-profit organizations in the USA and China that focus on environmental protection of urban rivers. Volunteers provide important support for these two organizations.

Understanding the factors that bring volunteer satisfaction and the motivation of volunteers to keep participating is an important evaluation item for these and other non-profit organizations. This study used 5-point Likert scale electronic surveys to assess critical factors that bring volunteer satisfaction and semi-structured interviews were used to understand the evolution of volunteers' motivations to continue participating and to solicit suggestions to improve volunteer satisfaction. Volunteer responses from the two organizations were compared to identify the major similarities and differences in the two organizations' experiences with volunteers. Results show that protecting the environment is the main factor that brings satisfaction to volunteers, which is consistent with previous studies. Being able to provide help to the organization is another important factor. A good impression left by the first volunteering experience increases the chances that volunteers continue participating, and their motivation and source of satisfaction is enriched and enhanced with the number of times they participate. The closer social relationships with others and being valued are the main enriched aspects. HWRC is a well-established and run organization and been affirmed by their volunteers. They could maintain the current level of organization or potentially strengthen cooperation with college student clubs and developing more diverse marketing methods to expand volunteer engagement by youth. PETA is a newer organization, to raise the enthusiasm and efficiency of volunteers, they might consider increasing communication and interaction among volunteers, between volunteers and PETA personnel, and between volunteers and service objects (schools).

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1. Introduction

Volunteers are a vital part of environmental protection organizations. The number of volunteers in various environmental protection organizations around the world has grown in recent years and has received increasing attention (Savan *et al.*, 2003; August *et al.*, 2019). Volunteers are helping with monitoring rivers, removing invasive species, and observing wildlife among other tasks to contribute to the programs of environmental organizations and to obtain citizen data for scientific research. Moreover, with the progress of urbanization, urban ecosystems are home to most of the world's population, therefore environmental protection projects have begun to be closer to the city, which makes the participation of citizens more important for the success of environmental projects (Asah & Blahna, 2013). For example, in Brazil, the community of volunteers monitoring urban streams covered 64 cities, helping to identify potential drivers of phytoplankton community structure (Cunha *et al.*, 2017). In the City of Seattle, 95% of urban forest restoration projects in 2007 were accomplished with the help of community volunteers (City of Seattle, 2007).

Increasing care and attention to the environment makes people participate in volunteer activities to understand and protect the ecosystems in the cities where they live. The most important motivation for people to volunteer is helping the environment (Schroeder, 2000), and the awareness of the destruction of natural areas by urban development is an important catalyst for people's initial motivation to be involved in volunteer programs (Grese *et al.*, 2000). The results of a study by Asah & Blahna (2012) revealed that in urban and urbanizing areas, volunteering to restore and conserve ecosystems is an increasingly important way for people to enhance necessary connections with the natural world. Other related studies show that citizens' engagement have greatly helped voluntary organizations to improve local environmental conditions, disseminate knowledge, conduct scientific research, and even contribute to urban management decisions (Carlson & Cohen, 2018). Therefore, understanding motivations for volunteering and the value of participation for volunteers, can help organizations to attract and retain volunteers in the long term. Evaluating the satisfaction level of

volunteer programs can also help organizations work more effectively, and increase the positive impact on communities and the environment.

This study is to analyze and evaluate volunteer programs of environmental non-profit organizations in the USA and China that focus on environmental protection of urban rivers. These organizations are The Huron River Watershed Council (HRWC) in Ann Arbor, Michigan, and The Protect the Environment Together Association (PETA) in Beijing.

1.1. The Huron River Watershed Council (HRWC)

Regional context: The Huron River watershed

The Huron River is 210 km in length, and the watershed is 2,350 km² in size (USGS, 2012). It flows through the southeast Michigan counties of Oakland, Ingham, Livingston, Washtenaw, Monroe, Wayne and finally heads into Lake Erie. The Huron River watershed has a complex series of wetlands and lakes, which create diverse habitat for a rich array of animal and plant life, including over 90 species of fish and 34 species of reptiles and amphibians (Michigan Department of Natural Resources, 1995). The watershed is also an important stopover for migrating birds.

A large proportion of the Huron River watershed falls in the Detroit metropolitan area and it contains the city of Ann Arbor (Figure 1). About 30% of the watershed is urbanized. In addition, wetlands, agriculture, forest/grassland, and water bodies accounted for 14.9%, 24.5%, 23.3%, and 4.1%, respectively (Xu *et al.*, 2017). In the area, citizens enjoy an abundance of parks and nature preserves. Individuals, communities and industries alike have a tradition of cultural and environmental conservation, which offers a great foundation for environmental volunteering.

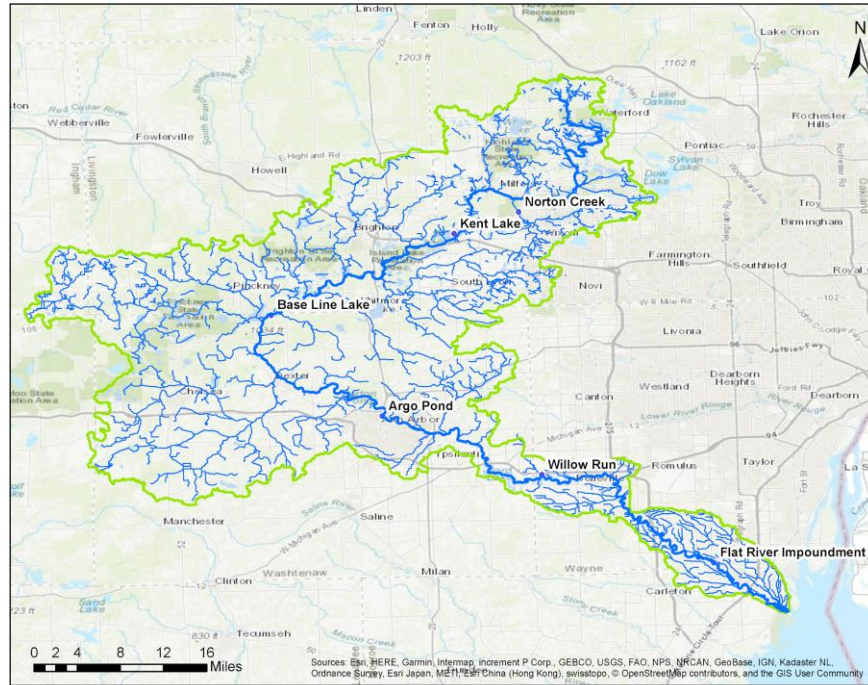


Figure 1. Huron River Watershed, taken from https://hrwc.maps.arcgis.com/apps/Embed/index.html?webmap=4a60226bd2c24aa3b65400b58dd11071&extent=84.6988,41.9373,82.6705,42.7684&home=true&zoom=true&scale=true&legend=true&basemap_gallery=true&disable_scroll=true&theme=light

Organization information

HRWC is the oldest environmental organization in southeast Michigan, established in 1965, dedicated to Huron river protection. It is a nonprofit coalition of residents, businesses, and local governments. The volunteers in HRWC help with monitoring environmental conditions in the Huron River and its tributaries, with restoration projects, and engage in public education.

HRWC has no enforcement powers, but the organization uses technical data, information, and citizen stewardship to influence decisions made by local and state agencies. Yet, the organization plays an important role in securing statewide and federal legislation that protects water resources and many interviewees commented on its effectiveness. The funding of HRWC comes mainly from foundations, government grants, and personal donations.

HRWC, conducted research on volunteer participation in 2013 and 2017 (Jason Frenzel, HRWC Personal Communication). Surveys were conducted to evaluate volunteer experience accounting for demographics and were sent to all volunteers that participated in the program for four years (2010 to 2013, 2014 to 2017). Based on results of these surveys, motivations of volunteers to participate are mainly to make an impact, socialize and learn skills, and results also showed that to be part of a well-organized process and feeling that their help is appreciated can encourage them to continue to participate. However, there is no detailed analysis from the research of the relationship between demographic data and volunteer motivation and satisfaction.

1.2. The Protect Environment Together Association (PETA)

Regional context: Beijing River System

The city of Beijing is located in northeastern China and covers an area of 16,411 km². The Beijing Water System is an artificial definition based on administrative divisions containing all rivers flowing through the Beijing area. It comprises five river systems: the Chaobai, Yongding, Daqing, Jiyun, and the Beiyun river systems (Figure 2). These river systems provide various functions including potable water, hydropower, and ecological services.

The central urban area of Beijing is mainly covered by the Yongding and Beiyun River systems (Figure 2). Beijing's center area has been completely urbanized, where most river banks have been constructed artificially or modified. Since this area of Beijing used to be the imperial city, the historical and cultural significance of these rivers is particularly prominent. There are many historical stories, legends, about these rivers and they constitute famous attractions. Many of these rivers became cruise visiting routes and park sights (Irland, 2017).

In Beijing's suburban area, the population and development level are noticeably lower. The terrain is mainly mountainous and covered by forests. Rivers in the suburbs supply potable water and hydropower for Beijing. For example, the Chaobai River flows into the

Miyun Reservoir to ensure drinking water, and it flows into the Ming Tombs Reservoir for power generation. The main environmental stressors of suburban rivers are domestic and industrial wastewater pollution, and reduced water levels because of overuse. Especially in the 1990s, many migratory birds and local fish in the Beijing area experienced marked declines due to the deterioration of water quality and habitat.

During the last decades, as the government began to strengthen its efforts to call for environmental protection, many parks and protected areas have been established (Peng *et al.*, 2010). At the same time, as people's awareness of the environment continues to increase, more and more people join in environmental protection activities. As a result of these efforts, some river systems in the Beijing suburbs have begun to recover. For example, the Wild Duck Lake in Miyun district has become an important habitat for migratory waterbirds such as wild swans and egrets (Zhou *et al.*, 2011). The number of native carps, snails, and other animals in the rivers system are also gradually recovering.

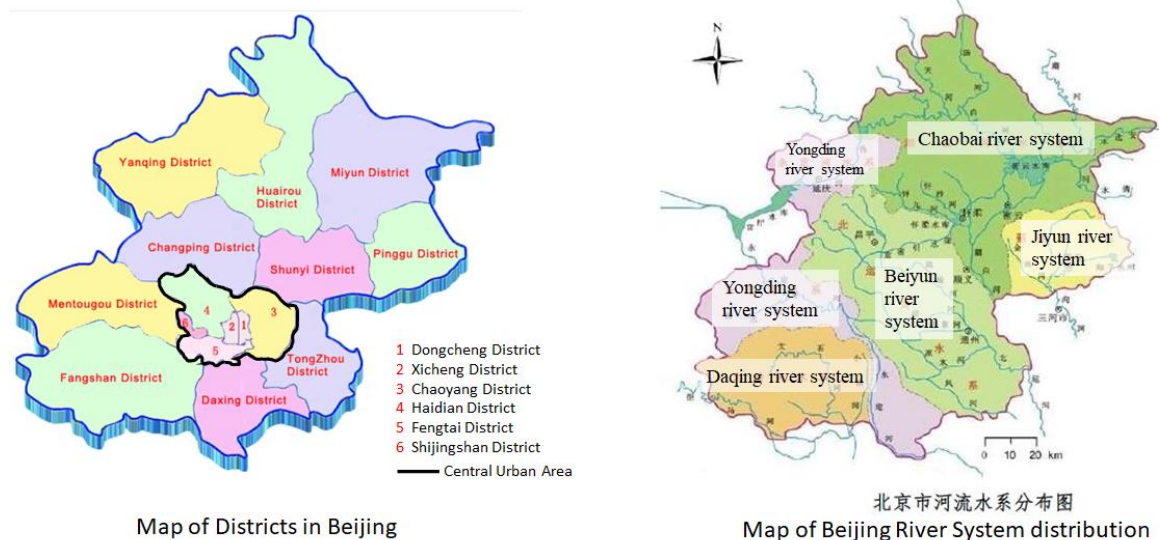


Figure 2. The administrative division of Beijing and the five river systems in Beijing, taken from http://www.ebeijing.gov.cn/Government/Administration_region/ and <http://www.rmjtxw.com/news/hb/28719.html>

Organization information

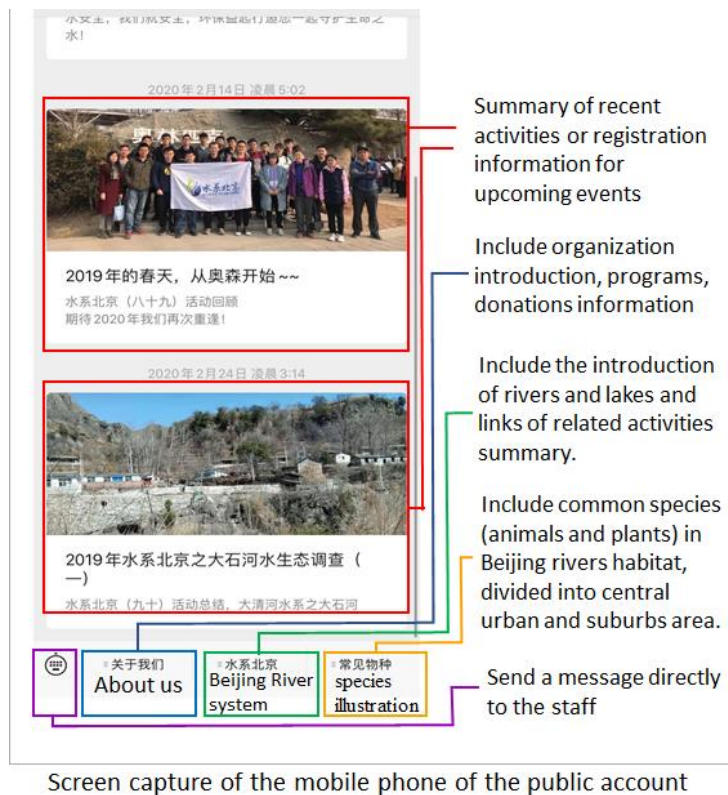
The Protect Our Environment Together Association (PETA) is a non-governmental organization (NGO) established in 2014. Volunteer activities mainly include monitoring the ecosystem health of the Daqing River, Beiyun River and the Yongding River and their tributaries, and conducting educational programs in primary schools to promote environmental stewardship. The organization is also in the planning stage to expand their programming to include wetlands and migratory birds. It collaborates with the Changping District Science and Technology Commission of Beijing.

In China, NGOs generally interact with the public, rather than with decision-makers. They have far less influence on legislation and management than in the United States. In some cases, NGOs are considered radical or just auxiliary; therefore, they have not received enough attention. Despite this, many NGOs, including PETA, are working to improve their own professionalism, and build more communications and alliances to make the effort of volunteers more valued and strengthen the NGOs' influence on the environmental protection policy.

The major funding source of PETA is from the China Biodiversity Conservation and Green Development Foundation (<http://www.cbcdgdf.org/NewsShow/4950/5287.html>). Additionally, the China Social Assistance Foundation has funded a project on migratory bird protection in 2016. There are also direct donations from society. The staff of the organization helps companies in planning events such as group activities, or act as judges of corporate activities to raise funds. This is because companies invest in environmental protection projects and evaluation of these projects requires practitioners to serve as judges that are paid for this.

Since the organization was established recently, funds are limited. Thus, volunteers might be responsible to cover expenses of some activities, such as insurance for outdoor activities, park tickets, and food. In comparison, although HRWC does not provide lunch, it will provide snacks for all volunteers in every activity, which helps to boost volunteers' satisfaction. In terms of communication methods, since e-mail is not commonly used in China, the registration and information exchange of PETA is usually through an app

called WeChat. WeChat, a social app that is very popular in China, can send individual or multi-person messages, create groups, upload photos, and share web connections on the smartphone. The organization also has a WeChat public account; it's similar to a webpage that can be viewed through WeChat (Figure 3), where PETA also publishes event information and illustrations of some common species in the Beijing River system.



Screen capture of the mobile phone of the public account

Figure 3. Screenshot of PETA's WeChat public account. WeChat is the main communication method between PETA and their volunteers.

1.3. Research objectives

HRWC and PETA are non-profit environmental protection organizations situated in different institutional contexts and cultures with similar focus and programs about city rivers that rely heavily on volunteer participation. This study investigates mechanisms that are successful at recruiting and retaining volunteers to understand factors that determine the level of volunteer satisfaction by comparing these two programs. HRWC has conducted some surveys to evaluate the level of volunteer satisfaction from

participating in different programs and asked for feedback about the programs after each event. But in-depth investigation of motivations and satisfaction sources is needed. PETA is a very young organization and has yet to evaluate the level of volunteer satisfaction of the programming. While volunteers are asked for feedback after each activity, surveys or research about the volunteers' experience are lacking. In this context, the main objectives of this study are to:

1. Understand the critical factors that determine volunteer satisfaction in each organization, to improve the program content and make it fitter to volunteer expectations.
2. Investigate how factors that determine volunteer satisfaction vary among different demographic groups, to help attract specific target groups.
3. Identify volunteer motivations for joining the organization, challenges and facilitating factors for continuous participation, to explore improvements in volunteer recruitment and retention.
4. Evaluate educational programs in two organizations, to propose improvements on educational achievements and engagement success.
5. Compare the existing practices and challenges faced by the two organizations to draw learnings and recommendations that might be more universal.

2. Materials and Methods

2.1. Programs Included in the Study

This study comprises four programs conducted by the HRWC and PETA organizations that have similar objectives:

2.1.1. Biological River Monitoring

The HRWC River Roundup and the PETA Short-term research programs focus on involving volunteers in biological monitoring of rivers. Both evaluate the health of river ecosystems by monitoring macro benthic invertebrates.

A. River Roundup

In this program volunteers work together in the field for several hours to collect macroinvertebrates and other organisms to determine the health of the river system. Volunteers help HRWC personnel to collect aquatic benthic invertebrate samples. The following week volunteers can also participate in an “ID day” activity, and sort samples and identify organisms in these samples.

Volunteers sign for the activities through the HWRC website (<https://www.hrwc.org/volunteer/sign-up/>) and meet at the HRWC office (1100 N. Main, Suite 210) in Ann Arbor. Then they are divided into groups of three to seven people, families and friends can request to be in the same group when registering (Figure 4a). Each group is led by one or two trained volunteers usually called leaders and collectors. The training process of these leaders and collectors usually lasts one day and consists of two parts: a lecture and a hands-on activity. The content of the lecture involves a description of the general flow of this activity, safety instructions, the importance of biological monitoring, and basic knowledge about the river and benthic invertebrates. In the practical operation part, HRWC staff lead the volunteers to a river to learn the skill of collecting samples (Figure 4b, c).

In the River Round up program, one group usually heads up to two sites along the Huron River. One site is generally located in a more natural area, where the water quality is better. The second site is chosen to be in a more urbanized area with lower water quality so that the volunteers can develop an intuitive feeling for evaluating ecosystem health. At each site, trained volunteers wearing waders and gloves enter the water to collect stones, leaves, and sediment from different habitats using d-nets and their hands. Once the samples are brought to shore, they find and pick organisms (Figure 4d). They store all the macroinvertebrates in vials with alcohol for later analysis during “ID day” activity. Although this activity aims to collect benthic invertebrates, in the process of collecting samples, volunteers may also find other organisms such as small fish and crayfish. The leader will provide relevant information about biodiversity of the river system to the group as appropriate. The richness and depth of information depend to a great extent on the experience of leaders and their own knowledge reserves.

Volunteers participating in “ID day” will sort and classify invertebrates under the guidance of the HRWC staff. Then they record the data and compare the results to last year's data. Since the samples are collected at a similar time window, they are comparable.

The data from the River Round up program are used to determine the health of the rivers. Results are made available to local managers and can affect decision-making, help get local legislation passed, and identify where there is a need to focus restoration efforts. This event is held twice a year, in April and September. About 100 volunteers sign up for each event.



Figure 4, (a) The volunteers gather in the HRWC office before departure and listen about the program content and directions. (b) Leader and collector training process. Volunteers are practicing using a d-net. (c) Leader and collector during training, HRWC staff guide volunteers to identify common aquatic invertebrates. (d) The River Roundup volunteer group is picking benthic invertebrates from stones and leaves. The upper left corner shows the collector getting in the river. <https://www.hrwc.org/volunteer/roundup/>.

B. PETA Short Term Field Trip

In the PETA Short Term Field Trip program, the number of volunteers is relatively small, usually around 10 to 20. There is no training for volunteer leaders. Volunteers are led by PETA staff members as one group. The volunteers sign up for activities and contact the WeChat group. If there are enough volunteers to provide vehicles, they drive to the site, if not, they use public transportation or taxis (Figure 5a). Sites are always located in suburban areas, within Beijing's forest park, wetland park, or accessible sites along the Chaobai and Yongding rivers. The central urban area has fewer sites because the constructed channel is not suitable for entering the river, and parks have stricter safety management.

At each site, the PETA staff enter the water and collect rocks and sediment where macroinvertebrates can be found. Because of safety considerations, volunteers do not get into the water, but they can find and pick organisms from the objects collected by staff and also use nets to collect some small fish and other organisms in the shallow area near the riverbank (Figure 5b). The groups will also observe vegetation, birds, and fish. During this activity, besides the biological monitoring, the PETA staff also provides testing kits for volunteers to measure the water chemical oxygen demand (COD) and pH using test strips. So the activity also teaches volunteers about methods to determine water quality (Figure 5c).

Unlike in the HRWC program, the PETA staff is always present, and usually completes the species identification on the spot. If staff is unsure of the species identification, they will take pictures to document the specimens, then consult relevant information and report the results to the WeChat group after the activity is conducted (Figure 5d, f, g). After each event, the staff summarizes and publishes on the PETA WeChat public account the species photos, event content, a list of species found, and a report on the environmental status of the river for the volunteers to view and forward to their relatives and friends.

The main purposes of this PETA program are to foster an interest in river systems and biological monitoring of river habitats, and to make a preliminary determination on the

health of the Beijing River system. It takes about a day to complete all the content of Short-term research. Depending on the number of volunteers and weather conditions. This activity is conducted three to four times a year.

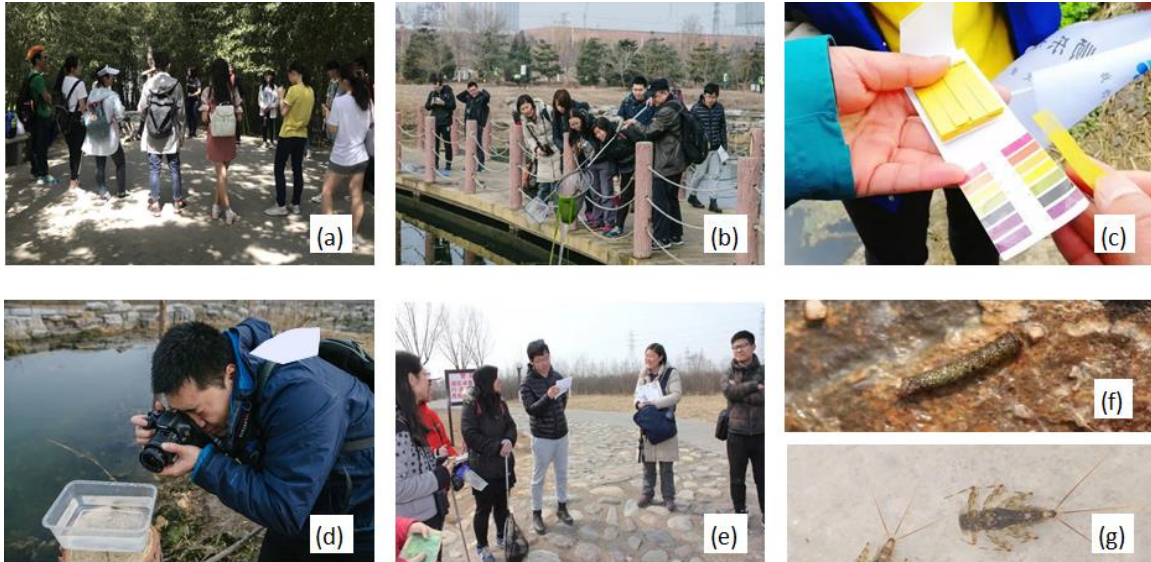


Figure 5, (a) PETA Short Term Field Trip volunteer group gathers at the sampling site and a PETA staff member introduces the program content, provides site information, and explains precautions that need to be taken. (b) Volunteers are standing on the river bank using nets and kegs to collect aquatic plants and organisms. (c) Kit to test the pH of the water. (d) Volunteers use cameras to photograph the benthic invertebrates they collected. (e) At the end of the event, everyone shares the results and their experiences and feelings. (f, g) Benthic invertebrates photographed by staff and volunteers (f: Caddisfly larva, g: mayfly nymphs).

2.1.2. Water Quality Monitoring

The HRWC Chemistry and Flow Monitoring and the PETA Long Term Research programs focus on involving volunteers to measure nutrients, bacteria, and chemistry conditions of the river systems. Volunteers collect water samples, test water chemistry and measure stream flow.

A. HRWC Chemistry and Flow Monitoring

In this program, volunteers receive training on how to measure pH, conductivity, dissolved oxygen by YSI (brand) multifunctional instrumentation, record water flow

using electric flowmeters, reading water level gauge to record water levels, and collect water samples in streams.

After receiving the training, the volunteers can enroll on the website and choose the date to participate in the monitoring scheduled from April to September. During the monitoring day the volunteers meet up in teams of 2-4 individuals in the HRWC office. They go to one or two sites to collect samples and take measurements of in-stream water chemistry, and then complete a record form (Figure 6). Before returning to the HRWC office and returning the instrument, volunteers deliver samples to the Ann Arbor Water Treatment Plant for further analysis. Analysis includes nutrients (Phosphorus, Nitrogen), Total Suspended Solids, and E. coli counts.

The data collected by volunteers are used for evaluating pollution from nonpoint and stormwater sources in sub drainage of the watershed. Results help community partners such as Middle Huron Partners, Livingston Watershed Advisory Group (WAG), and the Alliance of Downriver Watersheds (ADW) to track pollution. This program complements monitoring conducted by municipalities, universities, the Michigan Department of Environmental Quality and other organizations.

This program includes about 30 sites which are sampled twice monthly from April to September. The program is held for about ten days each month, 2-4 volunteer groups at different time periods go to different sites every day. Water flow monitoring are canceled when there are less than three volunteers enrolled. If there is only one volunteer enrolled, the HRWC staff or the summer vacation internship of HRWC will go with the volunteer.

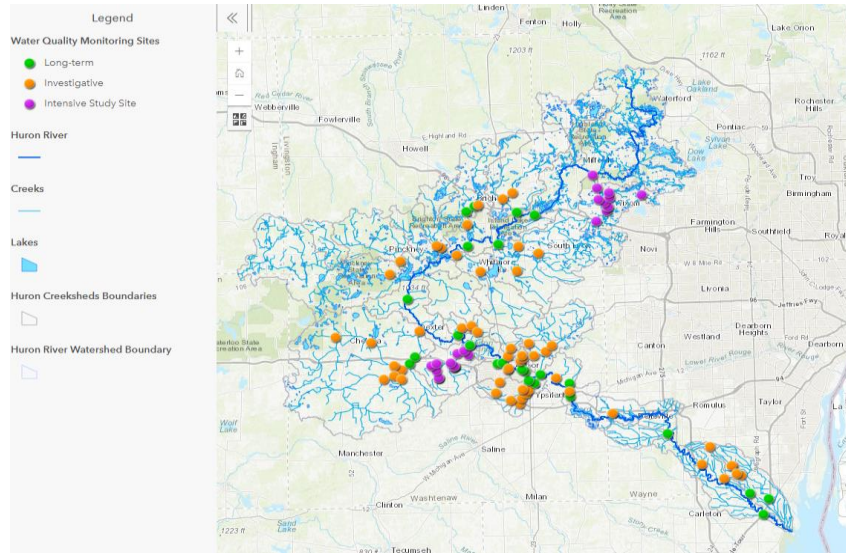


Figure 6. Map of the Huron River indicating Chemistry and Flow Monitoring sites

B. PETA Long Term Research program

In this program, similar to in the “Short Term program”, volunteers will sign up by the WeChat app and communicate about transportation. On the day of the event, volunteers led by PETA staff go to 1 or 2 sites along Daqing River, Beiyun River or the Yongding River (Figure 7a) to record water levels through the reading water level gauge and collect water samples. At sites where access to the river is difficult, such as where the river bank is too steep or too muddy, water samples are collected with a rope tied bottle (Figure 7b).

Volunteers use electronic thermometers to measure the water temperature and use testing kits with strips to measure the water chemical oxygen demand (COD), ammonium, and pH of the water sample on the site (Figure 7c). They also collect water samples and send them to the Changping District Science and Technology Commission to measure nitrogen, phosphorus, E. coli, and heavy metal. During the event, PETA staff will take photos to record the process and document any areas of suspected or illicit discharges. The summary of results from each activity is published on the PETA WeChat public account.

This program mainly helps to evaluate the pollution of Beijing's water system. For river sections with poor water quality that are polluted by domestic sewage and industrial wastewater, PETA will summarize the results and report to the Beijing Municipal

Ecology and Environment Bureau and keep constant attention. The update and feedback is also posted on the PETA public account. For eutrophic conditions caused by fertilization of riverside vegetation in urban parks, PETA will report the result to the organization responsible for park management.

The program is conducted on weekends from April to October, covering about 30 sites. During July, PETA adds an additional event on weekdays since most student volunteers are on summer vacation. It always takes about half a day to complete.

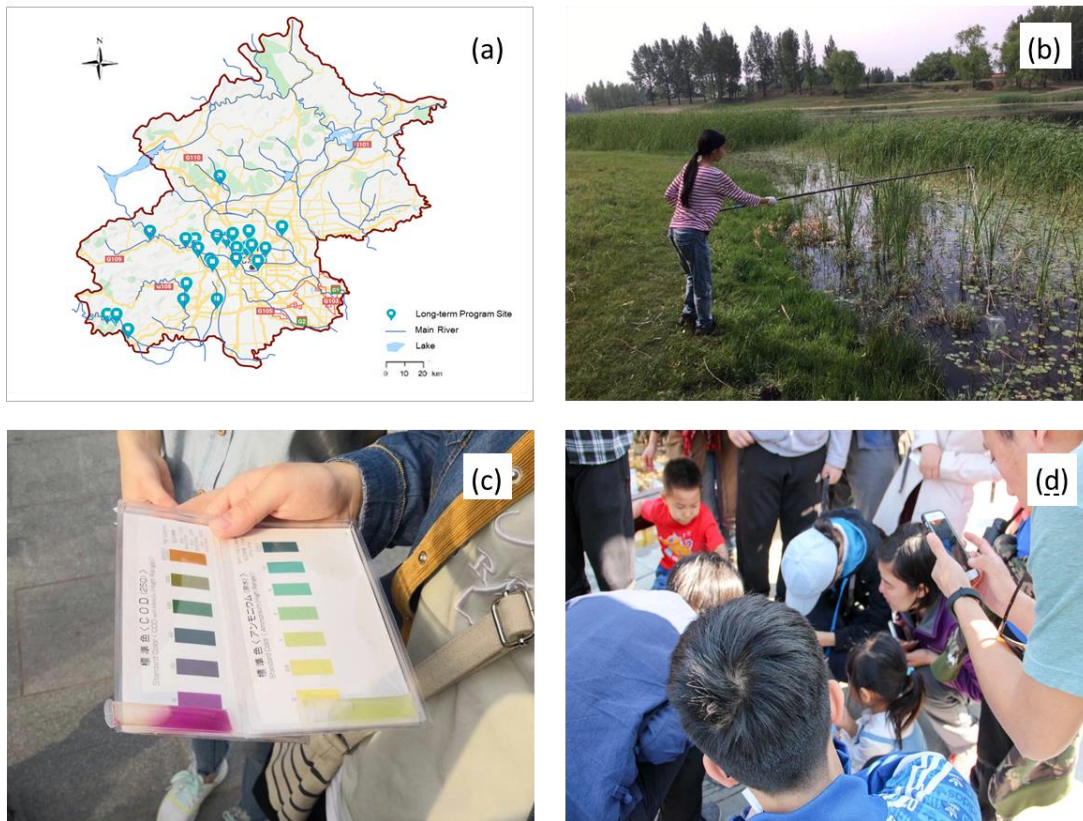


Figure 7, (a) Map of the Chaobai, Yongding, Daqing, Jiyun, and the Beiyun rivers in Beijing indicating PETA Long Term research sites. (b) A volunteer is collecting water samples with a rope tied bottle, (c) Volunteers use a testing kit to measure COD and ammonium of water samples, (d) Passed-by visitors in the park are attracted by the content of the program and take pictures.

2.1.3. Natural Areas Assessments

A. HRWC Natural Areas Field Assessments

In this program, volunteers work in the field for three to four hours to observe a site and complete an assessment form. They provide basic information for HRWC to score and release a site report to the community and other participating partners. HRWC members also use the results of the Natural Areas Field Assessment program to create a Bioreserve Map of the Huron River watershed's natural areas (<https://www.hrwc.org/wp-content/uploads/2009/10/huron-river-bioreserve-map.pdf>).

Volunteers need to attend a half-day training session to get familiar with the assessment form and some typical habitat types and plants. The form was designed by HRWC personnel. HRWC adapted the method from assessments designed by experts Michigan Natural Features Inventory (MNFI) and made it more accessible for volunteers. The form lists various descriptions of the habitats, volunteers only need to select the one that best fits the actual condition. Volunteers who already had plant identification knowledge, and have credentials can skip the training. Volunteers pick dates and sign for the activities through Google Calendar. A few days before the event, the volunteers will receive maps, evaluation forms, and other documents they need via email, then they can arrange transportation out to the site by themselves. There are usually three people in one group: a team leader, an expert, and a recorder. The leader is responsible for controlling time and taking care of the group members, the expert identifies all the plants, the recorder fills the form and this is usually the position for new volunteers.

At the site, following the guide and map provided by HRWC, volunteers walk through the area to identify all the ecological community types (grasslands, forests, wetlands, and aquatic habitats) in the area and fill the assessment form for each community. The form generally includes hydrology conditions, soil conditions, vegetation structure and coverage, native and invasive species, human disturbance, etc. Throughout the process, the volunteer group needs to bring a camera to take photos for indicative scenes and unrecognized plants. In the end, the volunteers send back their forms and photos to HRWC who will score and release the report.

The data from the Natural Areas Field Assessment program are used to help local landowners, conservancies, state and county agencies to manage and maintain their natural areas prioritizing limited funding to preserve the best areas first. The result also provides conservation planning and GIS support for Southeast MI and Livingston conservancies. Up to now, over 200 volunteers have been trained, and they have assessed over 300 properties.

B. PETA Habitat Field Work

In this program, volunteers go to the suburbs of Beijing to monitor habitat conditions. The data and results provide information for the Beijing Water Ecological Database of the Changping District Science and Technology Commission of Beijing. PETA also created species illustrations in the Beijing River System that is posted on their WeChat public account.

The volunteers need to participate in a half-day training session. The session consists of presentations by experts from the Changping District Science and Technology Commission. Volunteers learn about various aspects of the Beijing river system, including their history and current status, the importance of river-wetland ecosystems, the relationship between rivers and people's daily lives, and basic botany and zoology concepts.

On the day of the event, two or more PETA personnel lead the volunteers to head for the natural areas in the countryside of Beijing to conduct biodiversity and ecosystem surveys, including observation and identification of plant species, animals (birds, insects, etc.), rivers' conditions, and human disturbance. When there are ten or more volunteers, they will be divided into small groups to observe and record the status of vegetation, rivers, birds, insects separately. The record form used during the monitoring was designed under the guidance of the Changping District Science and Technology Commission. Volunteers only need to tick the options and write down the species name. PETA personnel and experienced volunteers will identify species and introduce the identification knowledge to new volunteers. They also take photos of the indicative scenes and all species they meet. After the event, PETA will summarize the results and publish them on their public

account.

PETA's habitat assessment has not yet reached the level of the HRWC assessment, so personnel do not conduct the follow-up scoring and reporting part. This program helps volunteers to understand the status and importance of river ecosystems, and at the same time, it provides information for PETA and their partners' assessment of Beijing's water system and surrounding environments. This program is held about once a month, from March to May. About ten volunteers sign up for each event.

2.1.4. Environmental Education Programs

A. HRWC education program

In this program, volunteers can participate in K-12 educational activities at the stream-side. HRWC offers this program to engage K-12 students in learning about water quality and protecting the Huron River watershed. Volunteers use hands-on, small group activities to teach about water quality testing and provide information about issues that impact streams and specific actions that families can take to protect the Huron River.

Volunteers participating in the program receive training on teaching content required to run the activities from HRWC and some experienced volunteers. The training is mostly hands-on activity. Volunteers get the outline of teaching content, then experience all the hands-on activities together. They also give teaching demonstrations to each other, practicing their skills in how to engage with students of different ages and leading discussion (Figure 8a).

After the training, volunteers sign up to participate in the education activities in areas and times according to their availability and means of transportation. Volunteers are divided into groups and receive an email notification, each group is responsible for one specific activity topic, so they can practice more targeted. Each group usually has two volunteers, combining new and old. When there aren't enough volunteers, some activities only have one volunteer in charge. If volunteers want to change groups or teach different activities each time, their requests will be considered to the extent possible.

On the program day, HRWC personnel and volunteers set up experiment stations before

the students' arrival (Figure 8 d). Each experiment station has their own equipment and display boards designed by HRWC (Figure 8 b, c). Students are separated into small groups of four to eight people and assigned to stations staffed by a volunteer. Volunteers work with each group in timed increments. HRWC supplies worksheets for students to fill out at each station. The school teachers can interact with each group or assist as they see fit. The program will last for half-day or longer, a lunch break is scheduled for longer sessions. Volunteers need to arrange transportation and lunch by themselves, but HRWC will provide some snacks. Every time after the event, all volunteers meet together to share experience and feelings.

This program is offered twice a year in the fall (September/October) and spring (April/May) during the school day. Volunteers are expected to commit the event at least three times. The number of volunteers fluctuates every year, ranging from about ten to more than twenty people. More volunteers means that there can be more groups, the number of students in each group will be less, so students can have more hands-on and discussion opportunities.

The main teaching activities/topics include the following (Most schools select two to five activities for the day):

1. **Benthic Macroinvertebrates:** HRWC education volunteers collect materials from the stream before the activity. Then volunteers lead students to pick, sort, and identify insect early stages and other small organisms. There are also display boards at the experimental station showing various benthic macroinvertebrates. Volunteers can use them to complementary introduce some typical species that can tell the water quality, but not have been found during the activity (Figure 8e).
2. **Conductivity:** Using conductivity meters, students measure the conductivity of local water samples.
3. **Dissolved Oxygen:** Students use chemical indicator tests to measure the amount of dissolved oxygen in water samples. Best for secondary students.
4. **PH:** Students use a pH kit to measure the pH of water samples.
5. **Stream Discharge:** Some students enter the stream and measure stream speed across a transect, and then calculate discharge. Best for secondary students.

6. Stream Erosion: Volunteers lead students to lay sand on metal tracks to simulate river channels and pour water to simulate the streamflow. By adjusting slope, water volume, etc., students can see how variables of slope, amount and pulse affect erosion.
7. Stream Speed: Students measure the speed of the stream. Volunteers set two small flags for a certain distance along the river bank as start point and end point. The starting point can also be chosen on a bridge. Then volunteers organize the students to be responsible for different tasks. A student drops a branch at the start point, a student starts timing, and another student at the end point waits for the branch float to reach there, then stops the timing. They repeat the process three times and calculate the average speed of the stream.
8. Streams as Homes: Volunteers lead students to the riverside to observe and discuss the variety of habitats in the stream. They also use display boards with various habitats photos as a supplement to on-site observations and introduce relevant knowledge.
9. Temperature: Students use alcohol thermometers to measure the temperature of the water.
10. Turbidity: Students use a turbidity tube to measure the relative amount of sediment in the stream.



Figure 8, (a) A group of volunteers is practicing using the turbidity tube and the teaching process. (b) Display board used in the “Streams as Homes” topic. (c) Information sheet used to identify benthic macroinvertebrates. (d) The education experiment station in Island Park, set by HRWC volunteers. (e) Students from a local primary school are picking and identifying benthic macroinvertebrates under the guidance of volunteers.

B. PETA Education Program

In this program, volunteers will go to the classroom and teach environmental protection topics to K-12 students. This program helps to engage K-12 students to learn and discuss issues related to environmental protection in Beijing, especially for river protection. PETA hopes this program can draw more attention from K-12 students towards environmental issues, and even influence their families to help protect the environment of Beijing.

Volunteers need to attend a half-day training session to learn the content of what they are going to teach and how to organize the discussion (Figure 9a). PETA personnel give demonstration lectures of all topics and provide lecture slides, outlines, and notes. A large

number of volunteers of this program are from local colleges or environmental protection clubs. PETA contacts and provides training to the club leaders, after that, the leaders can train their club members who want to participate (Figure 9b).

On the day of the event, volunteers usually go to the class in pairs. One volunteer is responsible for presenting the lectures, and the other mainly for helping to maintain discipline; they can take turns in the roles. Considering safety and school requirements, volunteers will not lead students to go out of the school campus. They can show students how volunteers and scientists conduct fieldwork using photos and videos (Figure 9c). When funds allow, PETA will provide some simple props, such as using “water filter column model kit” with granite stones, activated carbon, and quartz sand, to explain the process of water purification (Figure 9d). The school teacher may stay in the classroom providing help or just to listen, but sometimes leaves the class completely to volunteers. At the end of the class, volunteers usually let students express their feelings and learnings by painting a picture or poster, which may be completed in class or left as homework according to available time (Figure 9e).

After each event, volunteers, especially college students, will provide written feedback and thoughts, which will be summarized by PETA and published on their public account. This program is offered twice a year in the fall (October/November) and spring (April/May) during school days. The lectures are generally 40 or 50 minutes depending on the lesson duration in different schools. Volunteers may go to two or more classes, so the program will last about 2 hours each time.

The main topics in the education program include the following:

1. Rivers around us: Volunteers introduce basic knowledge about the river ecosystem and the various habitats. The presentations also include videos and photos showing how researchers and volunteers monitor and protect the rivers in Beijing.
2. Life of a drop: Volunteers introduce the journey and circulation of water in the city. The lecture shows the different experiences of water in natural areas and water entering households and factories. Volunteers can use the “science kit” to

- explain the process of water purification when they have.
3. Rivers in Beijing: Volunteers introduce the history of the main rivers in Beijing's five river systems. They use several actual cases to show how they affect and are affected by the development of Beijing.
 4. Heavy metal pollution: This topic is not aimed at rivers, but rather at various environmental problems caused by heavy metal pollution. Nevertheless, heavy metal pollution in water is a major aspect covered.
 5. Let the migratory birds fly: This topic focuses on the wetlands in Beijing that are important habitats for migratory birds. Volunteers introduce the importance of migratory birds and the habitats on which they live.



Figure 9, (a) Volunteers are listening to the demonstration lecture offered by PETA personnel (b) Volunteers from local university clubs are practicing the lectures' content under the leadership of trained club leaders. (c) A volunteer is giving a lecture to primary school students by using slides. (d) Volunteers are using the “water filter column model kit” to show the process of water purification to students in the classroom. (e) A student's painting about wetland plants created after listening to the lecture given by volunteers. (e) Group photo of students and volunteers after the course.

2.2. Research Methods

This study utilizes participation and observation, electronic surveys, and semi-structured

interviews (Abrahamson, 1983) to evaluate the experiences among participants in HRWC and PETA volunteer programs. We developed electronic survey questionnaires for each program to understand the factors that promote volunteer satisfaction, based on experiences obtained during personal participations in the program activities, and on description of the activities on the websites and promotional materials of the two organizations. Then, a semi-structured interview was designed and implemented to further understand perception among volunteers participating in PETA and HRWC programs and to solicit their views on management methods, activity organization, and publicity content used by the organizations. We used the results to propose improvements to the programs towards increasing participant satisfaction and helping the organizations better attract and retain volunteers.

2.2.1. Electronic Survey

The electronic survey questionnaires consist of two parts. The first set of questions is about basic demographic volunteer information such as age and educational background, and specific activities they have joined. The second set of questions is about the number of times the volunteers had participated in a specific program and the factors that brought them most satisfaction from participation. The questions to evaluate satisfaction use a 5-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree). The questions are to explore why volunteers are interested in particular activities and whether these activities met their expectations.

The questions to evaluate satisfaction were articulated based on descriptions available on the organization's websites and promotional materials, and also on conversations with volunteers when participating in the activities. Based on that information we developed a list of options as sources of volunteers' satisfaction for each of the four programs in both organizations. These satisfaction sources were presented into 5 categories with several options which differed depending on the program and organization. The categories are 1) Help the environment, 2) Learn about the environment and acquire sampling skills, 3) Enjoy social interactions and sense of belonging, 4) Engage in recreation, and 5) Satisfy individual needs.

For the Biological River Monitoring programs, specific questions in the helping the environment category (1) included helping protect river habitats, the river and improving environment conditions (Tables 4 and 5). In the acquiring knowledge and skills category (2) questions related to learning about the environment especially about bugs, acquiring new skills to collect/search bugs, and observing nature. Questions among the social interactions category (3) differed a bit between surveys for the two organizations because HRWC emphasized the welcome to families, especially children. Thus, the questions for HWRC volunteers included seeing friends, meeting new people, developing a sense of community and closer relationships with family, as well as helping the organization, and for PETA volunteers we removed the developing relationships about family (Tables 4, 5). The recreation category (4) included questions about trying something new, having fun, connecting with nature, and doing physical activity. The last category about satisfying individual or career needs (5), included questions about experiencing accomplishment, contributing to research, and acquiring a useful experience in education and career goals.

The Water Quality Monitoring programs (HRWC Chemistry and Flow Monitoring and PETA Long-term research) focus on measuring quality of local rivers and streams. Thus, we adapted the questions about bugs to water quality and pollution and measuring flow and collecting water samples (Tables 6, 7). Descriptions of both projects on the websites include that their results can help the management or decision making of the community, so we replaced the option related to family relationships with one related to helping community partners make decisions.

The natural area programs (HRWC Natural Areas Field Assessment and PETA Habitat Field Work) focus on habitat and biodiversity, so we changed the subject focused on bugs to plants, wetland and river, ecological assessments and plant ID (Tables 8, 9).

Descriptions of both projects include an introduction about the protection of natural areas, especially the HRWC mentioned that this activity is to assess the most important natural areas, and helps community preservation programs. Therefore, we replaced the option related to family relationships with one related to community preservation programs. In addition, both organizations encourage volunteers with previous knowledge in natural sciences to join, so we added an option about using previous knowledge in the

category about satisfying individual needs (5).

For the Educational Programs we designed more targeted questions about communication with students and sharing knowledge. We changed the learning about bugs and acquiring skills to collect bugs subject to communication and education, and added a factor about getting along with students within the category about enjoying social interactions (Table 10, 11). Since having relevant knowledge is helpful for participating in the environmental educational programs, the option of using previous knowledge was added to the category about satisfying individual needs.

We added questions to the surveys for HRWC River Roundup and HRWC and PETA education programs volunteers. The HRWC encourages volunteers in the River Roundup project to become leaders or collectors (the person who gets into the water to collect bugs and other objects) after training. So, we also asked whether the respondents were leaders or collectors. In the education project, we wanted to know about the performance of students, so we included relevant questions about student engagement, their attitude toward being outdoors and doing experiments, capacity to learn and remember information, response to questions, ability to develop questions, enjoy and being inspired by the process (Table 12).

We also asked volunteers if they were willing to continue participating in the programs. We listed the following potential reasons in case the answer was negative: i) lack of time, ii) feeling uncomfortable with others during the process, iii) activity content being too easy, iv) activity content being too tiring, v) feeling that participation was not effective, vi) losing interest, vii) finding too few opportunities to learn new things, and viii) other specific reasons.

2.2.2. Interviews

A semi-structured interview was designed to further understand volunteers' perception about participating in PETA and HRWC programs and to solicit their views on management methods, activity organization, and publicity content. At the end of the electronic survey, described in the previous section, there was a question about

willingness to participate in an interview with assurance of anonymity. Invitations were sent to those who provided a positive response. Interviews of PETA volunteers were face-to-face, except for two conducted by phone, while affected by Covid-19, all of the interviews of HRWC volunteers were conducted over the phone. The interviews were completed in 15 to 20 minutes, recorded and transcribed with the consent of the interviewees. During the interview, participants were encouraged to expand the scope of their responses (for example by saying, “Can you tell me more about this?”).

The interview sought to understand:

1. Initial experience of the volunteer participation with PETA/HRWC organizations, focusing on the reasons that attracted them to join, and whether the experience obtained was consistent with expectations and the description provided by the organization.
2. Satisfaction evolution since joining the programs. The questions encouraged interviewees to share experiences that made impressions on them, in particular about interactions with organization personnel, other volunteers, and the public.
3. Suggestions for program improvements, focusing on how to increase volunteer enrollment and retention, and broader ideas for the future of the organization. The questions encouraged interviewees to share their views on the positive aspects, and potential problems, and why they value these aspects.

The interviews followed the following format:

1. Which program have you engaged in?
2. What is your professional background, such as being involved in education, environmental sciences?
3. Can you tell us why you first participated in the activities and what kind of experience did you have?
 - Probes: You mentioned____, could you tell me more about this? Why is this important to you? Could you tell me more about your feelings?
4. How did you know about this organization/ programs?
5. Do you feel that your experience has met expectations given the organization's

description of? (on websites or other sources)?

- Probes: You mentioned____, could you tell me more about this? Why is this important to you?
6. Do you often check the organization website for information, such as for data updates and program accomplishments?
 - Probes: Can you talk about the information you have obtained?
 7. How have your feelings about the programs changed since you have been involved in?
 - Probes: You mentioned____, could you tell me more about this? Why is this important to you?
 8. If the organization wants to attract and retain more volunteers like you, what do you think needs to do or improve?
 - Probes: You mentioned____, why was it important for you to mention this? Do you see any of those issues come up with you or your friends?
 9. Do you have any other comments or suggestions for this organization? not only about volunteer recruitment.
 10. Is there anything else you would like to add? Do you have any questions for me?

2.3. Survey distribution

The electronic surveys were sent to all participants in the PETA and HRWC volunteer programs between 2017 and 2020. The surveys were distributed with a letter explaining our research interest in exploring and evaluating the organization and content of volunteer activities. PETA's electronic survey was distributed by Xue Wang, the founder of PETA, and HRWC's was sent by their stewardship coordinator, Jason Frenzel.

The contact methods for conducting the survey differed between organizations due to consideration of different cultural preferences in the USA and China. The HRWC survey in Ann Arbor was sent by email to 1100 volunteers, and 127 surveys were completed by volunteers that had participated in the programs included in this study (12% response

rate). The PETA survey was sent to 264 volunteers as a link of the electronic questionnaires through social software: WeChat. There were 165 surveys completed (63% response rate).

2.4. Data Analysis

Electronic Survey: The demographics data were summarized and graphed. We calculated the average score of each factor that brought volunteers satisfaction in each organization. We also calculated the score of “senior volunteers”, and compared with the overall average score of all participants. “Senior volunteers” are volunteers who participated in the Biological River Monitoring, Water Quality Monitoring, and Environmental Education Programs more than 5 times and in the Natural Areas Field Assessment more than 3 times, due to the low frequency of the project.

Personal interviews: The recordings of the interview were transcribed. The Chinese transcripts of the PETA interview were translated into English. Responses were manually coded to identify the major themes in the volunteers' responses. Results were compared to identify differences amongst them and lessons to be learned.

3. Results

3.1. Demographics

3.1.1. Age of Participants

The mean age of HRWC survey respondents irrespective of the program was 50 years old. The number of respondents older than age 55 was significantly higher than that of other age groups (Figure 10a). The mean age of PETA respondents was 33 years old. Compared to HRWC, the number of respondents younger than 25 was significantly higher than that of other age groups (Figure 10b).

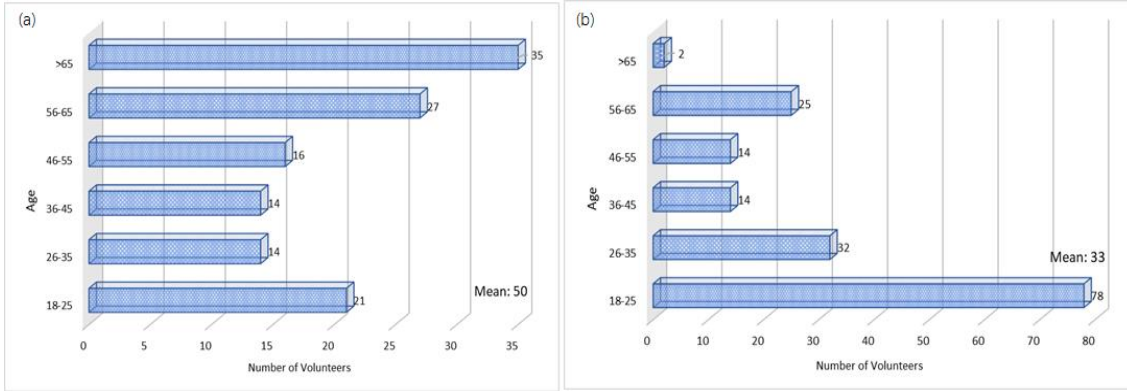


Figure 10. Age distribution of HRWC (n_a=127) and PETA (n_b=165) survey respondents.

Among survey respondents in the HRWC programs, the mean age of participants in the River Roundup program was lower than in the other programs (Table 3). Among survey respondents in PETA programs, there was little difference in the mean age among the four programs.

Table 3. The mean age of survey participants in each program

Program Name	River Round up	Chemistry and Flow Monitoring	Natural Area Field Assessments	Education Program
Mean Age	48	56	57	60
Program Name	Short Term Field Trip	Long-term Research Program	Habitat Field Work	Education Program
Mean Age	33	36	37	30

3.1.2. Years of Participation

Volunteers involved in HRWC programs for only one year or less accounted for 25% of the respondents, those involved for two and three years were fewer and accounted for about 15%, while the highest percentage (32%) were involved for more than five years (Figure 11a). It's worth noting that 68% of those who joined for more than five years had actually participated for 10 years or more. The number of volunteers returning was very stable and valuable and constituted a solid part of the HRWC volunteer.

PETA has only been established for 5 years and the number of respondents initially involved was small (14), but increase in the numbers is very stable (Figure 11b).

Volunteers who had participated for one year or less accounted for almost half of the respondents.

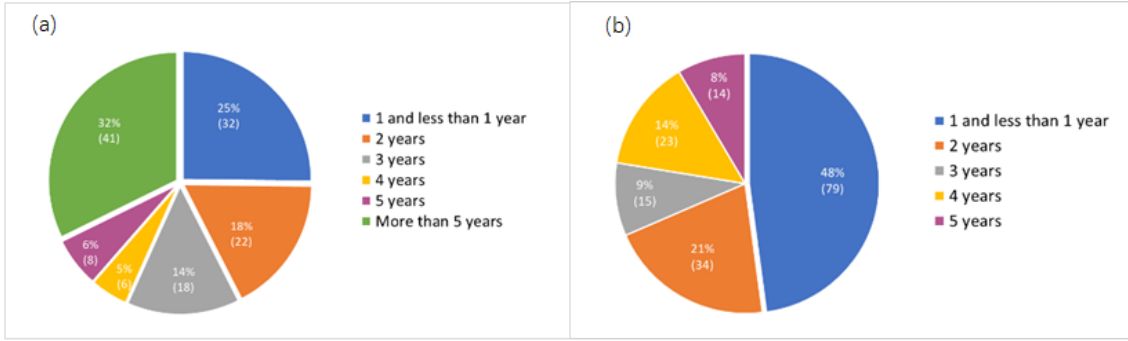


Figure 11. Participation Years of HRWC (n_a=127) and PETA (n_b=165) volunteers

The years in participation by HRWC programs varied. In the River Roundup and Chemistry and Flow Monitoring programs, nearly a quarter of the volunteers had participated for one year or less, between 12 and 16% for two, <10% for three and four years, and the highest percentage, between 35 and 40% had participated for five years or more (Figure 12a, b). Natural Area Field Assessments and Education Program had more experienced volunteers, the proportion of volunteers who had participated for more than five years accounted for >65% (Figure 12 c, d).

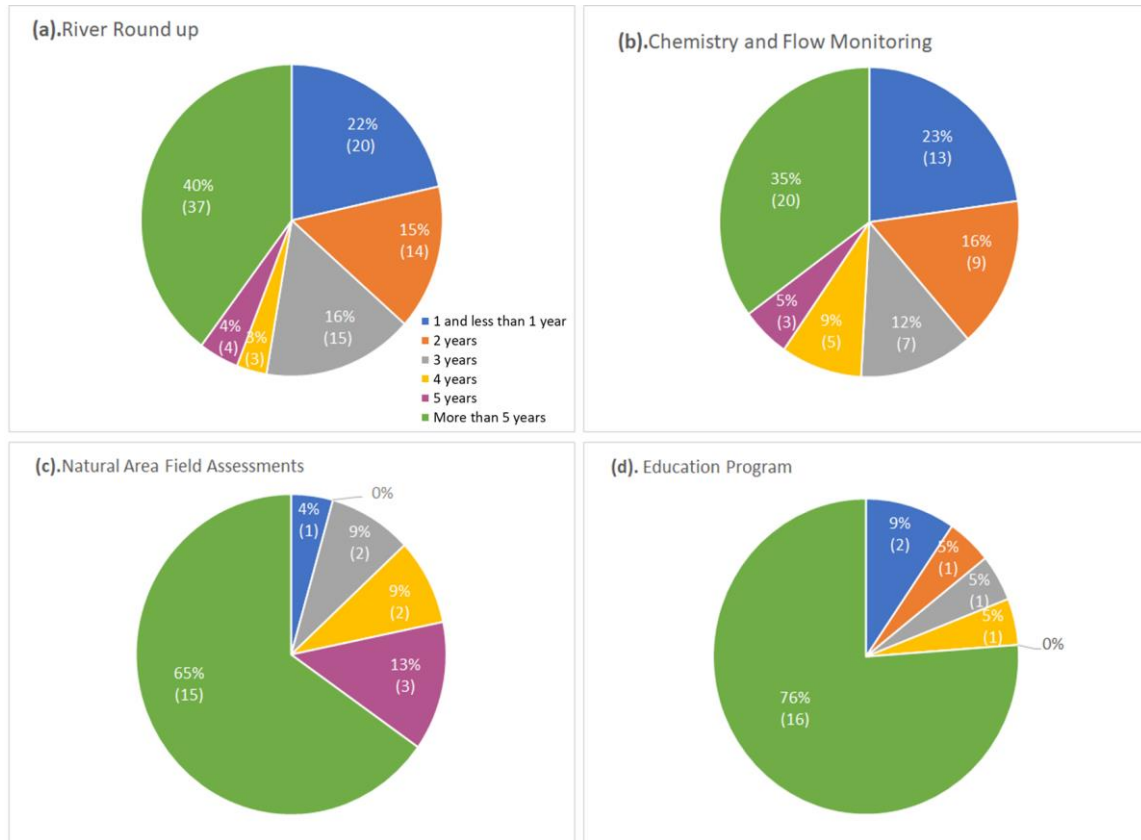


Figure 12. Participants years of volunteer experience in HRWC programs.

In PETA programs, only 14 people had participated for 5 years (Figure 11), and these volunteers participated in almost all projects (Figure 13). In the Short Term Field Trip and Long Term Research programs, nearly half of the volunteers had participated for one year or less (Figure 13a, b), about 20% for two, between 9 and 13% for three to five years. In the Habitat Field Work, about 30% of the volunteers had participated for two or one year or less, between 10 and 15% had participated for three to five years (Figure 13c). In the Education Program, 33% of the volunteers had participated for one year or less, between 13 and 16% had participated for two to four years, 25% had participated for five years (Figure 13d).

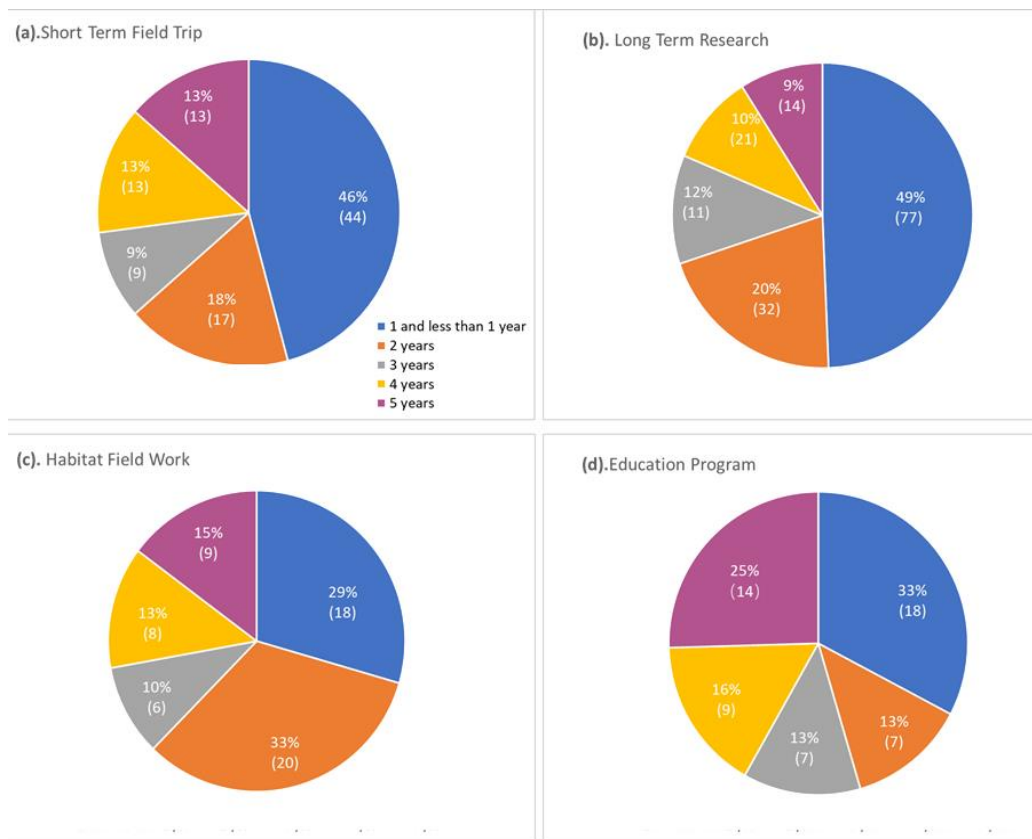


Figure 13. Participants years of volunteer experience in PETA programs.

3.1.3. Background of Participants

About half of the respondents in both organizations had a background in environmental sciences and education (Figure 14). While the proportion of volunteers with educational backgrounds in the two organizations was similar (13%), a higher proportion of PETA than HRWC volunteers had only environmental science backgrounds (38%), and a higher

proportion of HRWC volunteers had both educational and environmental backgrounds (which is related to their age).

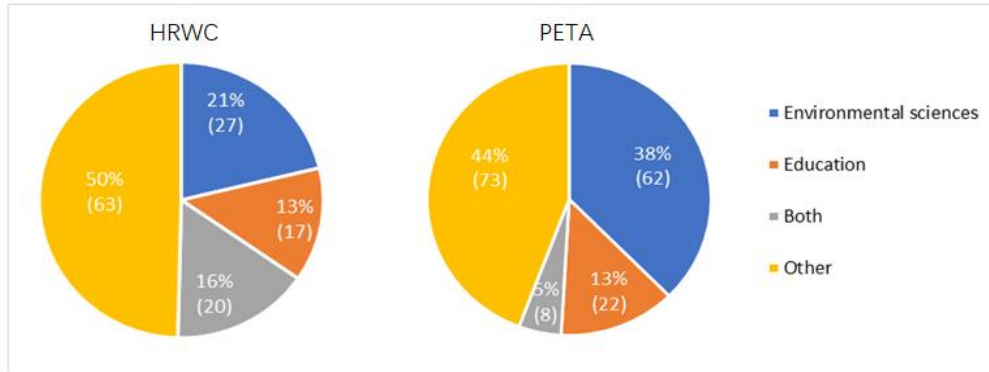


Figure 14. Background of HRWC and PETA volunteers.

The respondents' background differed among the four HRWC programs (Figure 15). The proportion of volunteers with an environmental science and education background in the River Roundup, Natural Area Field Assessments and the educational programs exceeded 50% (Figure 15a), while over half of the volunteers in the Chemistry and Flow Monitoring did not have environmental science or education backgrounds (Figure 15b).

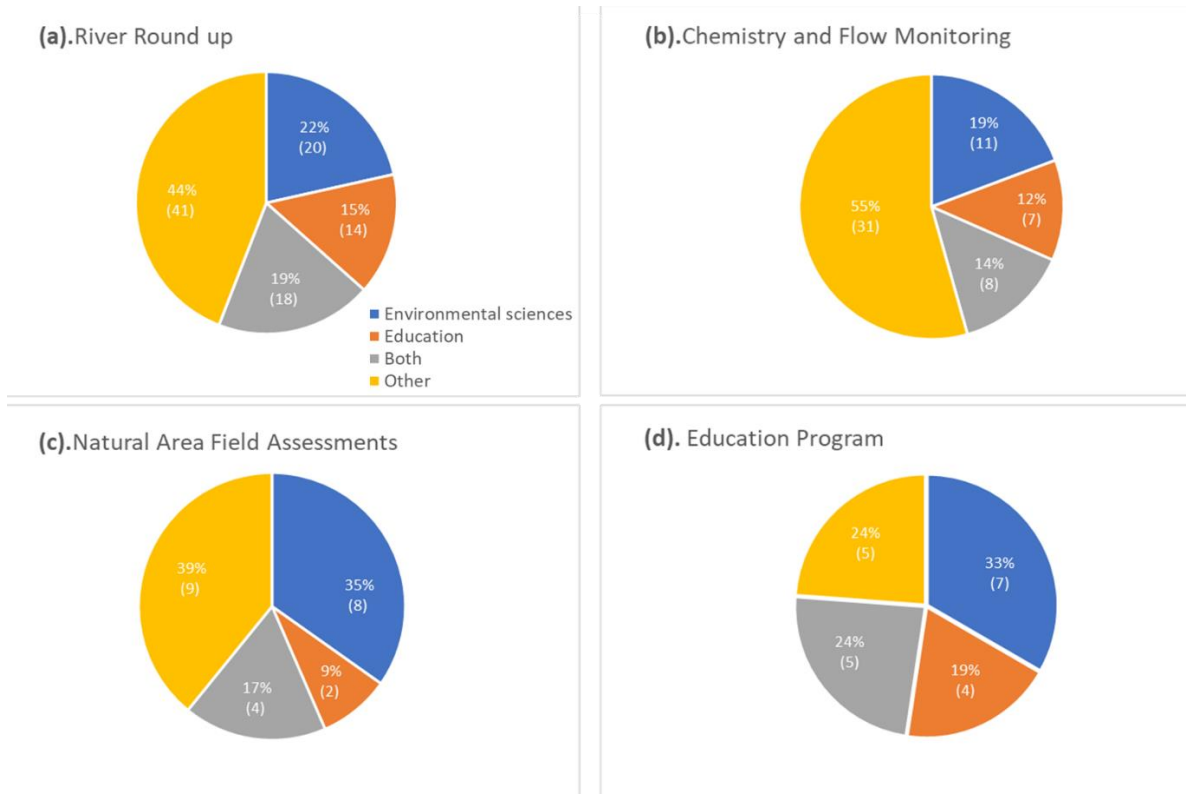


Figure 15. Educational background of volunteers in HRWC programs

In PETA, the respondents' background among programs differed slightly (Figure 16). The Long-Term Research had the highest proportion (47%) of volunteers without environmental science or education background (Figure 16b) while the Educational Program had the lowest with only 29% (Figure 16d).

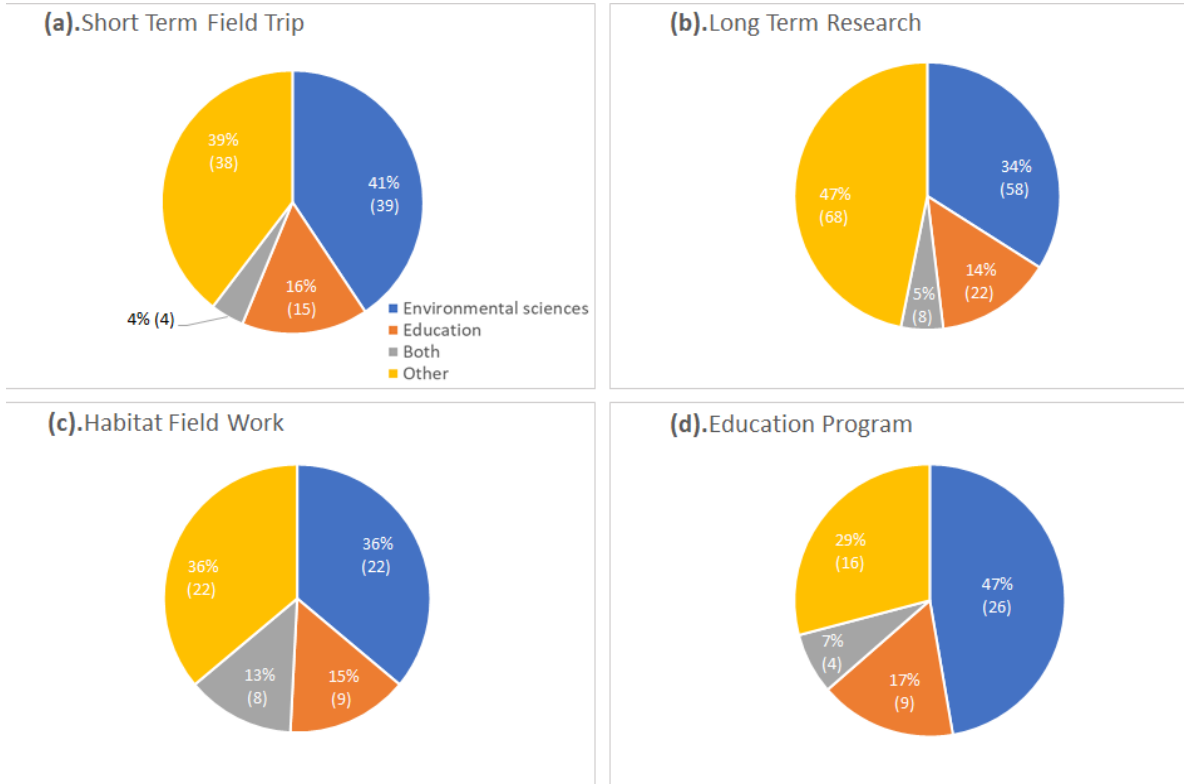


Figure 16. Educational background of volunteers in PETA programs

3.2. Volunteer Satisfaction

3.2.1. Biological River Monitoring

In the HRWC River Roundup program, the average score for volunteer satisfaction was highest among the “Helping the Environment” category (4.7 over a maximum of 5). All factors scored high (>4.5), and contributing to river protection brought volunteers the most satisfaction (Table 4). In the “Learning” category, “Observe nature” and “Learn more about bugs” scored the highest (4.5 and 4.4 respectively); “Acquiring specific skills” scored lower. Among the “Social” category, the highest score was for “Help HRWC” (4.5), which was a great affirmation, and the lowest score was for “Develop closer relationships with family” (3). Among the “Recreation” category, the scores for “Connection with nature” (4.5), and for “Have fun” (4.3) were the highest. Finally, among the “Individual” category, the highest score was for “Contribute to research” (4.6), and the lowest score was for “Useful experience in education or career goals” (3.4). When considering the responses of volunteers who had participated in the River Roundup program five times or more, scores were similar. The score of “See Friends” was higher, as volunteers develop deeper relationships between each other and HRWC personnel; scores for “Useful experience in education and/or career goals” were lower, as older volunteers might pay less attention to these aspects.

Table 4. The factors that brought volunteers most satisfaction in the HWRC River Roundup Program

Factors	Mean score of all River Roundup volunteers	Mean score of volunteers who joined 5 times or more
Helping the Environment: altruism, focus on environment	4.7	4.6
Help to protect river habitats	4.7*	4.6*
Protect the Huron River	4.7*	4.6*
Help to improve environment conditions	4.6*	4.5*
Learning: learn knowledge and skills	4.3	4.3
Learn more about the environment (especially about bugs)	4.4	4.4
Acquire new skills to collect/search bugs	3.9	3.9
Observe nature	4.5*	4.4
Social: focus on social interactions, sense of belonging	3.7	3.8
See friends	3.3	3.6
Meet new people	3.6	3.7
Develop a sense of community	3.9	3.9
Develop closer relationship with family	3.0	3.1
Help HRWC	4.5*	4.6*
Recreation: get relaxation and happiness in nature	4.1	4.1
Try something new	3.9	3.8
Have fun	4.3	4.3
Connection with nature	4.5*	4.4
Do physical activity	3.9	3.8
Individual: Personal pride feelings and needs	4.1	4.0
Sense of accomplishment	4.2	4.2
Contribute to research	4.6*	4.5*
Useful experience in education and/or career goals	3.4	3.2

*Scores above 4.5, respondents who have participated five times or more (n=34) all respondents (n=93).

In the PETA's Short Term Field Trip program, among factors that brought satisfaction to volunteers in the “Helping the Environment”, “Recreation” and “Learning” categories also got high scores (4.5, 4.5 and 4.4 s respectively) (Table 5). Among the “Learning” category, the scores about observing nature and learning more about bugs reached 4.5. Among the “Social” category, the highest score was for helping PETA (4.4), which was a great affirmation. The scores for meeting new people were also high (4.3), and for seeing friends and developing a sense of community were lower. Among the “Recreation”

category, the highest scores were for having fun (4.8), and connecting with nature (4.6). Among the “Individual” category, the highest score was for having a sense of accomplishment (4.4). When only considering the responses of those who had participated five times or more, scores were similar, although those for protecting the Beijing River system were higher and about useful experience in education and career goals were lower.

Table 5. The factors that brought volunteers most satisfaction in the PETA Short Term Field Trip Project

Factors	Mean score of all Short Term Field Trip volunteers	Mean score of volunteers who joined 5 times or more
Helping the Environment: altruism, focus on environment	4.5	4.6
Help to protect river habitats	4.7*	4.8*
Protect the Beijing River System	4.5*	4.7*
Help to improve environment conditions	4.3	4.5*
Learning: learn knowledge and skills	4.4	4.3
Learn more about the environment (especially about bugs)	4.5*	4.4
Acquire new skills to collect/search bugs	4.1	4.0
Observe nature	4.5*	4.5*
Social: focus on social interactions, sense of belonging	3.9	4.0
See friends	3.4	3.4
Meet new people	4.3	4.3
Develop a sense of community	3.6	3.7
Help PETA	4.4	4.4
Recreation: get relaxation and happiness in nature	4.5	4.5
Try something new	4.4	4.3
Have fun	4.8*	4.8*
Connection with nature	4.6*	4.8*
Do physical activity	4.0	3.9
Individual: Personal pride feelings and needs	4.0	3.9
Sense of accomplishment	4.4	4.3
Contribute to research	4.3	4.4
Useful experience in education and/or career goals	3.3	3.0

*Scores above 4.5, respondents who have participated five times or more (n=28) all respondents (n=96).

When comparing the results of the two organizations, protecting the environment and learning were the most important aspects of both programs that brought satisfaction to volunteers. While respondents in neither organization paid much attention to social issues, PETA respondents scored higher in "Meet new people". PETA respondents also gave higher scores to recreation. The scores in the "Individual" category were similar.

An encouraging result was that 71% of the HRWC respondents and 67% of the PETA respondents said they would continue to participate in the programs (Figure 17). HRWC volunteers not willing to continue to participate or with some hesitations, indicated they did not have time, felt that participation was not effective and were not interested anymore; among specific reasons, being too old was the most common. PETA volunteers often skipped the explanation and those who responded indicated they did not have time, the activity content was too easy, and that there are few opportunities to learn new things. The most common specific reasons for not continuing participation was leaving the city, among others because of graduation.

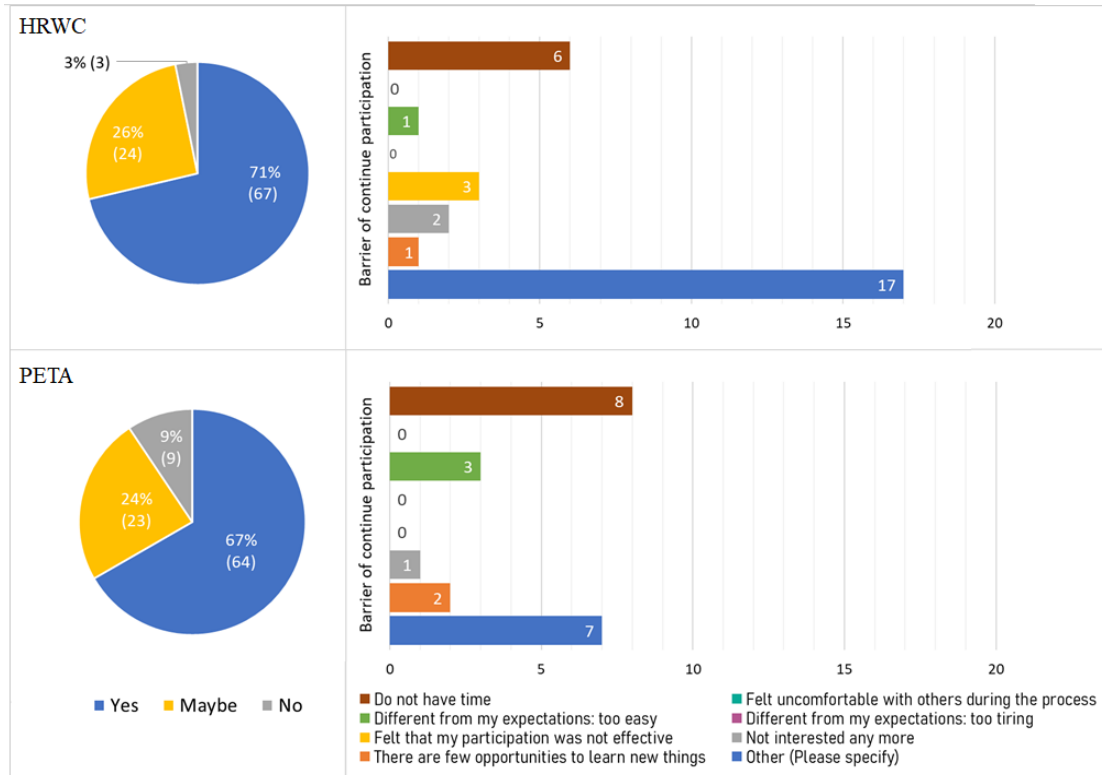


Figure 17. Left: Willingness to continue participating. Right: Reasons for reluctance to continue participating

3.2.2. Water Quality Monitoring

In HRWC's Water Quality Monitoring program: Chemistry and Flow Monitoring, similar to River Roundup, all factors in the "Helping the Environment" category scored high (>4.5) (Table 6). In the "Learning" category, "Learn more about water quality and pollution" score reached 4.5 and "Observe nature" also scored high (4.4). Among the "Social" category, the highest score was to help HRWC (4.5), which affirmed the work of HRWC, and all other factors scored lower than 4.0. In the "Recreation" category, no factor reached 4.5 and "Try something new" and "Connection with nature" had the highest scores (4.2). In the "Individual" category, the highest score was for "Contribute to research" (4.5) suggesting that volunteers pay great attention to whether their work is valued and is meaningful for doing science. The scores of volunteers who participated in Chemistry and Flow Monitoring 5 times or more were similar, except that scores of "Try something new" were lower, as volunteers were familiar with the program content; scores of "Develop a sense of community" and "Help community partners making decisions" were higher.

Table 6. The factors that brought volunteers most satisfaction in HRWC Chemistry and Flow Monitoring

Factors	Mean score of all Chemistry and Flow Monitoring volunteers	Mean score of volunteers who joined 5 times or more
Helping the Environment	4.7	4.7
Help to protect river habitats	4.7*	4.8*
Protect the Huron River	4.7*	4.7*
Help to improve environment conditions	4.6*	4.6*
Learning:	4.3	4.3
Learn more about water quality and pollution	4.5*	4.4
Acquire new skills to measure flow and collect water sample	4.1	4.0
Observe nature	4.4	4.4
Social:	3.8	3.9
See friends	3.3	3.4
Meet new people	3.7	3.7
Develop a sense of community	3.8	4.1
Help community partners making decision	3.8	4.0
Help HRWC	4.5*	4.7*
Recreation:	4.0	4.0
Try something new	4.2	3.9
Have fun	4.0	4.1
Connection with nature	4.2	4.3
Do physical activity	3.7	3.7
Individual:	4.0	4.0
Sense of accomplishment	4.1	4.2
Contribute to research	4.5*	4.5*
Useful experience in education and/or career goals	3.2	3.2
Satisfaction of contributing to a big project	4.0	4.1

*Scores above 4.5, respondents who have participated five times or more (n=27) all respondents (n=57)

In PETA's Long-term Research, the mean score of the "Helping the Environment" category was relatively high (4.3). The score for "Help to improve environment conditions" reached 4.5 (Table 7). In the "Learning" category, "Observe nature" scored 4.8, while acquiring specific skills scored lower (3.4). Among the "Social" category, highest scores were to help PETA and meet new people (4.3) while all other factors had scores ≤ 3.6 . In the "Recreation" category, "Have fun" and "Connection with nature" had

very high scores (4.7 and 4.8). In the “Individual” category, a sense of accomplishment brought most satisfaction (4.8). The scores among volunteers who participated in the Long Term Research program 5 times or more, were higher for “Help to improve environment conditions”. Scores for “Acquire new skills to measure flow and collect water samples”, “Try something new”, “Have fun” and “Develop a sense of community” were lower while the score for “Help community partners making decisions” was higher.

Table 7. The factors that brought volunteers most satisfaction in PETA Long Term Research program

Factors	Mean score of all Long Term Research volunteers	Mean score of volunteers who joined 5 times or more
Helping the Environment	4.3	4.4
Help to protect river habitats	4.4	4.4
Protect the Beijing River System	4.1	4.0
Help to improve environment conditions	4.5*	4.7*
Learning:	4.1	4.0
Learn more about water quality and pollution	4.2	4.1
Acquire new skills to measure flow and collect water sample	3.4	3.0
Observe nature	4.8*	4.8*
Social:	3.8	3.8
See friends	3.4	3.4
Meet new people	4.3	4.2
Develop a sense of community	3.6	3.2
Help community partners making decision	3.3	3.7
Help PETA	4.3	4.5*
Recreation:	4.4	4.3
Try something new	4.0	3.8
Have fun	4.7*	4.5*
Connection with nature	4.8*	4.7*
Do physical activity	4.1	4.2
Individual:	4.2	4.3
Sense of accomplishment	4.8*	4.8*
Contribute to research	4.3	4.4
Useful experience in education and/or career goals	3.5	3.8
Satisfaction of contributing to a big project	4.1	4.2

*Scores above 4.5, respondents who have participated five times or more (n=60) all respondents (n=156)

The willingness of volunteers to continue participating in the Water quality programs was 42% among HRWC and 62% among PETA respondents (Figure 18). HRWC volunteers not willing to continue participating or who had some hesitation, indicated they did not have time, felt that participation was not effective, and that there were few opportunities to learn more. Among those who offered specific reasons, physical limitation was a common answer. Respondents also mentioned the lack of feedback reduced their enthusiasm. Among PETA, respondents' unwillingness of participating or having hesitations was because of few opportunities to learn more, not having time and loss of interest. Among respondents who offered specific reasons (7), the most common one was leaving the city and others mentioned that there were too many volunteers in their group, resulting in the lack of materials and hands-on experience.

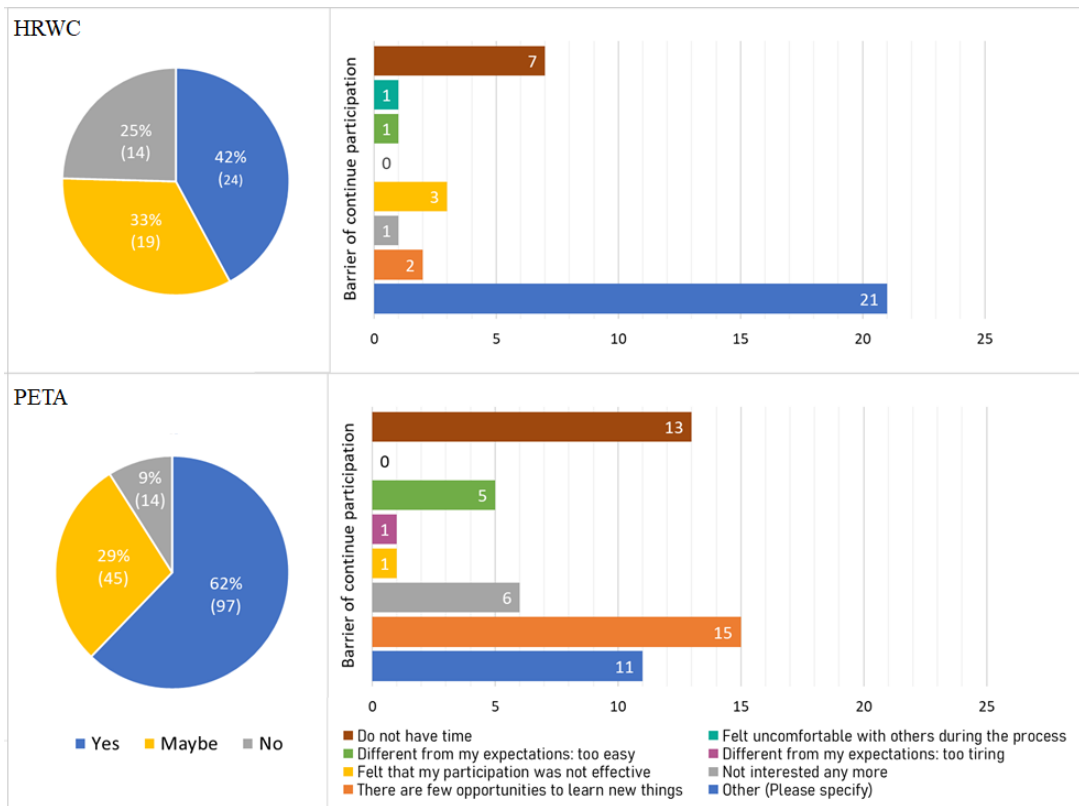


Figure 18. Continue participation: Left: Distribution of willingness to continue participating. Right: Reasons for reluctance to continue participating

3.2.3. Natural Areas Assessments

In the HRWC Natural Areas Field Assessment program, unlike the previous two activities, scores in the “Helping the environment” category reached 4.5 (Table 8). The average score was highest among the “Learning” category (4.4). The “Learn about plants, wetland and river” and “Observe nature” factors scored the highest (4.5 and 4.4), this was consistent with the publicity material emphasis on learning about local natural areas and plants. Among the “Social” category, the scores for “Help HRWC” (4.5) and “Help community preservation programs” (4.3) were highest, as the respondents felt satisfied as they realized their effort would help and promote community preservation programs. Among the “Recreation” category, factors did not reach 4.5 and “Connection with nature” had the highest score (4.2). Also, among the “Individual” category, scores did not reach 4.5. The highest score was for “Contribute to research” (4.4), as volunteers paid great attention to whether their work was valued and meaningful for doing science. Scores generally were higher when considering the responses of volunteers who had participated three times or more (Table 8); the scores of “Protect Huron” and “See Friends” increased to 4.5, “Help community preservation programs” increased to 4.7. The score of “Connection with nature”, “Sense of accomplishment” and “Contribute to research” also increased. The largest increase was for “Use my previous knowledge” (3.6 to 4.1).

Table 8. The factors that brought volunteers most satisfaction in HRWC Natural Area Field Assessments

Factors	Mean score of Natural Area Field Assessments	Mean score of volunteers who joined 3 times or more
	volunteers	more
Helping the Environment:	4.3	4.4
Help to protect river habitats	4.3	4.4
Protect the Huron River	4.3	4.5*
Help to improve environment conditions	4.3	4.4
Learning:	4.4	4.4
Learn about plants, wetland and river	4.5*	4.5*
Acquire new skills to conduct ecological assessment	4.1	4.2
Observe nature	4.4	4.5*
Social:	4.0	4.0
See friends	3.3	3.6
Meet new people	3.7	3.6
Develop a sense of community	3.8	3.6
Help community preservation programs	4.3	4.7*
Help HRWC	4.7*	4.6*
Recreation:	4.0	4.2
Try something new	4.1	4.2
Have fun	4.0	3.9
Connection with nature	4.2	4.5*
Do physical activity	3.8	4.1
Individual:	3.8	4.0
Sense of accomplishment	4.0	4.2
Contribute to research	4.4	4.6*
Useful experience in education and/or career goals	3.2	3.2
Use my previous knowledge	3.6	4.1

*Scores above 4.5, respondents who have participated three times or more (n=10) all respondents (n=23)

In PETA's Habitat Field Work, the highest score among the “Helping the Environment” category was “Help to improve environment conditions” (4.6) (Table 9). In the “Learning” category, similar to HRWC, the “Observe nature” and “Learn more about bugs” options scored the highest (4.7 and 4.6 respectively). Among the “Social” category, the highest score was for “Help PETA” (4.4), followed by “Help community preservation programs” (4.3). Among the “Recreation” category, scores for “Connection with nature” and “Have fun” were the highest (4.4). Among the “Individual” category, the highest

score was for “Sense of accomplishment” (4.7), as the pride of volunteers is an important source of satisfaction. When only considering the responses of volunteers who had participated in the Habitat Field Work three times or more, the scores of “Help community preservation programs” increased to 4.7, as volunteers got a better understanding of the meaning and effect of this program. The score of “Have fun” increased from 4.4 to 4.8 while the score of “Useful experience in education and career goals” declined.

Table 9. The factors that brought volunteers most satisfaction in PETA Habitat Field Work

Factors	Mean score of all Habitat Field Work volunteers	Mean score of volunteers who joined 3 times or more
Helping the Environment	4.3	4.4
Help to protect river habitats	4.1	4.3
Protect the Beijing River System	4.3	4.5*
Help to improve environment conditions	4.6*	4.5*
Learning:	4.5	4.5
Learn about plants, wetland and river	4.6*	4.6*
Acquire new skills to conduct ecological assessments	4.1	4.2
Observe nature	4.7*	4.7*
Social:	3.9	4.1
See friends	3.6	3.8
Meet new people	4.0	4.1
Develop a sense of community	3.4	3.3
Help community preservation programs	4.3	4.7*
Help PETA	4.4	4.6*
Recreation:	4.2	4.3
Try something new	4.2	4.2
Have fun	4.4	4.8*
Connection with nature	4.4	4.5*
Do physical activity	3.8	3.7
Individual:	4.1	4.1
Sense of accomplishment	4.7*	4.8*
Contribute to research	4.0	4.0
Useful experience in education and/or career goals	3.6	3.2
Use my previous knowledge	4.2	4.4

*Scores above 4.5, respondents who have participated three times or more (n=16) all respondents (n=61)

Among HRWC respondents, 26% were willing to continue participating in the program (Figure 19), although nearly half were uncertain (48%). This left room to win their support and continue participation. Those who were not willing to continue or had some hesitations, indicated they didn't think they knew enough to do well, did not have time, and that their participation was not effective. Most of those who offered specific reasons, responded they were too old, or that their interest was weakened because the activity was not strongly related to the river. PETA responses were more positive, with more than half of the volunteers willing to continue participating. Those who were not, indicated they did not have time, didn't think they knew enough to do well, the activity was more tiring than they expected, or that had lost interest. Respondents who offered specific reasons, similar to other PETA programs, indicated they were leaving the city.

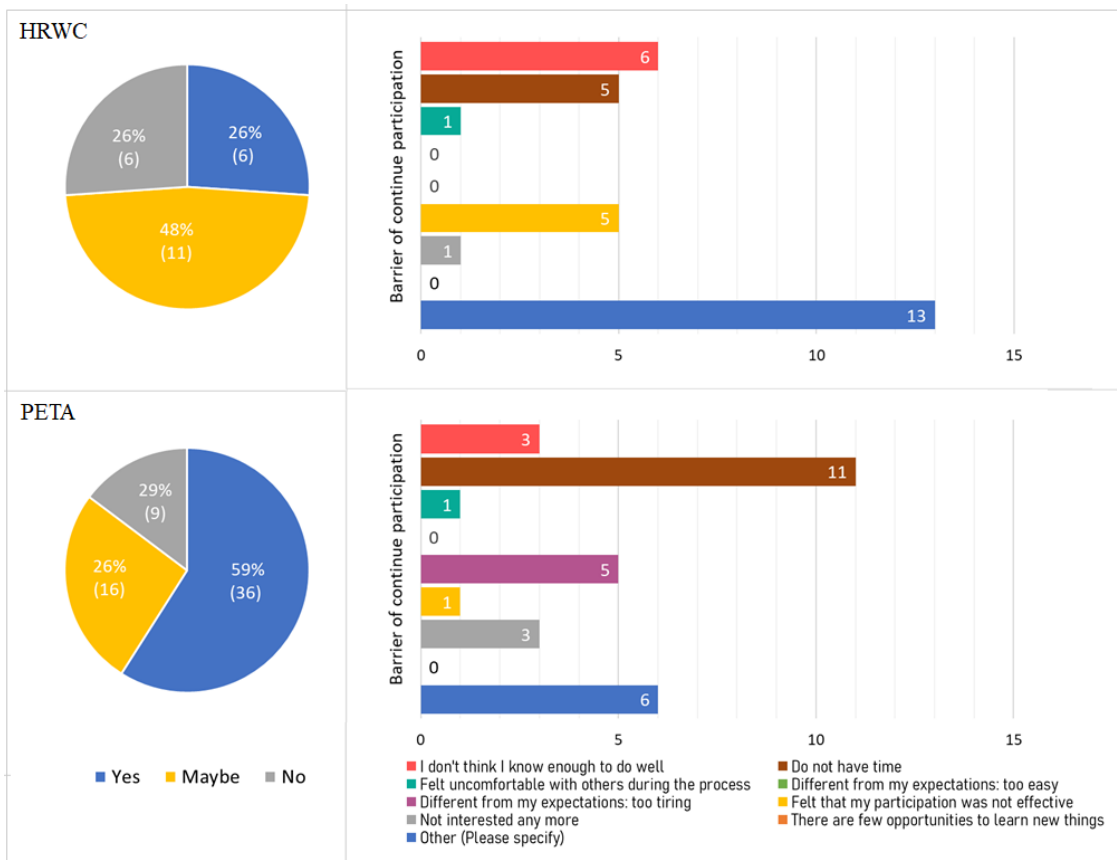


Figure 19. Continue participation: Left: Distribution of willingness to continue participating. Right: Reasons for reluctance to continue participating

3.2.4. Environmental Education Programs

In the HRWC's Education Program, scores among the "Helping the Environment" category did not reach 4.5 (Table 10). "Help to protect river habitats" and "Protect the Huron River" scored the highest (4.4). In the "Learning" category, "Observe nature" scored the highest (4.3), while "Acquiring communication and education skills" scored lower (3.9). Among the "Social" category, the highest score was for "Help HRWC" (4.6), the only factor to reach 4.5 in this program, which was a great affirmation. Surprisingly, the lowest score was "To see friends" (3.5). Scores among the "Recreation" category were similar (3.9 to 4.1), the highest being for "Connection with nature" (4.1). Finally, among the "Individual" category, volunteers attached great importance to using their knowledge (4.4) to help students and protect the environment (4.3), which brought them strong satisfaction. When considering responses of volunteers who had participated five times or more, the scores of "Learn communication and education skills", "See Friends", "Get along with the students" and "Have fun" increased by about 0.5.

Table 10. The factors that brought volunteers most satisfaction in HRWC Education Program

Factors	Mean score of Education Program volunteers	Mean score of volunteers who joined 5 times or more
Helping the Environment:	4.3	4.3
Help to protect river habitats	4.4	4.4
Protect the Huron River	4.4	4.2
Help to improve environment conditions	4.2	4.3
Learning:	4.1	4.3
Learn communication and education skills	3.9	4.2
Observe nature	4.3	4.3
Social:	3.9	4.2
See friends	3.5	4.1
Meet new people	3.8	3.9
Develop a sense of community	3.8	3.9
Get along with the students	4.0	4.5*
Help HRWC	4.6*	4.5*
Recreation:	4.0	4.2
Try something new	3.9	4.0
Have fun	4.0	4.4
Connection with nature	4.1	4.1
Individual:	4.0	4.0
Sense of accomplishment of sharing knowledge	4.3	4.4
Contribute to research	3.7	3.6
Useful experience in education and/or career goals	3.5	3.7
Use my previous knowledge	4.4	4.3

*Scores above 4.5, respondents who participated five times or more (n=12) all respondents (n=21)

In PETA's Education program, among the “Helping the Environment” category, scores for “Help to improve environment conditions” were the highest (4.4) (Table 11). In the “Learning” category, the score for “Learn communication and education skills” was 3.9 and “Observe nature” only 3.3, since this program had few outdoor activities. Among the “Social” category, the “Get along with the students” and “Help PETA” scored the highest with 4.2 and 4.0 respectively. Among the “Recreation” category, “Try something new” scored the highest (4.2). Similar to HRWC, among the “Individual” category, using their

previous knowledge and sense of accomplishment of sharing knowledge scored the highest with 4.6 and 4.5 respectively. These were the only two factors reaching 4.5 in the PETA Education Program, showing that volunteers attached great importance to using their knowledge to help students to protect the environment. When considering the responses of volunteers who had participated in the Education Program five times or more, scores for “Get along with the students” increased (4.5). Similar to other programs, the score for “Useful experience in education and/or career goals” decreased.

Table 11. The factors that brought volunteers most satisfaction in HRWC Education Program

Factors	Mean score of Education Program volunteers	Mean score of volunteers who joined 5 times or more
Helping the Environment:	4.1	4.1
Help to protect river habitats	3.9	3.8
Protect the Huron River	3.9	3.9
Help to improve environment conditions	4.4	4.5*
Learning:	3.9	4.2
Learn communication and education skills	3.9	4.0
Observe nature	3.3	3.1
Social:	3.6	3.7
See friends	3.7	3.7
Meet new people	3.7	3.6
Develop a sense of community	3.8	3.6
Get along with the students	4.2	4.5*
Help PETA	4.0	4.0
Recreation:	4.0	4.0
Try something new	4.3	4.3
Have fun	3.5	3.5
Connection with nature	3.4	3.2
Individual:	4.2	4.1
Sense of accomplishment of sharing knowledge	4.5*	4.6*
Contribute to research	3.4	3.3
Useful experience in education and/or career goals	4.2	3.9
Use my previous knowledge	4.6*	4.7*

*Scores above 4.5, respondents who have participated five times or more (n=12) all respondents (n=21)

The willingness to continue to participate in the educational programs was 48% among HRWC and 53% among PETA respondents (Figure 20). HRWC volunteers who were not willing to participate or had some hesitations, did not have time or felt uncomfortable with others during the process. Those who offered specific reasons expressed doubts about the effectiveness of this project. PETA volunteers who were not willing to continue participating indicated they did not have time, were not interested anymore, and felt that participation was not effective. Specific reasons to discourage participation included leaving the city and the lack of return visits to the schools.

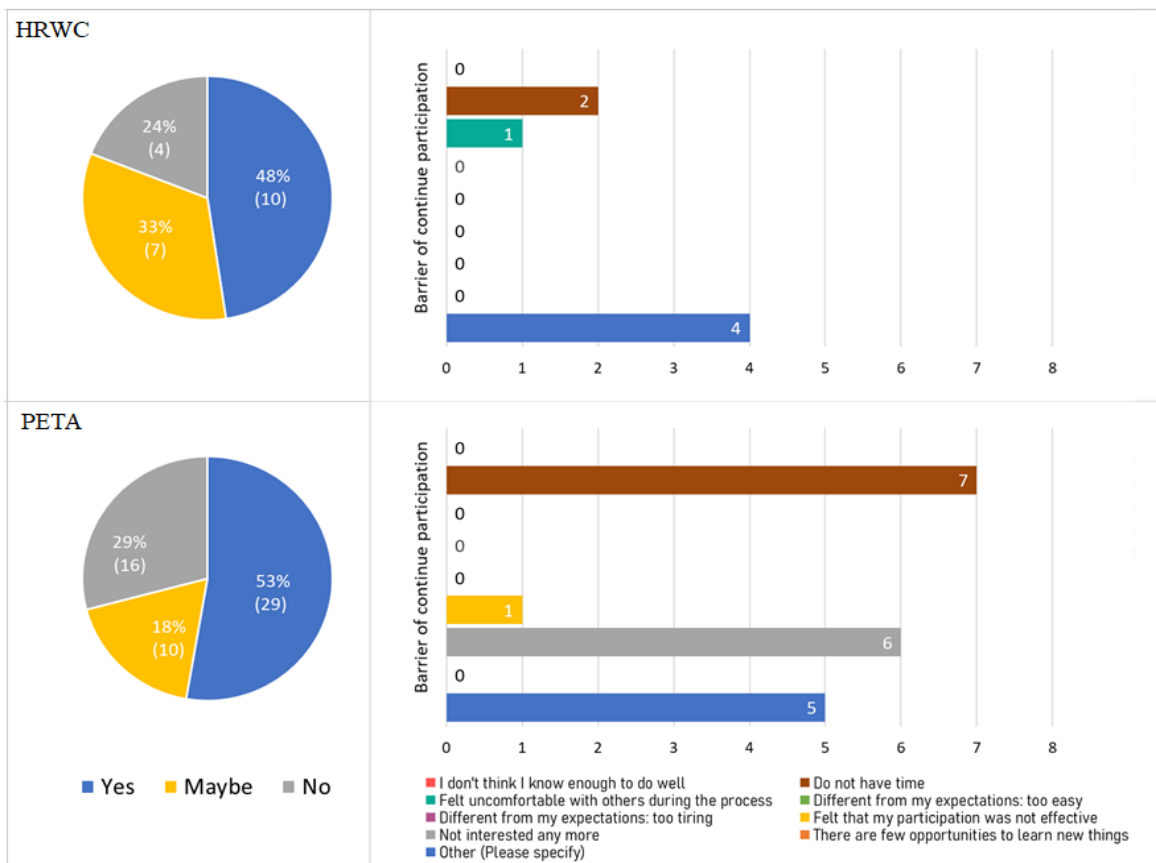


Figure 20. Continue participation: Left: Distribution of willingness to continue participating. Right: Reasons for reluctance to continue participating

Responses to the survey to HRWC and PETA volunteers about the students' performance were very similar (Table 12). From the feedback of the HRWC Education Program respondents, the students had a lot of fun during the activity and were very interested in being outdoors and doing hands-on activities. Students had high enthusiasm for

participation in this program. This was a positive result as a streamside program for local school students, the HRWC education project accomplished the goal of cultivating students' interest and allowing them to enjoy fieldwork and science. The PETA project did not lead the students to go outdoors, so we only asked whether the students liked doing the experiments by themselves. Although the conditions were limited, the students enjoyed and loved the activities provided by PETA.

The questions about teaching topics and students' performance indicated that most HRWC respondents have taught more than one topic (Figure 21a) and PETA volunteers usually only one (Figure 21b). "Benthic Macroinvertebrates Identification" (BMI) was the topic taught by most HRWC participants (17), and its popularity is related to observing real organisms. The PETA's "Rivers Around Us" and "Life of a Drop" had most participants as they were the earliest and most mature topics, while "Let migratory birds fly" and "heavy metal pollution" were new topics that PETA just developed two years ago and had fewer volunteers.

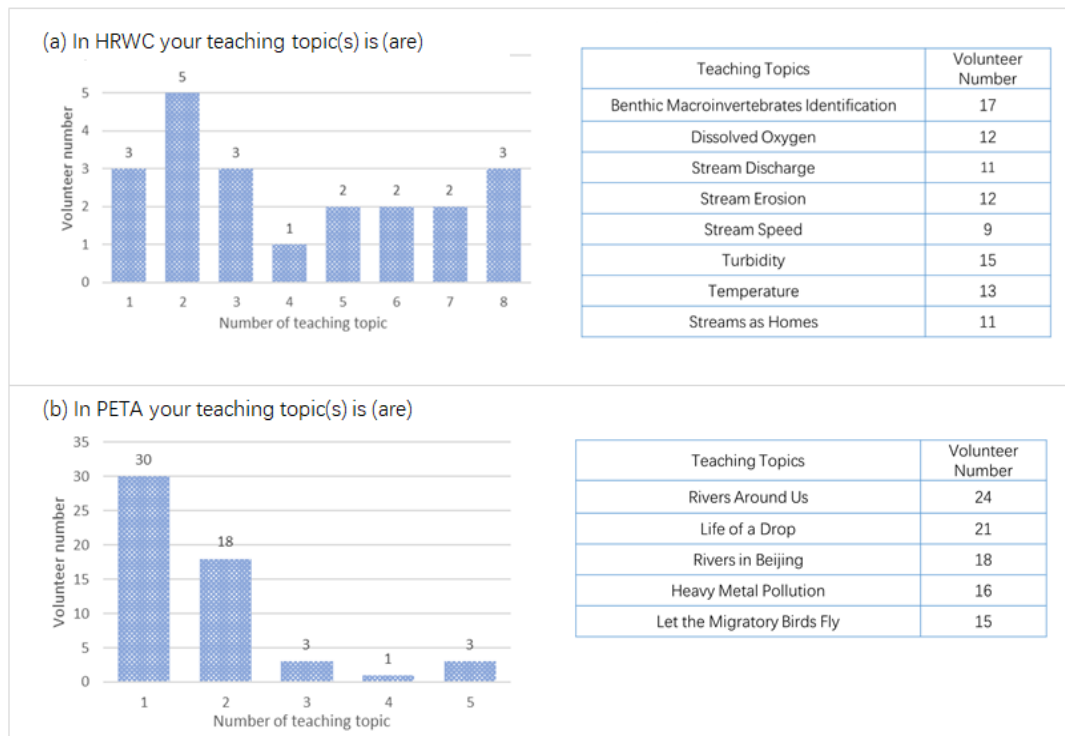


Figure 21. The topics in HRWC (a) and PETA (b) environmental education programs, figures show the number of topics taught by each volunteer, tables show the number of volunteers participating in each topic.

Scores in HRWC and PETA educational programs were similar, although PETA scores were slightly higher (Table 12). From the feedback of the respondents, students had a lot of fun during the activities and were very interested in being outdoors and doing hands-on activities. Students had high enthusiasm for participation in this program, which was a positive result. In terms of further and deeper learning, in both organizations, the scores of students about learning and remembering some information, seriously thinking about questions and developing new questions, were lower (< 4.0).

Table 12. Teaching evaluation about the effectiveness of the educational program

	HRWC	PETA
Students are engaged	4.0	4.5
Students like (being outdoors and) doing the experiments by themselves	4.0	4.4
Students learn and remember some information	3.6	3.8
Students seriously think about your questions	3.7	3.7
Students develop new questions	3.4	3.4
Students have fun in the process	4.1	4.3
The event inspired the students	3.6	3.8

3.3. Results of interviews

3.3.1. Interviewee demographics

Among the six volunteers who agreed to participate in the HRWC interviews there were individuals of various backgrounds. Volunteers included: a medical postdoctoral research fellow (participant #H1 volunteering with HRWC for 2 years), a 65-year-old local resident with no environmental background (participant #H2 volunteering with HRWC for 15 year), a 58-year-old company manager (participant #H3 volunteering with HRWC for 10 years), a university professor with biology and science education background (participant #H4 volunteering with HRWC for 16 years), and a 57-year-old property management agent with educational background (participant #H5 volunteering with HRWC for 3 years). We also interviewed a senior volunteer, who was also one of the

leaders and developers of the HRWC's youth streamside education program (participant #H6 volunteering with HRWC for more than 25 years).

The volunteers who participated in the PETA interviews also were of diverse backgrounds. Volunteers included college students majoring in ecology (participant #P1 volunteering with PETA for 3 years), environmental sciences (participant #P2 volunteering with PETA for 2 year), and in mathematics (participant #P3 volunteering with PETA for 2 years). Also a 37-year-old employee of an information technology company, (participant #P4 volunteering with PETA for 1 year), a 52-year-old Beijing office worker without background in an environmental field (participant #P5 volunteering with PETA for 3 years), and a retired middle school biology teacher (participant #P6 volunteering with PETA for 4 years).

3.3.2. Experience of volunteers first participation with the organization

This section addressed the following questions: How did the interviewee first learn about the organization? What motivated them to participate? Which program did the interviewee first join? What happened and were they satisfied? What reasons and sources of satisfaction were most important to them when they first participated?

3.3.2.1. How did the volunteers learned about the programs

Among the six HRWC interviewees, two found out about the organization by searching volunteer opportunities on the Internet. Others learned about HRWC through traditional media, including magazines, flyers from his child's school, and HRWC's presentations at a local science center gathering. Two mentioned that they themselves recruited family members or friends to the program. Three volunteers had specific targets, such as "related to water science" or "volunteerism in Washtenaw County" and after comparing and screening several programs and contents, they chose to volunteer with HRWC. Responses to this question suggest that HRWC's public outreach methods are very extensive, covering various media.

Among the six PETA interviewees, three college students found out about PETA activities through the environmental protection student club fair and posters distributed

across their campus. Two of them mentioned that they themselves recruited friends to the program. Others came across PETA's volunteer groups and became interested. Another interviewee learned about the program through his child, as the elementary school he attended cooperated with the PETA education program. Responses to this question suggest that PETA's cooperation with schools and student associations has played a very effective role in their public outreach, attracting people to participate and successfully promoting PETA to people around them. Not all interviewees actively seek or searched for an organization to volunteer. A volunteer explained this as *“the information on the Internet is messy, I am afraid of scammers or fake organizations... because I did see PETA personnel and volunteers in the park that day, I kind of trusted them”* (participant #P6).

3.3.2.2. Experience during the first time participating in the programs

In our interviews, participants offered manifold descriptions of their first experiences in volunteering. Four HRWC interviewees first participated in the Biological River Monitoring program. All interviewees expressed satisfaction with their first experience and thought it was a good start to motivate them to continue participating. Their responses revealed two main positive aspects of the experience.

1. The experience was fun: All volunteers expressed their enjoyment and excitement when they participated. *“That was a lot of fun, and we found many cute bugs”* (participant #H1).

2. The activities were well organized: Four volunteers affirmed HRWC's organizational ability when describing their first experience. *“Once I signed up, they told us why and what to do and it was very well organized”* (participant #H2). The professionalism and enthusiasm of HRWC personnel made an impression on the interviewees who were even able to name HRWC staff. *“I first started with Ellen, and then Jason is the volunteer coordinator, they are really nice and professional”* (participant #H4). *“Paul and Jason gave us a training, the training showed me everything I needed to know and was very concise which is fine”* (participant #H3).

Four PETA interviewees first participated in the Water Quality Monitoring program, and

two participated in the Biological River Monitoring and Environmental Education Programs. In general, all interviewees expressed satisfaction with their first experience and thought it was a good start to motivate them to continue participating in the programs. Their responses revealed three main attractive aspects of the experience.

1. The experience satisfied their curiosity: All volunteers expressed their excitement and curiosity. Even for two interviewees who had environmental-related backgrounds, participating was exciting as they had lived in a big city for a long time and this represented an opportunity to experience the outdoors. For volunteers who first participated in the Environmental Education Program, giving lectures to elementary school students was also an exciting experience. *“That was the first time I walked into a classroom not as a student; I was very excited”* (participant #P1).

2. The activities provided a valuable learning experience: Two interviewees participating in Water Quality Monitoring and one in the Biological River Monitoring program described their fieldwork steps and what they learned in detail. Even after a few years, many details were still vivid. *“I used a bottle with a rope to collect water samples, another volunteer took a drop of water carefully, dropping it on the test paper, we gathered around and watched it turn orange”* (participant #P5). *“We carefully picked a bug covered by many small stones, and the person guiding the activity told us it was a caddisfly larva”* (participant #P2).

3. The activities were well organized: Three volunteers affirmed PETA’s organizational ability when describing their first experience, saying that the personnel left a deep impression on them. They mentioned that the PETA staff *“gave a lot of guidance”* and *“the whole process was very orderly”*. The enthusiastic attitude of the staff was also praised: *“They tried to answer everyone’s questions and made everyone have something to do”* (participant #P4).

3.3.3. Initial motivation for participation and satisfaction

The interviewees’ motivations and satisfaction sources in both organizations were straightforward. HRWC interviewees initial motivations can be categorized as concern for the community, promote environmental stewardship among offspring, and learning.

1. Concern for the community: Three interviewees mentioned that being able to know more about the community or the Huron River watershed was a motivation and an important source of satisfaction since their first participation with PETA. *“I work in property management where I do evaluate and maintain appliances, equipment, and homes. One day, I was walking down the street thinking what would happen to all these people if one day we had a water failure in the community. Then I thought why wouldn't I try to know more about the water here? So I looked into it, checked out the Huron River Watershed and about volunteering there. It was important for a citizen to help the community and understand something that we use every day”* (participant #H5). *“I don't want to just study here all day. I want to learn more about this community, including its culture and environment. Right at this time, I saw HRWC's webpage. I think this is a good chance to do something”* (participant #H1).

Participant #6 talked about her experience after retirement, why she joined HRWC and decided to do more work, also to reach back to the community. *“I retired from being a school administrator in 2010. And I had a couple of years of being pretty busy, I was doing a lot of traveling... I said to myself "What am I doing here?" I need to be home more, and I need to get connected back to my community.”*

2. Promote environmental stewardship among offspring: A common motivation identified among responses was for parents to influence their children towards their attitude towards the environment. The participants affirmed the positive impact that HRWC made on their children and the whole family to pass down the habit of participating in environmental protection voluntary activities between generations. *“The main reason was my son, at the time, he was in junior high. He really needed to be thinking about volunteerism, which helps him as a person and also helps for college.”* (participant #H4). *“One of my daughters brought the flyer home. We looked at it and thought it would be good for children to understand what the watershed is and how can we affect the environment... Now my children are around 20, they are very environmentally aware. I think that was because of what we did with HRWC from a very early age”* (participant #H2).

3. Learning: One HRWC interviewee mentioned that she initially volunteered to acquire

more knowledge since this content was closely related to her career. *“I was already working outdoors with students and I read about the River Round up. I thought that could be fun and I might learn something more about streams at the time. I was leading a third-grade trip, I thought ‘Oh, I might learn some more about the bugs in HRWC”* (participant #H6).

Among PETA interviewees initial motivations and satisfaction sources can be categorized as concern for the environment, personal interest and peer pressure.

1. Concern for the environment: All interviewees mentioned that being able to help protect the environment and river systems was a motivation and an important source of satisfaction since their first participation with PETA. *“I often hear from the news that we need to protect the environment, our President Xi also said that ‘Clear waters and green mountains are as good as mountains of gold and silver’, PETA provides this opportunity to help the environment, and I think it is very meaningful”* (participant #P4). *“I major in ecology, and I have always been very concerned about environmental issues. I started participating in PETA as soon as I saw their flyers in my college, now I graduated but I still usually join, hoping to make some contributions”* (participant #P1).

Four interviewees expressed thoughts along the lines of *“I am not only having fun but I am also able to protect the environment, so it's very meaningful”*. It can be seen that the initial source of satisfaction of participants is generally a combination of self-benefiting (happy/social/get volunteering certificate, etc.) and altruistic (contributing to the environment) behavior. Protecting the environment is an additional benefit that makes the volunteers also feel valuable.

2. Personal interest: Responses revealed many personal reasons for participation that were not directly related to protecting the environment. For example, respondents indicated a desire *“to get along with children and be a teacher”* (participant #P1), and *“continue some things related to my previous career after retirement”* (participant #P6). Some interviewees had ambiguous goals, with expectations that participating in PETA activities may enrich their lives *“my daily life is boring so I want to find something new to do”* (participant #P3), and *“...(for my child and I) at least it's better than just staying at*

home and play with cell phones” (participant #P5).

3. Peer Pressure: Participants described how external influence such as policy requirements and relatives' invitation made them participate in PETA activities. Two college interviewees mentioned that they are willing to participate in PETA because they were organized by student clubs or in order to obtain a certificate of volunteering recognized by their school. Two interviewees mentioned the influence of family and friends. Although some interviewees mentioned that getting a certificate and having the opportunity to go out with friends and family can provide a certain degree of motivation and satisfaction, they thought the mentality and motivation was utilitarian, weak, and impermanent.

“I first heard about PETA through our college’s environmental protection organization. At that time, many of our members participated in their activities, and then after several months, only the two of us kept going. Others, when they had enough experience to fulfill their courses or related purpose, they just stopped participating...I don’t want to judge this kind of behavior, they got what they wanted and felt satisfied” (participant #P2).

“My child was very interested in a few activities so we participated in the ‘Short-term Program’ several times. I felt gratified to accompany him... he is still young, but maybe will be busy studying in the future, and won’t have time to participate. I’ve always been busy, so if he can’t go anymore, I’m not sure whether I’ll continue” (participant #P4).

3.3.4. Meeting expectations given the organization's outreach information

For the most part, the volunteers' experiences in the two organizations met their expectations based on description of activities on websites, flyers, and other outreach materials. All interviewees affirmed that the program they participated in met the description. The PETA volunteers even described experiences that were beyond their expectations. Two interviewees mentioned that personnel showed very broad and profound knowledge, especially when they introduced the sites at the beginning of the activity. *“Every time they provided us with broader knowledge, including about geology,*

formation of rivers, history and culture of Beijing rivers and so on, which was very interesting and really beyond my expectation” (participant #P5). One interviewee also praised highly the value of the Environmental Education Program. “Although PETA did not mention it in their description, the environmental protection club in my university emphasized that the Education Program is both to help the children and provide us an opportunity to exercise and improve our abilities. This is indeed the case” (participant #P1).

3.3.5. Satisfaction evolution since joining the program

This section addressed the following questions: How did volunteer satisfaction evolve since they have joined? What reasons and sources of satisfaction were most important to them after they had participated for a period of time? How are these changes related to the personnel’ behaviors, encouragement, and organizing?

In general, HRWC interviewees expressed becoming even more satisfied with continuing participation. Their motivations and reasons for satisfaction were enriched and strengthened. Their responses can be categorized into the following themes.

1. Satisfaction brought by social relationships is increased: After participating for a period of time, interviewees began to pay attention to relationships among people. The relationship among volunteers and with HRWC personnel became closer and made them enjoy participating more. Their feelings for the local community also became deeper.

“As I worked more and more in it, I think it is important for me to be sharing with other people about nature surroundings and even just the wonder of being out. We’re all getting together and everybody’s happy with each other” (participant #H5).

“Many of the volunteers are in my age group. They're very funny, smart and I'd like to see them. I've become so good friends with some of them, which is nice. When I go to these activities. I know I'm going to see people I like” (participant #H6).

“For example, one person on my team, their son went to school with my son. But I didn't know the father very well, so it allowed me to get to know the father. When you then go to school, the school is huge. It's hard to know all of the parents, but when you can get to

know one or two better, then it's just kind of familiarity, it's like you have some extra connection with the whole school” (participant #H4).

From participant #6 description of the educational program, we can see that HRWC is consciously strengthening this kind of social relationship. *“Because the volunteers are isolated, each is doing their own activities separately. If they don't know each other already they're not going to get to know each other. But we let them introduce themselves at the beginning and share feelings at the end, letting them see something about each other... I think people like to be recognized, they want me to know their names, they want me to acknowledge them. I think you have to sort of love your volunteers.”*

2. Satisfaction brought by accomplishment increases: In our interview, volunteers mentioned that after participating for a period of time they begin to realize that their contributions are valuable and feel proud of it. This allows them to participate more actively and continuously. The sense of accomplishment is more common among the leader and collector volunteers in River Roundup.

“I think my feelings or motivations, it's got better, because I realized the work we do is very important, the more I did the more I appreciated HRWC. Also, I can see more and more need for doing it, which motivated me to keep going” (participant #H2).

“I'm consciously being a leader, and feel proud that there is a contribution to make. What I do could make a difference in how people see the HRWC, I feel like I am a representative” (participant #H5).

“I know I'm probably not going to save the world, but I like having the sense that the work I'm doing, the energy that I'm spending, has the possibility of serving the world in some way” (participant #H6).

Responses of PETA interviewees on increased satisfaction can be categorized under the following themes.

1. Environmental protection: Four interviewees stated they were consistently satisfied because in PETA they got opportunities to protect the environment, which was consistent with their “caring about the environment” motivation at the beginning. Two interviewees

expressed that their motivation for protecting the environment is strengthened by constant participation. *“The more I go to the riverside, the more I can feel the preciousness of nature, and feel more satisfied because we can protect it.”* (participant #P5). *“At first, I thought more about having fun, and at the same time, we can protect the environment. It was like a win-win activity, but when novelty passed, the sense of honor to protect the environment took the lead”* (participant #P3).

2. Personal interests: In our interview, four interviewees mentioned that during the time of participating in PETA activities, their personal interests were always satisfied and made them continue participating in the programs. One of them mentioned that participating in PETA’s Environmental Education Program enhanced her interest in teaching. *“Every time I go into the classroom, I feel very rewarded and I more and more enjoy teaching children”* (participant #P1).

3. Social relationships become more important: In our interviews, three volunteers mentioned the relationship among volunteers and also with PETA the personnel became closer after participating for a period of time, and made them more enjoy participating in PETA.

“All the people I met were great, their attitude towards the world infects me to some extent. Sometimes when I sign up for the activities, I look at the group list and find someone I know, I mean, I 'm looking forward to seeing them” (participant #P2).

“... after a few times, I was very familiar with the activities and those people, getting along with them makes me very happy even just chatting in the WeChat group” (participant #P5).

“I'm retired and have a lot of time. I can meet many people every time I participate in PETA activities, and also the staff, like Xue, the organizer of PETA education program, she is very nice. I am glad to work with her and help her. Also, there are some young volunteers, our relationship may not reach the level of friendship, but we communicate and try to understand each other. Their fresh ideas can always inspire me, and I can share my experience with them, it's pretty good” (participant #P6).

3.3.6. Suggested improvements to attract and retain more volunteers

This question focused on interviewees' suggestions for the two organizations to attract and maintain more volunteers. There were many good measures mentioned by the interviewees.

Answers by HRWC respondents included strengthening to attract young volunteers, providing sufficient feedback, and continuously updating training.

1. Attracting young volunteers: From demographic information and the interviews, the old age of volunteers is a serious issue for HRWC. Four interviewees mentioned the importance to working with schools. Cooperating with relevant courses in colleges could be a potential way, or attracting children to participate at an early age and attracting their parents to come together *"I would say they can involve more young volunteers; I know they have a good relationship with universities, colleges, and schools"* (participant #H4). However, participant #6 expressed concern through her experience: *"I think that there is a source of hope in that young people could be interested and do many things, but the downside is they go away fast. So you take a certain amount of trouble to train and then you get to have their participation two or three times, and then they are gone, but the older volunteers once they sort of get connected, I can contact them season after season."* So, to ensure volunteers continue participating it's very important to make them understand the importance of HRWC programs and of their role and to build connections in the process.

2. Providing sufficient feedback: Four interviewees highly praised the feedback provided by HRWC, which made the volunteers feel valuable. The feedback considered both the influence and effort of each program and emotional gratitude to the volunteers.

"They always show their appreciation to all their volunteers, and I can feel how positive they are, and like to tell others I've really benefited from being a member" (participant #H1). *"They tell you and give you feedback on what you are doing. That's why I stayed with them for so long because you could see how valuable it is"* (participant #H2). *"It's important to make sure we know that we make a difference, and we do something that helps"* (participant #H3).

Two volunteers specifically mentioned the annual River Givers Gathering, which is very helpful for volunteers to communicate with each other and build a sense of belonging and pride.

“There's one thing that I really enjoyed is they have an appreciation party. It's a way for everybody to get together and also learn new things. Because they have posters and small presentations. It's not only thanking your volunteers but a way to entice new volunteers” (participant #H4). *“I think the appreciation event is very fun, the people that I've met that work there have been fabulous. I also see new faces there every time, I mean now they have some new players, and I will keep joining them”* (participant #H3).

3. Continuously updating training: Two interviewees praised HRWC's volunteer training system. HRWC regularly organizes training for its volunteers, as even volunteers who have participated need to be retrained regularly. Also, HRWC always updates the training content, which makes the volunteers feel that they are constantly learning. *“I appreciate that they insist on doing it periodically, it is important to refresh. I'm glad that they have that activity. What is also great is they bring in new techniques that we need to know. For example: how to inhibit invasive species, they do give us as much resources as we want, so I keep joining them and gradually learning more and more”* (participant #H4).

Recommendations of PETA respondents included to provide more feedback, increase engagement, and improve management of the WeChat group.

1. More effective feedback: One interviewee appreciated the WeChat push message summarizing their activity content sent by PETA after the event. This kind of timely feedback was very effective. It can make the volunteers feel valuable and motivate others in the group. Four interviewees expressed their expectation of receiving more feedback, especially about the progress of the project on a larger scale. This motivates volunteers to continue participating, and can also be used as a showcase of achievement to attract new volunteers.

“I don't know (the achievement of PETA), especially the administrative aspects. I don't think they perform a lot of analysis. The only thing I am familiar with is the species

illustrations on their public account” (participant #P1). “I keep tracking the result of the Long Term Program, but I don't know the progress of the water system map. I talked with Xue (founder of PETA), and it seems that it also involves other voluntary organizations, and needs to cooperate and coordinate... Of course, I hope they can do more, releasing progress, making us feel more valuable” (participant #P5).

Xue, the organizer of PETA, said that they offer an annual report, including the results of all programs and the progress of cooperation with other institutions. However, the frequency of once a year and the way of communicating through WeChat message push makes it easy to be ignored by volunteers, and it is not convenient for communication.

Three volunteers mentioned the same feedback problem in the Education Project in the absence of a return visit to the school. *“In the Education Project, we always ask students to draw a poster or hand in a simple report, but we won't go back to look at them. Although school teachers sometimes send us their homework or post them on the walls of their classrooms, actually there is no effective feedback neither for us nor the students. So I look forward to a stable partnership with schools to have more complete communication and feedback” (participant #P2).* This kind of one-time lecture wasn't conducive for volunteers to see the result of their work and build a sense of responsibility. *“Although I often participate, sometimes I have doubts. We only went there once and did not return. This is a bit frustrating, one of my classmates lost confidence and interest because of this” (participant #P1).*

2. Increase the sense of engagement: Two interviewees mentioned that the engagement can still be improved, especially in the “Long Term Research” and the “Short Term Field Trip” programs. They mentioned that increasing the number of participants results in lowering volunteer engagement. *“When there are a lot of volunteers coming, some of them are just observing, which may be boring and obviously not good for us to keep them” (participant #P4).* Under the current PETA volunteer organization model, this situation may be difficult to improve, because personnel are limited, and all activities are led by personnel.

3. Develop the sense of belonging: Another suggestion was to help volunteers

develop a sense of belonging in various ways. From the electronic survey, volunteers scored very high to “Help PETA” as the source of satisfaction, indicating that volunteers attach great importance and affection for PETA, which is also confirmed in the interviews. Two interviewees mentioned that they really hope to be recognized in PETA. *“From their behavior, I know that PETA valued us very much, but what I want to say is that it needs to be expressed. They do not express enough. ‘We are together and everyone should be proud of this.’ I really hope they can always tell this to all the volunteers”* (participant #P6). Another interviewee emphasized that if PETA could provide uniforms (pins, caps), volunteers could have a stronger sense of belonging and participation. He called this a kind of “medal” and also good marketing advertising.

The organizers of PETA are aware of this. This year they designed printed T-shirts and stickers for volunteers. For cost considerations, this is only a trial policy, and whether they can do more in the future depends more on their budget.

3.3.7. Additional comments or suggestions for the future of this organization beyond volunteer recruitment.

Two HRWC interviewees provided marketing advice, and one of them mentioned using easier and more understandable language. This can help the public to understand the programs and mission of HRWC better. *“If you talk to most people and say do you know what ‘Benthic Macroinvertebrates’ are, they won’t know, it’s hard to get those people involved if they don’t know some of the words. Word and literature would be an important part to market and promote what they do. I think they do a great job working with the local administrations and other organizations because everybody speaks the same language, but if you want to face the general public that’s a different strategy”* (participant #H2).

Another volunteer mentioned that HRWC can prepare material that is easy to hand out, so the volunteers can give it to many people, and make HRWC better-known. Although HRWC now provides items like stickers and hats, this is more like a logo without useful information. *“It could be a bookmark or a card that has the basic HRWC information, activities, contact number or something like that. It should be small and cheap, and can*

write some on it” (participant #H5).

PETA interviewees offered suggestions on marketing and funding, and improving management of WeChat group.

i) Marketing and funding: Many suggestions can be attributed to insufficient PETA funding. Xue admitted that they didn't have professionals with marketing and management expertise among PETA personnel at this stage. This may be a hiring direction for future efforts. Regardless of how to get funding, interviewees gave suggestions on areas that should be prioritized for improvement if funding were available.

The first suggestion was to improve transportation access. Two interviewees mentioned that the inconvenience of transportation may decline volunteer access and enthusiasm. Spending excessive time and energy on the road made them already tired before the activity started. This problem is especially serious for older volunteers.

“I need to admit I'm old, it's kind of tiring to take 40 min subway or bus ride, so I have to reduce the frequency of participation in the future” (participant #P6). “That site is really far away. Maybe it's okay for those college students, but if we didn't have a car it would be more difficult for us (with a young child). I always offer carpooling, but few people do this. I don't know if PETA can afford to rent a van or other vehicle...they are very nice, but conditions are indeed difficult” (participant #P4).

Interviewees also suggested adding hands-on materials and props to the educational project. At this time, each class (40-50 students) has very limited materials, most students just watched the demo. Compared with adult volunteers in other projects, children are more interested in hands-on work. Just simple and cheap material kits would be enough to inspire their interest, which is an affordable choice under limited budget.

“The students' theoretical knowledge is perfect, maybe they are precocious now... But if I give them a kit and let them operate by themselves, they will be very excited. I understand the difficulties on budget, but I think our unique role lies on this, not just give abstract knowledge” (participant #P1).

ii) Management of WeChat group: PETA's WeChat group provides the volunteers with access to learn and share news, information, ideas related to the Beijing River system, and even about broader environmental issues. An interviewee mentioned that PETA can encourage these discussions, and even wrote some articles for publicity or popular science based on these discussions.

However, some interviewees pointed out that too much messy information made them feel annoyed. *“The information in the group is kind of messy. Now there are more than 200 people in a group, maybe dozens of them are active, sharing news and chatting. But there are also many people, like me, who blocked this group, because it was a bit annoying. I don't have time to read all these messages, and it is easy to miss important events. It might be better if they can manage it and post more important news”* (participant #P4).

A possible solution would be to establish two groups, one for daily communications and discussions, the other for only managers to release relevant event notification information.

4. Discussion

4.1. Methodology

In this study, the participatory observation approach successfully helped understanding the details of each program, built rapport within the organizations, and established a sense of trust so that the volunteers could reliably convey their perceptions, concerns, and suggestions. The one shortcoming of the study is that electronic surveys sent via email to HRWC volunteers and WeChat to PETA volunteers resulted in a low response rate among the former. The limitation imposed by the sample size may affect the results of this study since the response rate can be higher among older people with more free time or the volunteers who are more dedicated to their activities. Nevertheless, this shortcoming was addressed to some extent by direct observation and follow-up interviews. A paper survey originally developed to distribute among HRWC volunteers right after participation in the various programs and increase the sample size, was not

implemented due to Covid-19 cancellations. Paper surveys can be added in future research to obtain more representative volunteer data and corroborate the results of this study. Additional to the Likert-scale surveys, a personal semi-structured interview approach was used, which has been effectively used in similar research (Pita *et al.*, 2011). In the semi-structured interview, volunteers passionately provided ample qualitative information. Larger-scale and more detailed interviews can be conducted in future studies on an annual basis to evaluate changes in volunteer perceptions. While this study was not conducted to fully illustrate and compare the complex situation of non-profit environmental organizations in the US and China, focusing on the programs of the two selected organizations offers valuable opportunities for evaluation and suggestions for improvement.

4.2. Demographics

The HRWC volunteers who responded to the survey were mostly older than 55 years old. Given the low response rate (12%) it is not possible to determine if this age demographic is representative of the full population of volunteers. However, interviewees also raised concerns about the general age of their volunteers, suggesting that it is a concern to the organization. The older volunteers no longer participate because of physical condition limitations. On the other hand, most PETA volunteers who participated in the survey are university students; universities are a significant platform offering many Chinese students their first experiences in big cities and the chance to join student and environmental organizations (Lu, 2003). One strategy to attract younger volunteers to HRWC programs is to strengthen cooperation with student environmental organizations in nearby colleges. Members of these organizations have already been interested in the mission of environmental and river protection, which is an important motivation for volunteers' long-term participation, as shown by this and previous studies (Schroeder 2000, Grese *et al.*, 2000). Several colleges in the Huron River watershed provide a large number of potential volunteers; this strategy might also reduce HRWC's worry about young volunteers' lack of perseverance.

In addition, objectively, the prevalence of cars in the United States makes it relatively convenient for all age groups to join fieldwork activities, while in China PETA has to rely on public transportation, which hinders the participation of some volunteers. Renting a vehicle for volunteers when PETA's funds permit may increase participation of volunteers of more age groups. Also, to attract more especially middle-aged volunteers PETA might consider sending some recruiting information to companies. Environmental protection activities are becoming increasingly popular, and some PETA programs can be used as team-building activities for companies. This approach may attract more volunteers and at the same time increase income for PETA. Finally, the influence of children on parents is mentioned by volunteers in both organizations. So, increasing cooperation with elementary and middle schools to familiarize children with the content and meaning of their programs, can influence the engagement of the children's family.

HRWC has many volunteers who have participated for more than five years or even more than ten years, and these are basically local residents. Many people attach great importance to the contribution they can make to the local community and the establishment of close relationships with others. The social benefits and emotional connections support their continued participation (Ryan *et al.*, 2001). PETA has more volunteers participating for a year or less, which implies that PETA's volunteers change over more frequently. This turnover is related to the fact that most PETA volunteers are highly mobile college students. According to a 2017 study, nearly half of college students in Beijing chose to leave after graduation (Li, 2017). They come from all over the country, although they understand the impact of PETA on the community, they scorn the concept of "community" and "local" and consider them unnecessary. The cultural background in China also makes volunteers believe environmental protection transcends the region limitation (Chen *et al.*, 2011). Volunteers who cannot continue participating as PETA volunteers because of leaving Beijing are still willing to participate in other environmental protection organizations in the future.

In the two organizations, the number of participants with environmental science or education backgrounds is basically the same as the number of participants with other backgrounds, which is a positive result. Their outreach is not limited to attracting people

with relevant backgrounds welcoming volunteers from a wider population. Thorough training combining slideshow with direct training in the field helps all volunteers to learn about the basics, and complete the activities effectively (Ratnieks *et al.*, 2016). A wide range of volunteer backgrounds can also bring unique perspectives on the different aspects of the programs. HRWC has more volunteers with education and environmental science background combined, it is great for both the organization and other volunteers to hear from and work with them.

4.3. Biological River Monitoring

In the Biological River Monitoring program, volunteers of the two organizations attach great importance to their contribution to the environment, which is consistent with the results of many previous studies (Schroeder, 2000; Roggenbuck *et al.*, 2000). Although the HRWC River Roundup's webpage includes content indicating that family and friends can enjoy this activity together, and we observed that there were indeed volunteers bringing their children to participate, not many volunteers indicated their satisfaction was brought by developing closer family relationships. They pay more attention to facilitating their children to enjoy nature than to the relationship with the family. Another interesting result is that the "Help HRWC" and "Help PETA" are both highly rated social factors, and there are similar results in the other three programs. This means that the volunteers not only care about the rivers and environment but they also care about these two organizations that are trying to protect the rivers. They want to volunteer in order to help these two organizations succeed by helping them with their work.

Also, HRWC volunteers who have participated many times appear to be focused more than PETA volunteers on meeting friends in this program. This is very related to the leaders training HRWC volunteers. Smaller groups provide volunteers with more opportunities to collaborate, communicate, and build friendships, which can keep them active in the long-term (Omoto & Snyder, 1995; Donald, 1997). The volunteer leaders training also reduces the workload of personnel and makes it possible to collect data at multiple sites at the same time. PETA can learn from this approach to increase the interaction and sense of engagement among volunteers. When this idea was raised to Xue, the founder of PETA, she expressed concern about the safety of the volunteers and

whether the content of the activities could maintain the current level. However, if they attract more volunteers and expand their influence in the future, this step would be necessary.

4.4. Water Quality Monitoring

Volunteers of Water Quality Monitoring program also pay great attention to environmental protection. The HRWC Chemistry and Flow Monitoring program has simple content and flexible short activity time, which were conducive for new volunteers to start. Since there is a detailed operation procedure, even if volunteers forget some steps, they can follow the handbook. However, the shorter activity time barely allows for volunteers to make an effort to communicate and establish social connections. Its webpage description indeed emphasized more helping monitoring water conditions than providing social and recreation opportunities. In PETA, volunteers pay more attention to happiness and the fresh feeling. In such a big city as Beijing, people have very few opportunities to be outdoors and enjoy nature, so even if the content is simple and programmatic, they cherish the experience and feel excited. In both organizations, as the time of participation increases, volunteers have a deeper understanding of the programs' mission and long-term goals (i.e., their results may influence community decision-making). Therefore, for volunteers in these programs, knowing their actions are meaningful and valued is important (Grese *et al.*, 2000). Providing detailed and timely feedback is an effective way to encourage them to continue participating.

4.5. Natural Areas Assessments

The number of volunteers in Natural Areas Assessment programs in both organizations is relatively small, and most have participated in the organization's programs for a long time. One reason is that in this program certain background knowledge is required which is somewhat difficult for some volunteers. The other reason that limits the number of volunteers is the low frequency and irregular timing of the assessments. Many volunteers miss or do not know when and where to sign up. For example, the HRWC Natural Areas Field Assessment program relies heavily on email contact, unlike River Roundup, where everyone can find the registration place directly on the webpage. To increase people's

participation in the Natural Areas Assessments program, personnel can introduce these events to the volunteers when holding Biological River Monitoring and Water Quality Monitoring. In this way, they can ensure that no volunteers miss the information. In addition, these volunteers have both interests and basic knowledge, so they are more likely to engage in other programs. Moreover, both organizations' volunteers attach great importance to learning in this program. Continued learning from the experience helps motivate volunteers' long-term participation (Grese *et al.*, 2001). Experienced volunteers usually have a lot of relevant knowledge, and gain a great sense of accomplishment when using their knowledge to contribute to research.

4.6. Environmental Education Programs

Volunteers from the HRWC Environmental Education Program usually taught more topics than PETA in its education programs. From my personal experience, HRWC volunteers were more willing to communicate with each other and try different topics. While, although PETA did not have any restrictions on topics volunteers can choose to teach, most volunteers seem to subconsciously choose familiar content that they had tried before. This is convenient and fast to a certain extent, but encouraging volunteers to learn and teach other topics may be a way to enhance volunteers' fun and broaden their horizons.

The HRWC's Education Program is faced with the problem of having insufficient volunteers. There are feasible ways to address this problem as mentioned before, such as through cooperation with student environmental organizations and promotion of the program in other HRWC programs. The major challenge PETA faces is that they are unable to go outdoors, but adding hands-on experiments, especially real organisms' observation can arouse students' interest. For example, learning from what is done at HRWC, bringing some water samples and bugs to the classroom is a simple, low-cost, but useful way to enliven the program.

Another thing worth learning about the HRWC's education program is that volunteers feel noticed and recognized. As H#6 said, you need to love your volunteers. Also, this love should be expressed actively. PETA conducts much work but it is relatively shy in

terms of expression, which is related to cultural traditions. Nevertheless, Chinese people today are also paying more attention to being recognized. Feeling that one's presence is needed also encourages the participation of volunteers (Gump & Barker, 1982).

5. Conclusion

This study is an initial investigation of volunteers from two non-profit organizations dedicated to urban river protection, HRWC and PETA. These two organizations are worlds apart yet they are doing similar things for similar missions and there are also some notable distinctions given their different cultural and institutional contexts. HRWC is longstanding and focuses on the local environment, they participate in decision making and citizen science projects more extensively than PETA. HRWC volunteers pay great attention to make changes in their community and develop friendships and social networks. PETA is a relatively new organization; volunteers want to obtain interesting experiences and treat the environmental protection concepts and activities in a broader sense. However, many motivations and experiences of their volunteers are remarkably similar; they care about these two organizations and want them to succeed. They also all desire to help the environment and to learn more in the course of their volunteer activities, and eager to receive feedback on their contribution. If both organizations pay attention to these considerations, they may fare better in attracting and retaining volunteers, which is critical to their long-term success.

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