

Inspiring Ocean Conservation

A Multi-Phase Research Project at the Monterey Bay Aquarium



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Contents

- Executive Summary** 3
- Project Overview** 5
 - Introduction 6
 - Research Questions 8
 - Project Teams 9
 - Project Description 10
 - Key Findings 12
 - Implications 16
- Project Phases** 19
 - Phase I: Front-End Study and Logic Model 20
 - Phase II: Onsite Exit Survey 21
 - Phase III: Post-Visit Online Survey 26
 - Phase IV: Whole-Visit Observational Study 32
- Accomplishments and Limitations** 37
- References** 41
- Appendices** 44
 - Appendix A: Research Questions 44
 - Appendix B: Research Methods 46



Executive Summary

The mission of the Monterey Bay Aquarium is to inspire conservation of the oceans. From 2006 to 2008, Aquarium staff members and consultants conducted a series of qualitative and quantitative studies to assess the extent to which visiting the Aquarium engaged, inspired and empowered visitors to care about and for the oceans. The Inspiring Ocean Conservation (IOC) Project included four phases.

During Phase I, the researchers consulted with Aquarium staff and conducted in-depth interviews with visitors to develop a logic model. The model outlined the conservation outcomes that could result from visiting the Aquarium, along with factors that might influence these outcomes.

During Phase II, the researchers conducted an onsite visitor survey to assess the outcomes that emerged immediately following a person's visit.

During Phase III, the researchers surveyed Phase II's sample of visitors online six months after their visit.

During Phase IV, researchers observed a sample of visitors throughout their entire visit and interviewed them in depth before and after their visit.

The findings from all four phases showed that many visitors who encountered conservation information or experiences during their visit retained and translated these encounters into personal intentions and actions that persisted for months following their visit. Impacts were greatest for visitors who were conservation-oriented when they arrived at the Aquarium, viewed more of the Aquarium's conservation exhibits, attended certain programs, talked to Aquarium staff or volunteers or took home a printed guide on how to choose sustainable seafood. Interesting findings emerged with respect to how visitors carried out their visits, which varied according to visitors' characteristics, backgrounds and interests. The project also documented how crowding during busy periods in the Aquarium diminished visitor outcomes. These findings have important implications for the Aquarium and for other aquariums and zoos that promote environmental conservation.



Project Overview

Introduction

Advancing the Mission

Over the last century, as aquariums and zoos have evolved from menageries to conservation centers (Rabb, 2004), their missions have evolved as well. Institutions accredited through the Association of Zoos and Aquariums (AZA) typically have missions that focus on public education and wildlife conservation. However, there has been much discussion among supporters and detractors alike about how well these members of the informal science education community are achieving their missions (Stoinski, 2002; Arbuthnott, 2003; Ogden et al, 2004; Marino et al, 2010; Falk et al, 2010).

To help inform these debates, and to assess the effectiveness of their organizations, zoos and aquariums have conducted research studies to determine their impact on visitors' conservation-related knowledge, feelings, attitudes and subsequent behaviors¹. Notable examples include the National Aquarium (Adelman et al, 2000; Falk & Adelman, 2003), the Philadelphia Zoo (Wagner et al, 2009), the Wildlife Conservation Society (Hayward and Rothenberg, 2004; Sickler and Fraser, 2009), Brookfield Zoo (Myers et al, 2004; Clayton et al, 2009), Disney's Animal Kingdom (Dierking et al, 2004) and the London Zoo (Jensen, 2011).

In addition to research focused on a single organization's impact, a study conducted by the Association of Zoos and Aquariums and funded by the National Science Foundation called *Why Zoos and Aquariums Matter* found

that visitors' motivations for visiting zoos and aquariums directly influenced how they conducted their visits, as well as the outcomes they experienced (Falk et al, 2007; Falk et al, 2008).

In 2006, the Monterey Bay Aquarium began a project to determine the extent to which it was achieving its mission to inspire conservation of the oceans through its onsite visitor experience. The purpose of this multi-year research project was to define and measure the ways in which visiting the Aquarium inspired visitors to become more interested in and concerned about ocean conservation and inspired to engage in conservation actions during their visit to the Aquarium as well as at home (McKenzie-Mohr & Smith, 1999; Hein, 1991; Monroe, 2002).

Inspiring Conservation of the World's Oceans

The Monterey Bay Aquarium opened in 1984 as the nation's first regional aquarium, dedicated to showcasing the natural wonders of Monterey Bay. During its first decade, the organization pioneered breakthrough husbandry techniques, created innovative educational programs and exhibitions and served as a model for a new generation of public aquariums. However, by the mid-1990s, as the dire state of the oceans became increasingly well documented, the Aquarium realized that it could serve a much larger role and extend its impact further by advancing the cause of ocean conservation.

¹ For a thorough compilation of visitor research studies conducted at zoos and aquariums, consult *Looking at People Looking at Animals: An international bibliography of visitor experience studies and exhibit evaluation in zoos and aquariums* (Schram, 2011).

In response, the Aquarium took the next step in its evolution in 1997, when it dramatically altered its mission. Instead of focusing on research and education for the purpose of enlightening the public about Monterey Bay, the Aquarium took on the charge of inspiring conservation of the world's oceans. This new mission required the Aquarium to be more explicit about interpreting complex conservation issues by first, taking a position on these issues and second, by encouraging visitors to take an active role in helping to protect the oceans (Hughes et al, 2005).

The Aquarium's initial approach to advancing conservation through its onsite visitor experience has been well documented by Ramberg et al (2002). Since this article was published, the Aquarium has experimented with additional strategies to advance its mission. These strategies have included developing special exhibitions and programs about global conservation issues; researching and distributing a highly successful guide to help consumers choose ocean-friendly seafood; installing labels, videos and interactive displays about conservation throughout its permanent galleries; signing up visitors to support advocacy campaigns; and encouraging informal conversations about conservation between visitors and Aquarium staff and volunteers.

In addition, the Aquarium has a long history of developing and evaluating exhibitions and programs that promote ocean conservation (Ramberg et al, 2002; Yalowitz, 2004; Kemmerly & Macfarlane, 2009). However, the resulting studies have focused mainly on specific aspects of a visit, such as measuring the number of visitors who attend programs, the time they spend in exhibitions, their recall of certain messages and their overall satisfaction with their visit. Although these evaluations have

been useful, they haven't explored the impact of an entire visit. As a result, Aquarium staff, in collaboration with outside consultants, came together to address this challenge in an effort we ultimately called the Inspiring Ocean Conservation (IOC) Project.

Studying Visitors and Their Experiences

The IOC project examined the relationship between three sets of factors: 1) visitors' individual characteristics, interests and backgrounds; 2) their onsite experiences; and 3) their post-visit experiences. Previous research on visitor learning in museums, zoos and aquariums has examined how these factors influence outcomes, including conservation outcomes (Falk & Dierking, 2000; Dierking et al, 2002; Ballantyne & Packer, 2005; Smith, 2009; Smith et al, 2008).

For example, prior studies have documented how individual factors (such as a visitor's orientation to conservation, reasons for visiting and social role) affect how visitors carry out their visits, what they remember from their visits and how they act upon their experiences (Swanagan et al, 2000; Anderson, 2003; Yalowitz, 2004; Falk et al, 2007; Briseño-Garzón et al, 2007).

Similarly, previous studies at the Aquarium found that the best predictor of what visitors remembered from their visit and how they reacted to conservation-related content was their prior involvement in a conservation group and their prior knowledge about conservation issues (Hayward, 1997, 1998). Visitors with a high interest in conservation in general and in individual conservation issues specifically stopped at more exhibits that featured an explicit conservation message than visitors who didn't share these characteristics (Yalowitz, 2004).

Research Questions

The IOC project was designed to investigate the following research questions:

- To what extent are visitors' knowledge, feelings and attitudes about ocean conservation, as well as their intention to engage in conservation behaviors, related to their personal characteristics, backgrounds and interests? What distinguishes visitors who achieve the desired outcomes from visitors who don't?
- To what extent are visitors' knowledge, feelings and attitudes about ocean conservation, as well as their intention to engage in conservation behaviors, related to experiences they have during their visit? Do certain experiences influence visitors more than others?
- To what extent do visitors' post-visit experiences help to reinforce or advance their knowledge, feelings, attitudes and intentions to engage in conservation behaviors? Do certain experiences serve to reinforce these outcomes more than others?

We assumed that many factors influence a person's thoughts, feelings, attitudes and behaviors with regard to ocean conservation over the course of his or her lifetime, and that an Aquarium visit could serve as one of these factors. We also acknowledged that the relationships among these factors are complex, interactive and evolving, with different experiences building on each other and with the outcomes varying in type and degree, depending on the individual. We also expected that visitors would find certain aspects of their visit more inspiring than other aspects. We assumed these differences would be associated with visitors' personal characteristics, backgrounds and interests.

Project Teams

The central research question that gave rise to the IOC project sounded deceptively simple: Does an Aquarium visit relate to changes in a visitor's knowledge, feelings, attitudes and actions regarding ocean conservation? In the end, devising and executing a strategy to investigate this question proved to be exceedingly challenging.

To accomplish this task, the Aquarium provided funding for a team of staff members and consultants to carry out a series of evaluation studies that would address this question. The project team included the Aquarium's Vice President of Programs Cynthia Vernon, Manager of Audience Research Steven Yalowitz and Senior Exhibition Developer/Evaluator Ava Ferguson, as well as Victoria Macfarlane from Quadra Planning Consultants. The Aquarium's Executive Director Julie Packard and Managing Director Jim Hekkers served as reviewers and provided an organizational perspective.

In addition, the project team assembled an internal advisory group comprised of staff members from across the Aquarium. This group met once or twice a year throughout the project to provide input on the studies and to help contextualize the findings.

The project team also recruited a group of external advisors from the field of visitor studies. This group included David Anderson from the University of British Columbia; Kirsten Ellenbogen from the Science Museum of Minnesota; John Fraser from the Wildlife Conservation Society; George Hein from Leslie University (emeritus); and Carol Saunders from Antioch University New England. This external group offered guidance at key stages of the project.

Finally, the project team recruited consultant Beverly Serrell to write two reports outlining the key findings and implications from the onsite and online surveys, which helped Aquarium staff members apply the results to their own work.

Project Description

Phase I: Front-End Study and Logic Model (2006)

During the initial phase, the researchers conducted in-depth interviews with a small sample of visitors to identify the range of conservation outcomes that might result from an Aquarium visit. The findings helped guide the creation of a logic model that identified the outcomes or changes the Aquarium was most interested in studying, along with factors that might be influencing these outcomes. The researchers also reviewed the relevant literature to better understand how and why changes in visitors' knowledge, feelings, attitudes and behaviors might have occurred as a result of their visit.

Phase II: Onsite Exit Survey (2006)

During the second phase, the researchers conducted a lengthy exit survey with a large sample of visitors as they were leaving the Aquarium to assess the changes that emerged immediately following a person's visit and the factors that were associated with these changes.

Phase III: Post-Visit Online Survey (2007)

During the third phase, the researchers conducted an online survey with a self-selected sub-sample of visitors who'd completed the onsite exit survey six to seven months prior. The goal was to see how visitors had changed since leaving the Aquarium and what post-visit factors might relate to these changes.

Phase IV: Whole-Visit Observational Study (2008)

During the fourth and final phase, the researchers observed a sample of visitors throughout their stay at the Aquarium and interviewed them in depth before and after their visit. These visitors also completed a written questionnaire at the end of their visit that was similar to the onsite survey administered during Phase II.



Key Findings

Visitors' characteristics and backgrounds influenced how they conducted their visits.

Positive conservation-related outcomes seemed to be greatly influenced by a visitor's pre-existing beliefs and values. However, these beliefs and values were bolstered by certain types of experiences, including interacting with staff members or volunteers, or viewing specific programs and exhibits. These findings are consistent with previous studies that have found conservation-oriented visitors are more likely to seek out these kinds of experiences.

Visitors' experiences during their visit influenced the outcomes they achieved.

The Aquarium's approach of providing varied experiences to inspire ocean conservation appears to be working; visitors reflected on a wide range of experiences that influenced them, from exhibit labels and printed handouts to the beautiful exhibits and animals. Conservation messages that resonated most with visitors were specific, repeated, interactive and tied to live-animal displays; narrated feeding presentations given by staff members and volunteers appeared to be particularly effective at delivering conservation messages. In turn, exposing visitors to conservation messages through multiple exhibits and programs increased their conservation outcomes. Staff members and volunteers also served important roles in communicating and expanding on the information visitors encountered.

In general, Aquarium visitors were very receptive to the level of conservation interpretation presented in the programs and exhibits they viewed. Most respondents (81%) felt that the amount of conservation interpretation they encountered was "just right," while a small percentage (2%)

felt there was "too much." In contrast, 17% of survey respondents felt there was "not enough" conservation interpretation; these visitors gave suggestions for how to increase the amount of conservation interpretation, including having the Aquarium provide more information on specific issues; offer more or different exhibits; or present more about what visitors could do to help.

Visitors' post-visit experiences reinforced their intentions to take action.

A person's intentions to engage in future behaviors tend to erode over time, especially if these intentions aren't reinforced. The most common post-visit conservation action voiced by Aquarium visitors involved making sustainable seafood choices; this action also showed the greatest change six months after their visit. The Aquarium can help to reinforce visitors' intentions by distributing tools, such as the Seafood Watch pocket guide, and by maintaining contact with visitors through e-mail, newsletters or social media.

Visitors' interests influenced their visits and the outcomes they achieved.

A majority of visitors had personal hobbies, interests or employment that related to their visits. They included teachers, artists, seafood restaurant owners and servers, scuba divers, people who work on environmental issues, students, people who work on the water (Navy service members, fishers) and others. These hobbies and interests related to how these visitors conducted their visits, as well as the outcomes they experienced. For instance, visitors with related interests had higher post-visit ratings on the onsite survey for under-

standing the problems facing the oceans, along with knowledge of the steps they could take to help solve these problems. They were also more likely to express interest in joining the Aquarium's Ocean Action Team.

Ocean-loving visitors were more receptive to conservation messages.

Many Aquarium visitors appeared to be "ocean lovers." They love to visit the beach or the ocean, have a high level of interest in reading or watching television shows about the ocean and/or nature and often visited the ocean, zoos and/or aquariums as children. "Ocean lovers" were more inspired and more positive about their visits and had higher conservation attitudes, knowledge and actions before and after the visit than those less enamoured with the ocean.

Special occasions inspired people to visit.

Many visitors mentioned that they were visiting the Aquarium to celebrate a special occasion, such as a birthday or anniversary. About one-fifth of visitors (17%) who completed the onsite survey rated this aspect as one of their primary reasons for visiting that day.

Visitors were interested in learning more about conservation.

A few visitors said they didn't recall seeing or hearing anything about conservation during their visit. However, all visitors said they were interested in learning about conservation at the Aquarium. In addition, they offered numerous suggestions about how the Aquarium could help people learn more, including suggestions about improving orientation and adding more interpretation.

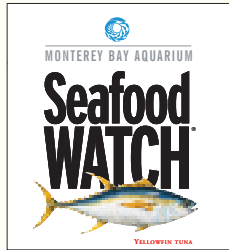
Crowding prevented some visitors from achieving the desired outcomes.

During each phase of the project, some respondents complained about crowding during their visit. In the final phase, more than one-third of visitors (36%) identified one or more problems they'd encountered during their visit, with the most common complaint being crowding.

Crowding not only interfered with visitors' enjoyment, it also interfered with their ability to learn more, care more and act on behalf of the oceans. For example, visitors who complained about crowding were less inspired to conserve the oceans and performed fewer conservation actions after their visit. They also had lower levels of concern for the oceans after their visit as well as less knowledge of what they could do to help conserve the oceans. In interviews, some visitors explained that crowds limited their ability to experience some of the programs and presentations, to stop at the conservation exhibits, to read panels or to use the interactive displays.

Interpreting Ocean Conservation at the Aquarium

During the IOC project, a handful of experiences proved especially effective in promoting conservation-related outcomes among visitors. These experiences were correlated with visitors gaining new knowledge, feeling inspired and being motivated to do more to protect the oceans at the Aquarium and at home. Some of these experiences are still available at the Aquarium, while others have been replaced by similar experiences.



Seafood Watch Pocket Guide

This printed handout continues to provide visitors with recommendations on how to choose sustainable seafood. Visitors surveyed in the IOC studies could pick up a copy of the guide in the Aquarium's restaurant, at the Information Desk, at selected exhibits or from volunteers stationed in the exhibition galleries. (More information about the guide is available at www.seafoodwatch.org.)



Vanishing Wildlife: Saving Tunas, Turtles and Sharks

This 2,000-square-foot exhibition features a stunning view into a million-gallon display showcasing large tunas, sea turtles and sharks. The surrounding videos, labels and interactive exhibits vividly describe how the world's growing demand for seafood, combined with destructive fishing practices, threatens these animals' survival in the wild.



Ocean Travelers

This 1,200-square-foot exhibition was replaced with another conservation exhibition in 2012. However, during the IOC project, it featured interactive exhibits focused on the threats facing sea turtles, whales, tunas and seabirds that migrate through Monterey Bay. The majority of visitors in the IOC project passed through this exhibition, although not all of them stopped to interact with the exhibits.



Act Now

Previously located at the exit to the Ocean Travelers exhibition, Act Now interpreted pending legislation to establish a network of marine protected areas along the California coast. Visitors could write a postcard to California's governor urging his support of this bill, which the Aquarium promised to mail. They could also sign up to join the Aquarium's Ocean Action Team, an advocacy group focused on ocean issues. The exhibit was replaced in July 2009, after Governor Schwarzenegger approved the bill.



Ocean Action Discovery Station

During the IOC project, this mobile station was located just outside the Ocean Travelers exhibition and focused on interpreting the Aquarium's Seafood Watch program. However, visitors could discuss any number of conservation issues with the volunteers who staffed the station.



Real Cost Cafe

Designed to look like a classic American diner, this exhibit features large video screens showing actors portraying the role of the cafe's chef, waitress and bus boy. Visitors can "order" different types of seafood using touchscreen menus, then get feedback from the restaurant staff about whether their selected entrées are ocean friendly.



Live-Animal Feeding Presentations

During the IOC project, visitors could attend up to four different narrated feeding presentations each day, including one at the Aquarium's Kelp Forest exhibit. This presentation features a scuba diver equipped with a microphone who presents a mix of natural history and conservation information to visitors while feeding the animals on display. A volunteer stationed next to the exhibit introduces the diver, forwards questions from the audience and hands out Seafood Watch pocket guides to visitors who request them.



Auditorium Programs

The Aquarium's 270-seat auditorium presents 15-minute interpretive programs hosted by a live presenter several times a day. During the IOC project, the Aquarium presented auditorium programs on a range of topics, including the deep sea, jellies, white sharks and sea otters.

Implications

We conducted this three-year project not only to document whether the Aquarium was fulfilling its mission, but also to gather information that would help the Aquarium improve or expand upon its activities. The project has a number of implications for how the Aquarium provides experiences that support its mission. Additionally, there are implications for other free-choice learning environments that hope to inspire their audiences to support conservation action.

The studies suggest the Aquarium's approach to inspiring ocean conservation is working. The varied interpretive approaches, including specific conservation exhibits and messages delivered throughout the Aquarium in animal feedings, exhibit signage and staff interactions, appeal to a diversity of visitors. Aesthetic experiences, such as the beauty of the displays and the Aquarium's proximity to the ocean, are also important attributes that strengthen the sense of awareness and responsibility visitors feel. Tools like the Seafood Watch pocket guide are important take-home materials that help reinforce visitors' behaviors after their visit, and that can be used to engage their friends, family members or co-workers.

Since visitors who interacted with staff members and volunteers showed greater conservation outcomes than other visitors did, it follows that increasing the number of these interactions should help advance the Aquarium's mission. Further research could shed light on which kinds of interactions have the greatest impact (e.g., animal feedings, interpretive stations, theatrical presentations or auditorium programs) and whether there's an ideal number of interactions that will achieve the greatest conservation outcomes.

Since the study found that visitors felt most inspired during their visit, and that some of their conservation outcomes diminished over time, the Aquarium should expand opportunities for visitors to immediately engage in ocean conservation actions during their visit and stay connected with them to support and reinforce their actions after they return home.

While the Aquarium's mission doesn't differentiate between different types of visitors, the study found that some visitors were more receptive to ocean conservation messages than others. Focusing on the more-receptive audiences by offering customized information, tools or experiences could increase the impact of their visit. However, this doesn't mean that visitors who are less oriented to conservation should be ignored. On the contrary, it would be valuable to conduct research with visitors who aren't conservation-oriented to see how the Aquarium can better engage them. Although most of the respondents in the IOC studies felt the current level of the Aquarium's conservation messages was appropriate, almost one-fifth of them felt the Aquarium could present more. So there may be room for increasing the level of conservation interpretation in the future.

One factor that has changed greatly since this project took place is the prevalence of social networking opportunities, such as Facebook, Flickr and Twitter. The Aquarium now uses social media to engage visitors onsite in conservation-related activities; these tools could be used to a greater degree, providing immediate opportunities for visitors to join a community, take action or become engaged over the long term.

Implications for Aquariums, Zoos and Other Conservation Organizations



While research about achieving conservation outcomes is being conducted at other aquariums and zoos, there are only a handful of studies taking place at the “whole-visit” level. The IOC project was a way to not only learn about the Aquarium’s visitors, but also to discuss, as an institution, what the goals and objectives were around our mission. Other institutions could benefit by conducting similar studies or by developing logic models that identify what they’re doing to accomplish their missions. In addition, more studies of this type would help the field determine patterns across institutions and create a better model for how best to engage and inspire visitors about conservation.

One of the key findings from this project was that social interactions during a visit are extremely important in achieving conservation outcomes; any organization wanting similar outcomes should look at increasing the number and quality of social interactions around conservation content. While it may seem obvious, the ability to tailor conversations and messages likely made a difference in encouraging visitors to start or continue specific conservation behaviors.

The fact that visitors’ previous experiences with and attitudes about conservation had such a strong connection to the conservation outcomes they achieved suggests that it’s essential for an organization to know its audience. This is particularly important when determining at what level to begin a conversation about conservation and what kinds of reactions audiences may have to different topics. Therefore, an important implication for zoos and aquariums is to understand how their audiences are currently engaging with conservation in general. Knowing which actions different audiences are already engaged in would also be important.



Project Phases

Phase I: Front-End Study and Logic Model

Overview

The project team developed a logic model with input from an internal advisory group comprised of staff members from across the Aquarium. The model identified the inputs, outputs, activities, audiences, outcomes and goals to be studied. It also identified factors that could potentially influence the desired outcomes. The team also prepared a research matrix that identified key research questions and the methodologies needed to address those questions. Developing the logic model helped to clarify the underlying process of change the Aquarium believed to be occurring among visitors during their visit.

Methods

In-depth interviews conducted with 47 visitor groups (representing a total of 145 visitors) in June 2006 helped to refine the logic model and shape the research questions and the onsite exit survey instrument that would follow. During the interviews, most visitors recalled seeing or hearing specific conservation messages while visiting exhibits, attending programs or talking with staff members or volunteers, and they frequently recalled encountering these messages at multiple sources. They also talked about feeling connected to the animals and habitats on display and about being inspired by live-animal exhibits that presented conservation information.

Results

Exhibits, programs and interactions with staff and volunteers not only appeared to reinforce what visitors previously thought or felt about conservation, but also provided them with new insights. As prior research has suggested, visitors who were knowledgeable about and oriented toward conservation prior to visiting the Aquarium recalled more of the conservation interpretation, while other visitors said they didn't notice any conservation interpretation at all.

Phase II: Onsite Exit Survey

Overview

The second phase of the project involved conducting an onsite exit survey. Many of the survey items asked visitors to reflect on how they would have answered a specific question prior to visiting the Aquarium that day as well as how they would answer the same question at the end of their visit (an approach more commonly known as a retrospective pre-post test). Prior studies have shown that this methodology is a valid means of assessing change and may be more reliable than giving visitors an actual pre-test (Campbell & Stanley, 1963; Rockwell & Kohn, 1989; Lamb & Tschillard, 2003). The survey included a mix of both open-ended and closed-ended questions to assess each of the target areas: knowledge, feelings, attitudes and behaviors. Key outcomes were scored using a seven-point scale, with one being “low” and seven being “high.” The items also built on some of the scales from the AZA study *Why Zoos and Aquariums Matter* (Falk et al, 2007; Falk et al, 2008).

Methods

Data collectors distributed printed surveys to a sample of adult English-speaking visitors ages 18 years and older as they exited the Aquarium at the end of their visit. After visitors completed their surveys, the data collectors invited them to provide their contact information so they could participate in an online survey to be conducted several months following their visit.

A total of 2,430 visitors were invited to participate in the study during August, September and November 2006, with a total of 1,005 visitors completing the survey. The response rate for the survey was 41.4%, with 87% of respondents providing an email address to take part in the online survey. The researchers compared this sample with a similar sample of visitors who had completed the Aquarium’s monthly exit survey over the same period of time. The comparison revealed only minor differences between the samples, which suggested that the onsite exit survey sample was representative of the Aquarium’s general audience.

Results

Visitors’ Knowledge, Feelings, Attitudes and Behaviors Before and Immediately After Their Visit

Almost all visitors (90%) who completed the survey said they’d been inspired to help conserve the oceans as a result of their visit. A comparison of their retrospective pre-visit ratings with their post-visit ratings showed positive shifts in nearly all of the items measured. For example, visitors showed significant gains on the following statements:

I have a good understanding of the problems facing oceans.²

There are small steps I can take today to help conserve the ocean.³

I’m personally very concerned about the state of the oceans.⁴

² t (980) = 25.971, p < .01

³ t (974) = 23.057, p < .01

⁴ t (981) = p < .01

The survey also asked visitors to indicate the extent to which they were carrying out selected conservation behaviors before their visit and the extent to which they were likely to carry out these behaviors after their visit. The eight behaviors included:

1. recycling
2. picking up litter
3. avoiding the use of pesticides
4. buying sustainable seafood
5. telling others about ocean conservation
6. supporting political efforts to conserve the oceans
7. donating to a conservation organization
8. learning more about ocean conservation through reading or watching television shows

In some cases, such as recycling, the survey showed that a large percentage of visitors (48%) were already carrying out the intended behavior prior to their visit, while in other cases, such as donating money to an ocean conservation group, a much smaller percentage of visitors (about 6%) were carrying out the behavior prior to visiting.

However, of those visitors who weren't acting at the highest level of conservation behavior prior to their visit, more than one-half reported a change in intention on the retrospective pre-post scale for each of the eight behaviors. Visitors expressed the greatest potential for change when purchasing seafood,⁵ telling others about ocean conservation,⁶ donating money to a conservation group⁷ and supporting political efforts to conserve the oceans.⁸ Many factors likely played a role in visitors'

decision to engage in these behaviors, and their Aquarium visit was viewed as one potential contributing factor.

Overall, changes in visitors' knowledge, feelings, attitudes and behaviors were all found to be highly correlated with each other. That is, visitors who said they'd learned something new (knowledge) frequently reported an increase in concern (attitude) and caring (feeling) as well as an increase in their intention to act in ways to conserve the ocean (behavior). Visitors' open-ended comments on the survey reinforced these intentions by describing the specific actions they planned to take once they returned home, such as making an effort to purchase sustainable seafood.

Visit Factors Related to Conservation Outcomes

In their open-ended comments, survey respondents identified a broad range of experiences during their visit that contributed to their feeling inspired to conserve the oceans, including learning about conservation in general and which actions they could take; the aesthetics of the Aquarium and of the marine life on display; seeing the animals; viewing specific exhibits and tools, videos and presentations; and talking with Aquarium staff members and volunteers. Visitors often referred to more than one issue, observation or experience when explaining what had inspired them. Visitors also referred to a range of exhibits and locations when talking about where they'd encountered conservation information. These findings reinforce the idiosyncratic nature of an Aquarium visit; different visitors respond very personally to different things. This may explain why no one feature of the visit dominated visitors' responses.

5 mean difference, 1.419, t (881)=24.376, p <.001

6 mean difference, 1.214, t_(976) = 27.436, p <.001

7 mean difference 1.154, t_(978) - 26.303, p <.001

8 mean difference 1.351, t_(977) - 23.945, p <.001

In addition, visitors who reported greater conservation outcomes conducted their visits differently than those who reported lower outcomes (although, the correlations were low to moderate). For example, visitors who reported higher conservation outcomes:

- spent more time at the Aquarium
- recalled more of the conservation exhibits
- interacted more at the conservation exhibits
- interacted with staff members or volunteers
- picked up a Seafood Watch pocket guide
- viewed more programs and feedings.

The researchers conducted stepwise regression analyses⁹ to determine the extent to which a combination of experiences might relate to more positive visitor outcomes. Visit-related variables used in the regression model included attending programs, visiting the conservation exhibits, picking up a Seafood Watch pocket guide and interacting with staff members or volunteers.

With the entry of each successive variable or set of variables into the model, there was improved predictability for the different outcomes, including level of inspiration, overall intentions to engage in conservation actions, changes in knowledge and levels of concern. For instance, in a model with intention to take action following the visit as the outcome, and picking up a Seafood Watch pocket guide entered first, the R^2 increased significantly with the addition of listening to or talking to a staff member or volunteer about ocean conservation and viewing conservation exhibits.

This means that the combination of these three variables best predicted a visitor's intention to take action. However, in all cases the R^2 and the change in R^2 for the models were low, which allowed for a somewhat low level of predictability ($R^2 = .096$). Other variables that might have been expected to contribute additional variance were not significantly strong enough to be included in the model.

Visitor Factors Related to Conservation Outcomes

The onsite survey showed that visitors who were most inspired by their visit to the Aquarium were also those who held positive feelings toward ocean conservation prior to visiting. Nevertheless, visitors who reported feeling less positive about the ocean upon entering the Aquarium were also inspired by their visit.

The survey also showed that respondents' reasons for visiting related to the amount of time they spent at the Aquarium, the number of conservation exhibits they visited, their interaction with staff members or volunteers and whether they picked up a Seafood Watch pocket guide. For instance, visitors who gave high ratings to "I actively support ocean conservation" as a reason for visiting were more likely to recall stopping at conservation exhibits and talking with staff members or volunteers about conservation than visitors who gave this reason a low rating for visiting.

⁹ A stepwise regression analysis examines the relative influence of a group of variables on another single variable. The analysis reveals which set of variables best predicts that single variable. The analysis predicts both the individual and cumulative influence of the group of variables.

Pre-visit ratings on the knowledge, feelings, attitudes and behavior scales also were associated with some visit differences. For example, visitors who scored higher on these scales were more likely to talk with staff members or volunteers or to pick up a Seafood Watch pocket guide.

Combining Visit Factors with Personal Factors to Assess Conservation Outcomes

The researchers conducted stepwise regression analyses by entering personal and visit factors together into a model to assess the relative contributions of these variables to predicting outcomes. The personal characteristic of being “conservation-oriented” accounted for a greater proportion of variance than any aspects of the visit. However, visit variables contributed to the outcomes over and above the variance accounted for by visitors’ personal characteristics.

For example, in a model with post-visit conservation actions as the outcome, being an active supporter of ocean conservation accounted for an initial R^2 of 0.181, while picking up a Seafood Watch pocket guide, listening to or talking with staff members or volunteers about ocean conservation and visiting several conservation exhibits increased the initial R^2 by 0.041, 0.019 and 0.006 respectively, with a final R^2 of 0.247. This finding suggests that positive conservation outcomes are influenced not only by who someone is, but are also bolstered by certain types of visit experiences.



Phase III: Post-Visit Online Survey

Overview

The purpose of the post-visit online survey was to assess the extent to which conservation outcomes were maintained, reinforced or diminished in the months following a person's visit, and the extent to which respondents engaged in the conservation actions they said they would perform at home after they completed the onsite exit survey. It also explored the relationships between visit features and long-term conservation outcomes, as well as post-visit experiences that may have influenced these outcomes.

Methods

A total of 875 of the 1,005 visitors (87%) who completed the onsite exit survey provided an email address; six months after their visit, this group was invited to participate in an online survey. Forty-one percent of these visitors (360 of 875) completed the online survey. This represents 36% of the visitors who completed the original onsite survey (360 of 1,005). An online survey tool (see www.zoomerang.com) was used to carry out the survey.

Results

Assessing Long-Term Conservation Outcomes

Nearly three-quarters of online survey respondents (73%) said their experience inspired them to “think or feel differently” during the six months following their visit, and over half (55%) were able to cite a specific example. Some visitors said they became more aware of specific issues or that more needed to be done to conserve the oceans. About two-thirds of respondents (64%) said their visit inspired them to “do something new or different” during the six months following their visit, and over one-half of this group (58%) were able to cite a specific conservation action they'd taken as a result. The most common action involved choosing to buy sustainable seafood, which they typically attributed to using the Seafood Watch pocket guide.

In addition, about one-half of the respondents (55%) reported having a Seafood Watch pocket guide; some of them recalled picking one up during their visit, while others had kept one from a prior visit. About one-third of these respondents (35%) said they “always” used the guide when buying seafood, while about one-half (55%) said they “sometimes” used it. Only eight respondents who picked up a guide (10%) said they had “never” used it.

Six of the eight behavioral items on the survey showed a statistically significant increase from the retrospective pre-test on the onsite survey to the six-month post-visit survey (Table 1). The only items that didn't show a mean difference were picking up litter and donating to a conservation group. The greatest degree of change was on the item "I avoid buying seafood that's overfished or caught/farmed in ways that harm the ocean." As might be expected, post-visit actions were significantly lower than intentions for six of the eight action items assessed on the retrospective pre-post scale. In other words, visitors reported that they intended to take these actions more frequently than they actually did.

Nearly one-half of the respondents (48%) said their visit inspired them to talk to others about ocean conservation, for example, by handing out printed materials (particularly the Seafood Watch pocket guide), teaching children in classrooms or talking to business owners in stores and restaurants. From the examples that visitors provided, it was clear that some of them were very motivated by their visit and had carried out specific conservation actions during the six months following the visit.

Combining Visit Factors with Post-Visit Factors to Assess Conservation Outcomes

In their open-ended comments, respondents cited a variety of Aquarium experiences they found inspiring. The most frequently cited experiences were (in order of frequency):

- learning about specific conservation issues (e.g., overfishing) and what to do about them (e.g., buy sustainable seafood)
- learning about specific conservation tools (e.g., Seafood Watch pocket guide) and visiting specific exhibits (e.g., Real Cost Cafe)
- enjoying the aesthetics of the Aquarium (e.g., the beautiful displays)
- viewing the live animals (e.g., jellies, penguins)

Correlational analyses showed that many of the experiences that were associated with high levels of inspiration during the onsite visit continued to be associated with high levels of inspiration six months later.

Table I: Pre-Visit Mean Scores Compared with Six-Month Post-Visit Mean Scores for Select Behavioral Items

Survey Item	OnSite Exit Survey		Online Survey	Difference Between Pre-Visit Score and Six-Month Post-Visit Score
	Retrospective Pre-Visit	Onsite Visit	Six-Month Post-Visit	
1. Avoid buying seafood that's overfished or caught/farmed in ways that harm the ocean	4.39	5.80	5.60	1.21**
2. Tell others what they can do to help conserve the oceans	3.74	4.85	4.19	0.45**
3. Avoid using pesticides or weed killers	4.80	5.39	5.20	0.40**
4. Recycle paper, plastics, glass & other materials	6.01	6.40	6.34	0.33**
5. Support political efforts to conserve the oceans	4.03	4.93	4.32	0.29*
6. Read or watch shows about ocean conservation	4.85	5.50	5.05	0.20*
7. Pick up litter	5.64	6.10	5.70	0.06
8. Donate money to an ocean conservation group	2.99	4.09	3.00	0.01

* p < .05
** p < .01

For example, on the item that asked visitors if they were inspired to do something new or different as a result of their visit, visiting the Vanishing Wildlife exhibition ($r = 0.18$), visiting multiple conservation exhibits ($r = 0.20$), talking with staff members or volunteers about conservation ($r = 0.21$) or picking up a Seafood Watch pocket guide ($r = 0.35$) all proved positively correlated with visitors feeling inspired six months later.

In addition, certain post-visit experiences were associated with greater long-term outcomes, including:

Repeat Visits

More than one-fifth of respondents (22%) said they'd returned to the Aquarium during the six months following their initial visit. These respondents reported stronger feelings and attitudes than visitors who hadn't returned, but on most of the behavioral items they were no more likely to have taken action after returning home.

Visiting the Aquarium's Website

About one-third of respondents (36%) said they'd visited the Aquarium's website since their initial visit. These respondents expressed stronger feelings and more caring attitudes about ocean conservation and were more likely to have done something new or different than respondents who hadn't visited the website.

Using Printed Materials

Two-thirds of respondents (67%) said they'd brought home printed materials from their visit, and just over half of those who brought home

pamphlets or handouts from the Aquarium said they'd shared these materials with friends or family members. These respondents were also more likely to say they'd been inspired to do something new or different than were other respondents. They were also more likely to cite a specific conservation action they'd taken. Similarly, respondents who'd purchased books during their visit were more likely to say they'd been inspired to perform a new or different conservation action after returning home.

Engaging in Related Activities

Almost two-thirds of respondents (60%) reported instances in their day-to-day lives that had reminded them of their visit. These reminders included watching a television show, reading a magazine story or having a conversation with someone. These respondents were more likely than other visitors to report higher levels of inspiration, express more positive feelings, say they'd done something new or different in the last six months or describe a specific conservation action they'd taken as a result of their visit.

Finally, the researchers conducted regression analyses to assess the contributions of visit and post-visit experiences to the conservation outcomes reported six months after the visit. In these analyses, talking to an Aquarium staff member or volunteer about conservation during the visit and being reminded of the visit in daily life contributed most significantly to the model. However, as in the previous analyses, the predictive strength of the model was low ($R^2=0.14$).



Visitor Factors Associated with Long-Term Conservation Outcomes

Respondents who belonged to conservation groups¹⁰ were more likely to say they'd been inspired to do something new or different as a result of their visit. Likewise, respondents who expressed a specific motivation for visiting the Aquarium—particularly those who said they were visiting for educational or conservation-related reasons—were more likely to show gains in post-visit outcomes. Respondents who expressed a high level of interest in the oceans and ocean life were also more likely to engage in conservation actions than other respondents were.

Finally, respondents who arrived at the Aquarium with higher levels of knowledge, more positive feelings and attitudes and who engaged in more conservation actions continued to show higher scores on these measures six months after their visit than other respondents did.

Barriers to Long-Term Conservation Outcomes

About one-third of respondents (36%) said their visit didn't inspire them to do anything new or different to conserve the oceans once they returned home. When asked why, one-quarter of these respondents (25%) said they didn't have an opportunity to do something new or different, while another one-quarter (23%) said they had

other priorities in their lives. In addition, some visitors (23%) said they didn't act differently because visiting the Aquarium hadn't changed their views about conservation, while others (17%) said they weren't sure what they were supposed to be doing differently.

Similarly, about one-quarter of respondents (28%) said their visit didn't prompt them to think or feel differently about conserving the oceans. Over one-half of these respondents (57%) said this was because they'd visited the Aquarium for reasons that were unrelated to ocean conservation. However, nearly three-quarters of these respondents (71%) said their visit hadn't prompted them to think or feel differently because they already felt strongly about ocean conservation before their visit.

More than one-half of the respondents who said they had a Seafood Watch pocket guide (55%) said they'd used their guides only some of the time when purchasing seafood. When asked what prevented them from always using the guide, one-half (50%) said they sometimes forgot to carry the guide with them.¹¹ However, visitors cited other reasons as well, such as discovering that the sustainable fish listed on the guide weren't available (25%), or finding that they didn't have enough information to make an informed choice (23%) or being discouraged by the high cost of the sustainable seafood that was available (23%).

¹⁰ These respondents were identified by their response to the survey question: Do you belong to any organization other than the Aquarium that emphasizes nature, wildlife or conservation?

¹¹ After the completion of the study, the Aquarium released a mobile version of the guide in the form of a smart-phone app that visitors can now access on demand.

Phase IV: Whole-Visit Observational Study

Overview

While the first three studies relied on self-reports from visitors about what they experienced during their visits, the fourth and final study gathered detailed observational data about what visitors actually did, supplemented by surveys and interviews with these same visitors. The study was designed to gather more detailed information about visitors' entire experience, from the time they entered the Aquarium until the time they exited.

Methods

Data collectors recruited visitors to participate in the study between May and September 2008. A total of 281 visitor groups¹² were approached directly outside the Aquarium, and 102 visitors agreed to participate, for a response rate of 36.3%.

The data collectors recorded where visitors went, how long they spent and what they did in the exhibition galleries as well as at specific exhibits; they also noted the amount of time visitors spent in non-exhibition areas, such as the restaurant, gift shops and hallways. The project team created a list of visitor behaviors for the data collectors to observe and record. This list included actions such as stopping at interpretive panels, using interactive displays, viewing videos, touching plants and animals, talking with staff members or volunteers, picking up printed materials, writing a postcard to the governor of California, joining the Aquarium's Ocean Action Team or purchasing items at one of the gift shops. To record their observations, the

data collectors used the Noldus Observer[®] and Pocket Observer[®] software installed on a Hewlett-Packard iPAQ handheld computer. In addition to observing visitors, the data collectors administered a pre-visit interview and a post-visit interview and questionnaire. These instruments incorporated several questions from the onsite and online surveys so the results could be compared with those from the previous studies.

Results

Activities Associated with Conservation Outcomes

Visitors spent an average of 2 hours and 25 minutes at the Aquarium, with visits ranging from 50 minutes to 5 hours and 46 minutes. These figures corresponded well with years of data obtained from the Aquarium's monthly exit surveys. On average, visitors spent a total of 3.7 minutes visiting conservation exhibits, which represented about 2.6% of their visit. While this figure might seem low, it's consistent with the footprint of the conservation exhibits, which together represent 2.5% of the Aquarium's public areas. Visitors who stopped at one or more conservation exhibits spent an average of 4.3 minutes at these exhibits, with the total amount of time ranging from nine seconds to more than 22 minutes. While these were the designated conservation exhibits, conservation messages were delivered throughout the Aquarium in programs, presentations and narrated feedings.

¹² This number includes only those visitors who over the course of the day were approached and who were eligible for the study. Visitors who were included in the study had to agree to remain in the Aquarium without leaving and returning over the course of the day. Aquarium members and repeat visitors were purposefully oversampled during the study to ensure their representation in the overall sample.

Most visitors (86%) stopped at one or more conservation exhibits, with the amount of interaction (reading panels, looking at displays, using interactives, watching videos) depending on the specific exhibit. The majority of visitors stopped at more than one conservation exhibit (55%), attended a feeding presentation (60%), talked with staff or volunteers (72%) or talked with others in their groups about conservation (54%) at some point during their visits. Data collectors observed about one-fifth of visitors (20%) picking up a Seafood Watch pocket guide.

Some experiences appeared to be related. For example, visitors were more likely to pick up a Seafood Watch pocket guide if they engaged in any of the following activities: talked with staff members or volunteers about conservation, visited conservation exhibits where pocket guides were available or viewed the Kelp Forest feeding presentation (in which a volunteer hands out pocket guides). Visitors who attended a feeding presentation, visited the Real Cost Cafe exhibit or picked up a Seafood Watch pocket guide were also more likely to report having talked with others in their group about conservation than visitors who didn't engage in these activities.

Conservation Outcomes

Most respondents (83%) said that they were inspired to help conserve the oceans as a result of their visits, while nearly two-thirds of respondents (65%) agreed that they planned to do something more or differently to conserve the oceans than what they were doing prior to their visit. Overall, about one-half of visitors reported an increase in concern (48%), understanding (59%) or knowledge of steps they could take to conserve oceans (56%). Paired-comparison t-tests of differences on the retrospective pre- and post-visit means relating to concern and knowledge items (which were the same items used in the onsite survey) were found to be significant.

Many respondents stated that their visit helped to remind them of the importance of ocean issues and to reinforce their conviction to act in ways that help to conserve the oceans and ocean life. Eighteen percent of respondents said that they were already concerned about ocean conservation before their visit, but they had also experienced something during their visit that inspired them. In contrast, 12% of respondents said that they were already conscious of ocean conservation and hadn't experienced any changes as a result of their visit.

Visit Factors Associated with Conservation Outcomes

As in the previous phases, activities that were significantly related to positive conservation outcomes included visiting some of the designated conservation exhibits, talking with staff or volunteers about conservation, viewing feeding presentations and picking up a Seafood Watch pocket guide. Visitors' comments, along with other data, indicated that interactive experiences and simple tools, such as the Seafood Watch pocket guide, appeared to be particularly effective approaches to inspiring action.

In the interviews, visitors mentioned learning about conservation issues from a variety of sources, including exhibits, programs and feeding presentations. Some were inspired by messages or tools presented in the conservation exhibits, while others were inspired by seeing, hearing or reading about issues presented in other exhibits. Some visitors were inspired by the overall beauty and diversity of the live animals, which they appreciated and wanted to protect, while others were inspired by what the Aquarium was doing to study, care for and conserve animals. Visitors also talked about how conservation messages they'd seen or heard in one gallery were reinforced in other galleries.

In their open-ended comments, visitors with backgrounds or interests in conservation or education related to the Aquarium (e.g., photographers, teachers) conducted their visits in ways that reflected their backgrounds and interests. For example, visitors who were teachers talked about how they planned to bring photographs or other information they'd obtained during their visit back to their classrooms. Visitors who said their visit related to their hobbies, work or other interests also spent more time at the Aquarium and a greater proportion of this time was spent at the conservation exhibits.

Visitors who spent time at and/or interacted with the conservation exhibits (particularly Vanishing Wildlife and Act Now) were more likely to say they intended to take action to support ocean conservation. The total number of conservation exhibits visitors stopped at also related to their intention to take action. While simply talking to staff members or volunteers wasn't positively related to conservation outcomes, talking with them about conservation was associated with a greater intention to do something more for ocean conservation following the visit. Seeing and picking up a pocket guide was also significantly associated with the intention to do something more or different to conserve oceans. Visitors who attended feeding presentations (particularly the Kelp Forest feeding presentation) and auditorium programs were more likely to say they were inspired to conserve the oceans and/or that they intended to take action.

Table 2: Correlations between Visit Factors and Conservation Outcomes

Variable Type	Outcomes		
	Inspired To Conserve The Oceans (Yes/No)	Changes in Knowledge/Concern (Composite Score of 3 Items)	Intention to Act (Yes/No)
Time Spent			
Time spent in the Aquarium	(NS)	(NS)	r = 0.24*
Time spent in Vanishing Wildlife	(NS)	r = 0.21*	r = 0.23*
Time spent at conservation exhibits	(NS)	(NS)	r = 0.27**
Frequency of Experiences			
Number of feeding presentations	r = 0.21*	(NS)	r = 0.22*
Number of conservation exhibits (excluding Ocean Travelers)	(NS)	r = 0.28**	r = 0.25*
Type of Experiences			
Stopped in Vanishing Wildlife	r = 0.22*	r = 0.21*	(NS)
Stopped at panels in Act Now	(NS)	(NS)	r = 0.20*
Talked with staff members/volunteers about conservation	(NS)	(NS)	r = 0.26*
Picked up a Seafood Watch pocket guide	(NS)	(NS)	r = 0.25*
Attended an auditorium program	r = 0.20*	(NS)	(NS)
Viewed the Kelp Forest feeding presentation	(NS)	(NS)	r = 0.27**

(NS) = No significant difference
 * p < .05
 ** p < .01

The researchers conducted a logistic regression to test the relationship between a visitors' intention to act and the above visit experiences. The combination of visiting the Act Now exhibit, talking with staff about conservation and attending the Kelp Forest feeding presentation significantly predicted visitors' intentions to do something new or different with respect to ocean conservation ($R^2=0.196$). Each of these experiences appeared to add something unique to the model.

Visitor Factors Associated with Conservation Outcomes

Visitors who were conservation-oriented or who related their visit to their work or hobbies took greater advantage of the conservation exhibits and tools available. Also, visitors who were more familiar with the Aquarium (repeat visitors, Aquarium members and people who visited the Aquarium's website prior to their visit) were more likely to talk with staff members or volunteers about conservation.

Visitors who talked about conservation with others in their group spent more time during their visit overall. They also spent more time in the conservation exhibits, in particular the Real Cost Cafe exhibit and Ocean Travelers. They also attended more feeding presentations and were more likely to pick up a Seafood Watch pocket guide.

Accomplishments and Limitations

Key Accomplishments

The IOC project proved to be important on several fronts:

Multifaceted

Rather than simply describing what visitors took away from their visits, the project sought to uncover hidden relationships among three distinct, yet interrelated, factors: visitors' pre-existing thoughts, feelings, attitudes and behaviors prior to visiting the Aquarium; the concrete experiences visitors reported having during their visit; and what they reported thinking, feeling or doing differently afterwards. It also examined visitors' personal and social experiences before and after their visit. This model offers a broader, more nuanced and more authentic way of viewing the visitor experience than is found in more traditional models of museum learning, where the visit itself (i.e., the "treatment") is viewed as the primary (and sometimes sole) impetus for change.

Multi-Phased

Prior to the IOC project, the bulk of the Aquarium's previous visitor research was comprised of separate evaluation studies that assessed the effectiveness of individual exhibitions or programs. In contrast, each phase of the IOC project built on the results from the previous phases. In this way, the studies that resulted provided a deeper and broader view of visitors' experiences.

Open-Ended

Unlike most evaluation efforts, the IOC project didn't set out to evaluate the Aquarium's ability to fulfill a prescribed set of goals; rather, its purpose was to uncover how visitors had

changed through the course of their visits and to highlight some of the factors that related to these changes. In this way, the project left open the possibility that visitors would come away with all sorts of different outcomes. Change in and of itself was the ultimate measure, since the researchers equated change with inspiration and engagement during a visit.

Comprehensive

The project incorporated results from a variety of methods, ranging from in-depth qualitative interviews to large-scale quantitative surveys and from online questionnaires to onsite timing-and-tracking observations. It also compared visitors' self-reported responses with what they actually did during their visits. The research was costly and difficult to carry out, which is why most other institutions are reluctant or unable to take on this kind of project. As a result, the IOC project serves as a rare case study of how one institution sought to assess its mission by striving to better understand the visitors who make that mission possible.

Noteworthy

From a methodological standpoint, the whole-visit study shed light on what visitors were doing during the other phases of the project. This methodology provided clear evidence that what visitors actually do during their visit and what they recall doing aren't always the same. The study also stands as one of the few whole-visit, timing-and-tracking observational studies ever conducted at an aquarium that involved a relatively large sample of visitors.

Study Limitations

Every study includes biases based on the questions being asked, methods chosen, sampling approach, analysis and interpretation. Although the project team made every effort to eliminate or reduce bias, there were limitations in what was possible in planning and carrying out the studies. Below are several limitations that likely affected our results:

Refusal rate for the onsite exit survey

To be comprehensive and provide data about the breadth of the visitor experience, the onsite exit survey was quite long, sometimes taking 20 minutes to complete. This affected the number of visitors who were able and willing to participate; the refusal rate of 59% was quite high for a quantitative survey. Since only limited information was gathered from those who declined, it's difficult to know whether they were similar to or different from those who agreed to participate. Our analyses comparing the samples on available and relevant variables didn't reveal significant differences. However, this is always a concern with refusal rates that are higher than ideal.

Lack of cause and effect

Since the study didn't employ an experimental design, where people are randomly assigned to certain conditions or treatments, the results are solely correlational. This is important because when there is a significant relationship between two variables (e.g., talking to staff and being motivated to conserve the oceans) one can't determine the direction of the relationship. That is, it's not possible to know whether visitors were more motivated because they talked to staff or

whether they talked to staff because they were more motivated. This means that cause and effect can't be inferred.

Priming visitors

It's possible that participating in both the onsite survey and the follow-up online survey impacted visitors' responses and behaviors. The onsite survey could have focused visitors' attention on the conservation-oriented experiences and outcomes of their visit so that when they participated in the follow-up online survey, they were prompted to consider this aspect of their visit more than they otherwise would have. Without comparison groups that didn't participate in these prior studies, it's difficult to know what impact the onsite survey had on visitors' experiences and responses to the later survey.

Social desirability

All visitor research has the potential to elicit responses from participants that they think researchers want to hear or that paint them in a more positive light, in this case as more conservation-minded than they might actually be. This factor, coupled with the potential priming effect discussed above, suggests that the shifts in knowledge, attitudes and feelings identified and discussed here probably represent the best outcomes possible from an Aquarium visit. Nevertheless, the consistency in the findings across studies, the strength of findings with respect to the issues targeted most directly (i.e., sustainable fisheries) and the many open-ended responses from visitors that appeared to give greater meaning to and reinforce the quantitative results, all provide additional reassurance in the findings.



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Appendix A: Research Questions

1.0 Visitor Outcomes

- 1.1 How do visitors arrive at the Aquarium (i.e., what outcomes do they report based on their prior knowledge of or experience with the Aquarium)?
- 1.2 What visitor outcomes occur as a result of a visit?
 - 1.2.1 What outcomes do visitors report in terms of overall satisfaction with their visit and with customer service?
 - 1.2.2 What outcomes do visitors report in terms of changes in/strengthening of feelings, beliefs and attitudes about ocean conservation?
 - 1.2.3 What outcomes do visitors report in terms of changes in/strengthening of knowledge and awareness about ocean issues?
 - 1.2.4 What outcomes do visitors report in terms of changes in/strengthening of motivations and intentions to conserve oceans?
 - 1.2.5 What outcomes do visitors report in terms of changes in behavior, including specific actions to conserve oceans?
 - 1.2.6 What barriers and benefits do visitors face when making changes/in trying to act in ways to conserve oceans?
- 1.3 What relationship/connection/association do visitors develop with the Aquarium as a result of their visit?
 - 1.3.1 How do visitors currently describe their relationship with the aquarium?
 - 1.3.2 How does the visitors' relationship with the Aquarium change as a result of their visit?
 - 1.3.3 Ideally, what kind of relationship do visitors want to have with the Aquarium in the future?
 - 1.3.4 What role does the relationship that visitors form with the Aquarium play in terms of their motivation to take action to conserve oceans?
- 1.4 Is the Aquarium achieving its intended mission of "inspiring conservation of the oceans" through the visitor experience?
 - 1.4.1 What does "inspire conservation of the oceans" mean to visitors (what specific feelings, thoughts, intentions/ behaviors do visitors report)?
 - 1.4.2 What proportion of visitors are being inspired to conserve the oceans, and to what extent are these visitors showing a change?
 - 1.4.3 What specifically do these visitors intend to do to conserve the oceans as a result of the visit?
 - 1.4.4 What immediate, short-term and long-term changes are occurring with respect to conservation of the oceans?
- 1.5 How receptive are visitors currently to the conservation information presented ?
- 1.6 How do changes in visitors' feelings, beliefs, knowledge, attitudes, motivations and intentions interact with each other? What outcomes are necessary preconditions for inspiring conservation of the oceans?

2.0 Important Features of the Visitor Experience

2.1 What is it about an Aquarium visit that is most effective in creating positive outcomes, including satisfaction with service and inspiring conservation of the oceans?

2.1.1 What pre-visit activities, including communications, website information and other contacts and information, help to create positive outcomes and inspire conservation of the oceans?

2.1.2 What features of the exhibitions and programs help to create (or are most effective in creating) positive outcomes and inspiring conservation of the oceans?

2.1.3 What features of the café and the gift stores help to create positive outcomes and inspire conservation of the oceans?

2.1.4 What kinds of interactions with staff and volunteers help to create positive outcomes and to inspire conservation of the oceans, and why?

2.1.5 What combination of experiences in a single visit is most effective in creating positive outcomes and inspiring conservation of the oceans?

2.1.6 What inspires visitors the most to conserve oceans when they come to the Aquarium?

2.1.7 How/in what ways do repeat visits build on each other to create positive outcomes and inspire conservation of the oceans?

2.1.8 What post-visit activities, including communications, web site information and other contacts and information, help to create positive outcomes and inspire conservation of the oceans?

2.2 What is it about a visit that leads visitors to want to become part of the Aquarium's constituency?

2.3 What could the Aquarium do differently to increase positive outcomes and inspire conservation of the oceans?

2.3.1 What could the Aquarium do to better support visitors and promote the range of conservation outcomes?

2.3.2 What could the Aquarium do to better inspire conservation of the oceans?

3.0 Audience Differences

3.1 How do different types of visitors experience the Aquarium?

3.1.1 What kinds of visits do different audience segments have?

3.1.2 What exhibits and services do different types of audiences access?

3.1.3 What interactions do visitors have with each other during the visit, and how do these affect their experience?

3.2 What different outcomes occur for different types of visitors?

3.2.1 What kinds of outcomes occur for visitors from different audience segments?

3.2.2 What kinds of visitors are most likely to be inspired to conserve the oceans?

3.3 What are the relative impacts of (and interactions between) visitor characteristics, and visit experience on visitor outcomes?

3.3.1 Do different types of people who have the same types of experiences have different outcomes?

3.3.2 Do the same types of people who have different types of experiences have different outcomes?

Appendix B: Research Methods

Study Phase/Methods	Purpose	Measures/Variables
Phase I: In-Depth Interviews (n=47 visitor groups)	Develop a model of change and test this model through qualitative in-depth interviews with visitors	Visitor characteristics, visit characteristics and self-reported outcomes
Phase II: On-Site Exit Survey (n=1,005 visitors)	Examine visitors' background characteristics, visit experiences and impacts of the visit on their conservation knowledge, attitudes, feelings and intended actions	<p>Visitor characteristics: backgrounds (conservation orientation, demographics, etc.); reasons for visiting; previous experience with the Aquarium; visiting group composition; pre-visit knowledge, attitudes, feelings and actions</p> <p>Visit characteristics: length of visit; conservation exhibits attended; interaction in conservation exhibits (reading panels, etc.); feedings and presentations attended; talking to staff members or volunteers about conservation; picking up a Seafood Watch pocket guide; open-ended questions about visit characteristics that were most influential</p>
Phase III: Online Survey (n=360 visitors)	Assess the extent to which conservation outcomes were maintained six months following the visit and the extent to which visitors engaged in the conservation actions they had intended to perform at the end of their visit	All of the above variables, as well as post-visit experiences that may have reinforced outcomes (e.g., return visits to the Aquarium, reading or seeing other related material, etc.); also investigated factors that may have hindered outcomes (e.g., barriers to performing conservation actions)
Phase IV: Whole-Visit Observational Study (n=102 visitor groups)	Understand what visitors do during their visit, including which exhibits they visit and the interactions they have with staff members and volunteers, and how these encounters related to the outcomes visitors experienced	All of the visitor characteristics analyzed in the onsite exit survey, as well as extensive observations of visitors' activities, including the exhibits they visited, their interaction in exhibits and programs, their interaction with staff members and volunteers, etc.; also examined some self-reported visit experiences
<ul style="list-style-type: none"> • Pre-visit interviews • Timing-and-tracking observations • Post-visit interviews 		

Data Analysis

Content analysis of open-ended, in-depth interview responses

Descriptive statistics (means and frequencies) for visitor characteristics; visit features (exhibits visited, feedings attended, etc.); and self-reported outcomes

Significance of self-reported outcomes: paired-comparison t-tests of reflective pre-post responses (knowledge, attitudes, feelings, actions/intentions)

Qualitative analysis of open-ended responses: features of the visit associated with inspiration to conserve the oceans

Correlations, chi-square test, t-test of mean differences: significance of the relationships among visitors' self-reported outcomes and their personal and visit characteristics

Regression (step-wise) analyses: visit characteristics, visitor characteristics and self-reported outcomes

The same analyses as in the onsite exit survey, but with the addition of the following analyses:

Descriptive statistics (means and frequencies) of self-reported outcomes after six months post-visit

The extent to which self-reported outcomes were maintained after six months post-visit: paired-comparison t-tests (differences between post-visit intentions and six-month post-visit actions)

Relationships between post-visit experiences and self-reported outcomes: The relationships between visit characteristics and outcomes were assessed using correlational analyses and chi-square tests, t-tests of mean differences between groups and multiple regression analyses

The same analyses as in the onsite exit survey, but with the addition of more extensive analyses of visit characteristics and the relationships among visit characteristics and self-reported outcomes

The mission of the
Monterey Bay Aquarium
is to inspire conservation
of the oceans.



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