Key characteristics of successful fisher learning exchanges

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Abstract

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This study examines the key characteristics of successful fisher learning exchanges (FLEs). FLEs are peer-to-peer gatherings in which fishery stakeholders from different communities freely exchange information and experiences surrounding fisheries challenges and solutions. They are usually organized by fishers, non-governmental organizations, and governments and are credited as an integral tool for the diffusion and adoption of fisheries management strategies. Despite their numerous perceived benefits within fisheries management, little research has been conducted on FLEs. This multiple case study addressed the research question: "What are the key characteristics of successful FLEs?" Success metrics were defined during a workshop on FLEs in 2013. For this study, the author selected six successful FLEs that were presented during the workshop. As data, the author used documentation of FLEs and key informant interviews with participants and organizers. The following key elements of successful FLEs emerged from analyses: (1) a clear guiding purpose and flexible objectives, (2) careful and considered selection of participants with diverse professions and conservation beliefs, (3) a mix of activities including giving presentations, conducting site visits, talking with local fishers, spending time on boats or in the water, and participating in cultural activities, and (4) logistical

and financial follow-up support, including information dissemination about what participants learned at the FLE. Based on these results, the author provide recommendations for conducting successful FLEs.

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1. Introduction

1.1 Knowledge exchange in environmental management

Sharing environmental management ideas and experiences among stakeholders can help develop conservation best practices [1-6]. While this interaction has traditionally been viewed as a one-way process from conservationists to resource managers and users, knowledge exchange is increasingly seen as a multidirectional process through which the insights of all stakeholders are valued and knowledge is co-produced [4, 5].

Conservation organizations and governments around the world have recently increased their efforts in providing opportunities for knowledge exchange by organizing learning exchanges that unite stakeholders, including conservationists and resource managers and users, from different communities [5-8]. These exchanges allow communities and countries to share conservation and resource management strategies so that best practices can be replicated and unsuccessful ones avoided [9]. Exchanges create an interactive learning experience for all participants involved. In an exchange, local stakeholders are given the opportunity to show and teach visiting stakeholders who are facing similar conservation challenges, and the visiting stakeholders are able to see first-hand what conservation strategies are being used elsewhere. Visitors become increasingly aware of what needs to be improved back home and hosts gain valuable insights on their current practices from the visitors. The face-to-face dialogues that occur during exchanges allow participants to create, share, and reflect on experiences, which are all important factors for social learning processes [6, 10-12]. Social learning is valuable in effective resource management in that it assists stakeholders in developing a common understanding through personal interactions [10, 12]. Additionally, the social networks that are created and strengthened through learning exchanges encourage continued sharing of best

practices among communities after the exchange event [3]. According to Heyman and Stronza [6: 146], learning exchanges could be used to "foster more effective and participatory conservation and support sustainable local livelihoods."

These same perceived benefits have motivated the use of learning exchanges within fisheries management. Organized by fishers, non-governmental organizations (NGOs), and governments to share fisheries challenges and solutions, fisher learning exchanges (FLEs) are considered to be highly effective, and are credited as integral in the diffusion and adoption of fisheries management strategies [1, 6, 8, 13-15]. An FLE can be defined as:

> *"…a peer-to-peer gathering in which fishermen from different communities freely exchange information, experiences, and/or lessons learned about a common practice (fishing) in order to expand awareness, knowledge, skills, and networks for the betterment of fisheries resource management and/or the communities involved. Where appropriate these exchanges may include other fishery stakeholders and members of the wider community.*" [16]

1.2 Fisher learning exchanges as a tool

FLEs are used globally as tools to improve fisheries management. The Food and Agriculture Organization of the United Nations (FAO) recommends FLEs as tools to bridge the gaps in knowledge that exist among fishing communities, specifically small-scale fisheries in developing countries [17]. Exchanging knowledge within fisheries is important because fishers' knowledge differ based on their respective experiences [18, 19]. Bringing fishers and other stakeholders, such as conservationists and resource managers, together can therefore create a shared understanding, which results in more participatory and successful management processes [14].

Despite the numerous perceived benefits and increasing usage of FLEs, little research has been conducted concerning their processes, efficacy, or challenges. There exists a gap in research

on the processes required to facilitate effective knowledge exchange approaches, like those at a FLE [4]. Research on the FLE process is important because a FLE's success can depend on various factors, such as how information is presented and who participates [4]. Additionally, there can be challenges associated with carrying out a successful exchange. Exchanges can be costly, time intensive, and demanding to plan [9, 20]. The objective for this multiple case study was to better understand why FLEs are successful in fisheries management by answering the research question: "What are the key characteristics of successful FLEs?" The goal of this study is to identify best practices so that organizers are better aware of what factors most likely lead to a successful FLE.

2. Research Design and Methods

This study identified the perceived key characteristics of successful FLEs according to the organizers and participants of these FLEs. To investigate the research question, the author of this study employed a descriptive, multiple-case, holistic case study design. The descriptive case study approach is appropriate for analyzing an event in its real-world context without manipulating its environment, such as FLEs in their unique settings [21]. By only focusing on successful FLEs, the cases corroborate each other, strengthening external validity so that this study's findings can be generalized to other FLEs that were not part of this study [21]. The units of analysis are single FLEs or a series of FLEs that occurs at the same location.

To identify the perceived key characteristics of successful FLEs, the author of this study selected six successful FLEs that took place in diverse geographic locations and had varied purposes related to marine resource management (Table 1). The author identified these specific FLEs because they were featured at an international FLE workshop. The workshop, Fishermen Learning Exchanges for Conservation: An Examination of Lessons Learned (FLExCELL), was

hosted by the National Socio-Environmental Synthesis Center in Annapolis, Maryland in May 2013. The author also based FLE selection on the availability of interviewees and information. Furthermore, the author determined FLEs as successful if their outcomes met all of the following criteria: (1) participants expressed an increased understanding and level of support for marine management efforts, (2) the FLE's broad purposes were fulfilled, (3) participants formed cooperatives, NGOs, fisher networks, or other social groups as a result of the FLE, and (4) participants implemented marine conservation strategies (e.g. marine protected areas, gear switching programs, etc.) learned during the FLE.

2.1 Data collection

Twenty-one interviews with FLE organizers and participants serve as the primary sources of data for this study. The author also used written reports, videos, and surveys as supplemental information when available. Interviewees were primarily FLE organizers and participants who took part in the FLExCELL workshop. The author conducted the interviews at the FLExCELL workshop in May 2013 and via Microsoft Skype™ from June 2013-October 2014. These semi-structured interviews each lasted about an hour. The author asked the interviewees to describe the FLEs for which they were an organizer or a participant. The questions examined the FLEs' objectives, planning phases, activities, participants, challenges, outcomes, impacts, and lessons learned. The author recorded all interviews and transcribed them in accordance with human subjects provisions. To ensure confidentiality, the author did not include any identifying information about the interviewees in this paper.

Additional documentation on the six cases was limited and varied depending on the FLE. The analysis included FLE itineraries, participant lists, post-FLE summaries and reports, short documentaries and blogs on FLE events. Available material was either provided by interviewees

or found through online searches. This use of multiple sources of evidence helped corroborate findings, further increasing construct validity.

2.2 Data analysis

The author used a grounded theory approach to text analysis in order to identify central concepts of the transcribed interview text and additional material. Through grounded theory, important ideas inductively arise during data analysis while bias from the researcher is minimized [22]. The author used the qualitative data analysis software MaxQDA 10 to code the data into conceptual categories through an iterative process of constant comparison based on patterns of similarities and dissimilarities in the data. After coding and analyzing the relationships between the code categories, the author identified key characteristics of successful FLEs. The author then sent these characteristics to twelve interviewees for verification and feedback through an online survey administered through SurveyMonkey during July-October 2014. The survey asked interviewees to rate how much they agreed or disagreed with the major findings using a Likert response format and to provide any additional comments regarding these findings. The survey received a 67% response rate and all respondents either agreed or strongly agreed with the author's preliminary findings. The author analyzed the survey results in MaxQDA 10 and incorporated the analysis into the study's results, further enhancing construct validity.

Based on background research and preliminary conversations with experts in the field, the author developed four hypotheses before data collection and analysis. The author then attempted to falsify these hypotheses by engaging in an iterative process of hypothesis testing and theme building during the course of data analysis, leading to the final findings. The hypotheses were:

1. In successful FLEs, FLE objectives must be explicitly defined beforehand.
2. In successful FLEs, participants must be mostly fishers.
3. In successful FLEs, activities must be mostly hands-on.
4. Post-FLE support for participants is important for FLE success.

Name of fisher learning exchange (FLE)	Location(s)	Primary organizer(s) and organization type	Year(s)	Number and occupations of participants	Countries or areas represented by participants	Purpose(s)	Outcomes
1. De Pescador a Pescador I, II, III, and IV FLEs	Mexico	Comunidad y Biodiversidad, Niparajá (non-governmental organization (NGO))	2003, 2006, 2011, 2015	*50-100* Fishers, fishery managers, NGO representatives	Mexico, U.S., Central and South America, Southeast Asia	Share advice and narratives surrounding the themes: fishing in marine reserves, reasonable fishing, fisher's role in fisheries management, and organization to optimize fishing	Formation of cooperatives and networks, implementation of marine reserves and certification schemes
2. Connecting Cultures to Save a Transpacific Ambassador—the Loggerhead Turtle—FLE	Japan, Mexico, U.S.	Pro Peninsula (NGO)	2006, 2007	*~20* Fishers, community representatives, scientists, conservationists, government officials	Japan, Mexico, U.S.	Connect fishers from different countries, share bycatch challenges, develop international bycatch solutions	Gear switch to turtle-friendly techniques, enhanced understanding of threats to sea turtles, development of transpacific network
3. Jamaica-Belize FLE	Belize, Jamaica	The Nature Conservancy (NGO), Friends of Nature (NGO)	2008	*11* Fishers, tour operators, NGO representatives, government officials, filmmakers, fish vendors	Belize, Jamaica	Increase support for conservation efforts among Belizean and Jamaican fishers	Increased level of support for management efforts, creation of fish sanctuaries and fisher network
4. Andavadoaka's Temporary Octopus Closures FLEs	Madagascar	Blue Ventures (NGO)	2008-ongoing	*Number varies* Fishers, community representatives, government officials	Madagascar	Learn about temporary no-take-zones for octopus	Implementation of temporary closures, expansion of fisher network
5. Malaysian Fisheries Delegation Visits U.S. FLEs	U.S.	Marine Research Foundation (NGO), U.S. National Marine Fisheries Service (Government)	2009, 2012, 2013	*3-6* Fishers, fishery managers, government officials, NGO representatives	Malaysia, U.S.	Develop support for turtle excluder device (TED)-compliance in Malaysian shrimp trawl fisheries	Increased value for TED-compliance by participants, collaboration between U.S. TED experts and Malaysian delegation, creation of Malaysian national TED taskforce
6. Guam-CNMI-Palau FLE	Guam, CNMI, Palau	The Nature Conservancy (NGO)	2010, 2011	*~10* Fishers, cultural preservationists	Guam, CNMI, Palau	Learn from peers on other islands, build support for protected areas	Increased level of support for management efforts, creation of conservation NGO

Table 1. Names and descriptions of fisher learning exchanges used as case studies.

3. Overview of Cases

The six selected cases were either one-time FLE events or a series of on-going FLEs that occurred in one location. The earliest of these FLEs began in 2003, while the most recent is on-going. The FLEs took place in various Latin American, Caribbean, African, Asian, and Pacific Island countries. Table 1 provides the names and basic information on the FLEs, which is expanded upon below in short case descriptions that include the FLEs' activities and outcomes.

3.1 FLE 1: De Pescador a Pescador (From Fisher to Fisher) Exchanges

De Pescador a Pescador is a recurring three-day FLE held in Mexico in 2003, 2006, 2011, and 2015 (2015 results were not ready for this analysis). During the FLE, participants gathered in different sites in Mexico to share lessons learned surrounding specific themes for each FLE. The four themes were: fishing in marine reserves, reasonable fishing, fisher's role in fisheries management, and organization to optimize fishing [23]. Participants visited representative marine management sites in the area, presented their own management proposals to government authorities, and discussed their own successes and failures amongst themselves [23]. Some of the major outcomes of De Pescador a Pescador are the formation of fisher cooperatives and networks throughout Mexico by participants. Participants also implemented marine reserves, sustainability certification, tourism businesses, and research programs as direct results of the FLE.

3.2 FLE 2: Connecting Cultures to Save a Transpacific Ambassador—the Loggerhead Turtle

As part of this tri-national FLE conducted during 2006-2007, fishers, scientists and conservation practitioners from Japan, Mexico, and the U.S. traveled the migration route of the loggerhead sea turtle in order to share turtle bycatch solutions and challenges. Participants visited each other's countries for 10-15 days where they attended meetings and workshops surrounding

sea turtle conservation, visited turtle nesting beaches, participated in cultural activities, observed turtles in the wild, and went fishing [24, 25]. As a direct result of the FLE, a fleet in Baja California Sur, Mexico voluntarily switched to turtle-friendly fishing gear after learning how the high bycatch rates of sea turtles in Mexico were affecting nesting populations in Japan, resulting in hundreds of endangered turtles spared per year since then [25]. Furthermore, Japanese fishers and partners developed a pound net bycatch mitigations initiative [26]. FLE participants also generated a shared commitment to addressing the threats to sea turtles, created trans-pacific networks to protect loggerhead sea turtles, and increased their involvement in bycatch reduction solutions [24].

3.3 FLE 3: Jamaica-Belize Fisher Learning Exchange

The Jamaica-Belize FLE was held over a three-week period in 2008 in order to build support for conservation in these countries' fishing communities. Participants travelled between the two countries conducting site visits, snorkeling, giving presentations, and talking with local fishermen [27]. As a result of the FLE, participants increased their level of support for management efforts in their countries, including advocating for and helping develop a national initiative for fish sanctuaries in Jamaica.

3.4 FLE 4: Andavadoaka's Temporary Octopus Closures Exchanges

The Andavadoaka's Temporary Octopus Closures FLEs bring representatives from other coastal villages of Madagascar to the community of Andavadoaka to learn about its community-led temporary octopus closures that have been successful in reversing the decline of the local octopus and increasing fishers' incomes. These FLEs started in 2008 and continue today. Visitors see first-hand how successful the closures are with the goal that participants use the octopus closures as a model for their own marine management strategies. Participants visit

reserves in the area and exchange stories and advice about how to implement the new reserves [28]. As a result of these FLEs, more than 50 villages along the southwest coast of Madagascar as well as other neighboring countries have also put the closures in place. The octopus closures have served as a model for other management strategies such as mangrove crab and spiny lobster closures [28].

3.5 FLE 5: Malaysian Fisheries Delegation Visits United States Exchanges

Malaysian fishers and fishery managers have made several trips to the U.S. to visit the National Marine Fisheries Service's (NMFS) laboratories in this series of FLEs [29, 30]. During these FLEs, the Malaysian delegation saw first-hand how U.S. fishing vessels were turtle excluder device (TED)-compliant and heard local fishers express their support for TEDs, which are a type of bycatch reduction device. During the first two visits in 2009 and 2012, FLE participants conducted at-sea TED trials, learned about the history, legal issues, and certification process of TEDs, and designed and constructed their own TEDs [29, 30]. In 2013, Malaysia's Director General of the Federal Department of Fisheries visited NMFS to test the first ever Malaysian designed TED. As a result of the FLE, NMFS certified the TED design and the Director General established a national task force for implementing a complete TED program in Malaysia.

3.6 FLE 6: Guam-Palau-Commonwealth of the Northern Mariana Islands (CNMI) Fisher Exchange

This tri-national FLE in 2010 and 2011 centered on building support for marine protected areas within Guam and CNMI and used Palau as an example of a country with successful marine resource management efforts. During the FLE, participants visited each other's countries for about a week where they fished, learned about regulations, discussed different fishing methods, and met other local fishers [31, 32]. As a result of the FLE, participants increased their level of

support for management efforts and learned strategies for combining traditional and modern management approaches. Additionally, a participant from Guam started a conservation and cultural preservation NGO [32].

4. Results and Discussion

The key characteristics of successful FLEs fall into four major categories: (1) flexibility with FLE objectives, (2) participant selection, (3) activities during the FLE, and (4) post-FLE activities. The findings corroborate with literature in related fields as discussed below.

4.1 Flexibility with FLE objectives

Some interviewees perceived specific objectives as important to the success of the FLE, while others considered specific objectives constraining to the relaxing atmosphere of the FLE. Surprisingly, some organizers did not set any objectives for the FLE. Instead of focusing efforts on devising specific objectives, interviewees highlighted the importance of developing the FLE's general purpose and using that purpose to guide the FLE process (See Table 1 for examples of these purposes). For example, the overall purpose of the Jamaica-Belize FLE was to increase support for conservation efforts among fishers, while a specific objective was to educate and raise awareness among 10-12 members of the Pedro Bank fishing community. Interviewees across all cases insisted that there must be flexibility surrounding objectives without deviating from the FLE's broader purpose. Interviewees believe flexibility is an important aspect of FLEs because it is crucial for FLE organizers and participants to be able to adapt to unforeseen circumstances and to take advantage of unanticipated opportunities.

Organizers frequently described flexibility as an important characteristic in dealing with the various logistical challenges associated with running the FLEs. Because FLEs typically occur outdoors and on or near the water, bad weather can force FLE organizers to change plans

quickly. For example, during one of the Malaysian Fisheries Delegation's trips to the U.S., strong winds and rain kept the delegation from going out on the research vessel. As an alternative, the organizers suggested the delegation build a TED, which turned out to be one of the more meaningful activities for participants in the FLE.

Interviewees also perceived flexibility as being important because it allows organizers to take advantage of unanticipated opportunities. For example, fishers at a De Pescador a Pescador FLE had a lengthy impromptu discussion on the benefits of sustainability certification, which resulted in a fishing cooperative eventually applying for and receiving the first Marine Stewardship Council (MSC) certification of a community-based fishery [33]. Organizers never anticipated fishers certifying their fishery as a result of De Pescador a Pescador, but the FLE's flexibility allowed for such valuable conversations.

The benefits of flexibility hold true not just in other FLEs [6], but also for other conservation-related exchanges, such as grassland conservation learning exchanges between African and American pastoralists [7]. The flexibility of this grassland conservation exchange allowed participants to create the agenda for the exchange's final workshop during field visits days prior to the workshop [7].

4.2 Participant selection

Remarkably, both conservation advocates and critics attended the FLEs. Interviewees explained that a mix of values sparked stimulating discussions and helped to persuade conservation critics to improve their management practices. For example, during the FLE Connecting Cultures to Save a Transpacific Ambassador, organizers invited a Mexican fisher whose fleet at the time was responsible for high rates of sea turtle bycatch. This lead fisher was well-known as a serious conservation critic, but, as a direct result of attending the FLE, he retired

the damaging fishing gear and switched to more turtle-friendly practices. This decision has saved hundreds of these endangered turtles each year ever since the FLE and has set an example for other fleets in the region [25].

While many FLE participants were fishers, participants also came from other sectors. Government officials (e.g. fishery managers, local government members), NGO practitioners, and scientists also attended the FLEs. For example, organizers invited an equal number of scientists, NGO representatives, and fishers to the FLE Connecting Cultures to Save a Transpacific Ambassador, and organizers of the Jamaica-Belize FLE made sure to invite local seafood merchants to accompany the fishers. The make-up of the participants was based on the context and purpose of the FLE. For example, the Malaysian's delegation most recent trip to the U.S. included only upper-level Malaysian fisheries government officials, because the FLE's purpose was to demonstrate the benefits of a national TED program to the nation's upper-level management. Other FLEs were fisher-focused. De Pescador a Pescador sought to provide a safe space for fishers to communicate and, therefore, made some days of the event for fishers only, while other days were open to government officials and managers.

The diversity of participants, either in occupation or opinion, seen across the cases also exists in other FLEs [6] as well as in other conservation-related learning exchanges [6, 7, 20]. In a study on a coastal management learning exchange, researchers identified the multi-perspectives of the participant group as a key element that determined the success of the exchange [20]. Participant diversity is described by other studies as beneficial to collaborative learning and resource management efforts [34, 35]. Participants with diverse occupations and cultural backgrounds foster learning because they have multiple perspectives and sources of knowledge [35], creating opportunities for constructive conflict [10] and helping generate new solutions to

old problems [36]. In a study on stakeholder forums in the U.K., members of different sectors of the fish distribution chain engaged in dialogue. Afterwards, the participants expressed a "deeper understanding of their complementary roles, concerns and capacities for action" due to their diverse backgrounds [14]. The participants were then more willing to collaborate with each other on future initiatives because of this deeper understanding. Another study by Bodin and Crona [34] highlights that occupational diversity among key individuals is important in community-based resource management because it allows the community to better respond to change and adapt to new circumstances.

There was little gender diversity at the successful FLEs. This lack of gender diversity in FLEs is likely because fishing is a male-dominated activity at many of the FLE locations. However, some of the organizers noted the presence of women and how having them there was important to the FLE process. For example, women typically attend the Andavadoaka's Temporary Octopus Closures FLEs. Organizers of these FLEs know they need buy-in from the fisherwomen in order to implement any octopus closure, because women catch most of the octopus in the region. The organizer of the Jamaica-Belize FLE noted that the woman participant in that FLE brought a slightly different perspective to the group because she was a woman and a seafood vendor. Because the presence of women was not a selection criteria for the FLEs included in this study, there were not enough instances of women being included in FLEs for the author to explore this finding in more depth. However, this is a topic worthy of further investigation in future studies.

Regardless of conservation opinion or profession, it is important to note that all participants were selected as leaders in their home community. Organizers perceived participant selection as an important element for successful FLEs. They viewed participant selection as an

investment in the future of the communities and fisheries and therefore strongly warned against picking "just anybody" to attend the FLE. They believed that having key individuals attend the FLE was critical to the FLE's success. Interviewees perceived these individuals as "key" in that they were influential, passionate leaders, well-respected, credible, and had extensive social ties within their communities or fisheries. Interviewees believed that these community leaders have the most success at opening the minds of other participants and community members and sharing what they learned at the FLE throughout their own social networks upon return home. Some interviewees noted that sometimes the influential, passionate leaders that should participate in FLEs are not those with official positions within the community and therefore organizers of a FLE must contact community experts to identify opinion leaders and other key individuals of the community.

To select key individuals, organizers came up with a list of desirable characteristics of FLE participants and relied on colleagues, associated organizations, or other experts who were familiar with the community to identify community members who had these characteristics. A FLE organizer summarizes how the participant selection process usually occurs:

> *"We just selected sites, and we depended on our other associate organizations or partnering organizations for them to help us select the actual fishermen, because we didn't know fishermen in every site. We would say 'We think this site would be a good site because…we know that they had a proposal to make a marine protected area in this area, so we should bring somebody from that site.'"*

This process of contacting community experts to contribute to the participant selection process was mentioned in all cases. Interviewees perceived this consultation as an effective way of inviting the key individuals organizers wanted to have at the FLE.

The importance of key individuals in collaborative learning and co-management environments is supported by studies in other related disciplines. For example, strong leaders

play a critical role in successful community based fisheries management, because they provide motivation, stability, and links to other stakeholders for community members [37, 38]. Trusted, knowledgeable, and experienced key individuals facilitate collaborative learning [14, 35] and collective action [34, 39] by providing the necessary guidance to make sure the learning outcomes are achieved, while also providing the necessary links to government agencies and NGOs for sources of information and further support [14, 35, 40]. When key individuals are able to exchange information with other stakeholders, such as during a FLE, the group can identify common interests and gather support for management initiatives [40]. Finally, key individuals who occupy a central location within networks can help communities change the way they utilize their natural resources, as was found in a rural fishing village in Kenya [41].

4.3 Activities during FLE

While hands-on activities, such as site visits and spending time on boats either fishing or snorkeling, were widely used across the cases, interviewees also perceived presentations, conversations with local fishers, and cultural activities as particularly beneficial to the success of FLEs.

Presentations at the FLEs included formal and informal presentations, question and answer sessions, and personal narratives. They took place in a classroom setting or in the field and provided opportunities for FLE participants to introduce themselves, provide details of a conservation program, and ask questions. The personal narratives allowed participants to share their own experiences regarding management strategies and to provide advice to fellow participants based on their lessons learned.

Participants also shared narratives by talking with local fishers during the FLEs. These local fishers were typically not part of the group of formal FLE participants but instead lived and

worked near where the FLEs took place. Participants' conversations with local fishers occurred either in a classroom setting or during site visits. Sometimes FLE organizers planned these conversations, while other times the interactions were spontaneous.

While interviewees perceived presentations and conversations as key in sharing management strategies, they also viewed cultural activities as important for allowing the participants to understand each other on a more personal level. For example, during Connecting Cultures to Save a Transpacific Ambassador participants visited local schools, attended traditional ceremonies and dinners, and participated in sporting events. Participants of the Malaysian Fisheries Delegation Visits U.S. FLEs also participated in some cultural activities such as eating local cuisine and exchanging cultural gifts. Organizers of these FLEs perceived these activities as important in enhancing cross-cultural understanding among participants, which was vital in achieving the FLE's purpose. It is possible organizers chose to use cultural activities in these particular FLEs since participants came from countries with notably different cultures.

During site visits, participants visited communities with exemplary management plans, successful protected areas, and alternatively villages that have suffered from a lack of effective management. Participants also toured local fishers' boats and seafood processing plants. The sites with successful management programs provide participants with a first-hand example of how conservation and management strategies can be executed well, while the sites with unsuccessful management (e.g. less fish, more bycatch, etc.) provide an example of what happens when management plans fail or are not implemented. For example, during the Jamaica-Belize FLE, the Jamaican delegation witnessed how successful a marine protected area can be when they went snorkeling in a marine protected area in Belize, while the Belize delegation saw the then nearly depleted fish stocks of Jamaica, which encouraged them to continue protecting

their resources. Overall, site visits allowed participants to see first-hand how management strategies, and consequently environmental conditions, differ among locations.

Many times site visits involved participants spending time on the water in boats. While on the boats, participants commonly fished, toured the area, went on snorkeling or diving trips, or conducted gear trials. Many times the local fishers drove the boats, which created additional opportunities for participants and local fishers to share their experiences.

Interviewees perceived activities that formalized the FLE as important to the participants. These activities, such as signing commitments and/or receiving certificates, recognized the commitment of participants for attending the FLE and motivated their continued involvement after the FLE. For example, before the Jamaica-Belize FLE, participants signed a simple commitment letter that outlined the participants' roles and responsibilities during and after the FLE. At De Pescador a Pescador, participants gave verbal commitments about actions they would take after FLE. Participants of the Malaysian Fisheries Delegation Visits U.S. FLE met with the U.S. Ambassador to Malaysia for a send-off ceremony before traveling. At the end of the FLE, the U.S. participants presented the Malaysian delegation certificates of completion during the closing ceremony.

In addition to specific activities, interviewees commonly described a "turning point" during the FLE, which the author of this study define as a pivotal moment that is crucial for achieving the intent of the FLE. These "turning points" most often occurred when participants were on or in the water or listening to testimonials during site visits. For example, during a site visit on the Connecting Cultures to Save a Transpacific Ambassador FLE, a Mexican fleet owner waded among sea turtles on a Hawaiian beach, which reminded him of the numerous turtles that used to gather in Mexico and gave him hope that the turtles could recover in his country. Shortly

after returning to his home in Mexico, this fisher ordered his fleet to change to turtle-friendly fishing gear.

The importance of two-way communication and hands-on participation for participants' learning identified in this study also holds true in studies on other conservation-related exchanges [6, 20]. The combination of participants telling their own stories regarding certain management issues and seeing and hearing from their counterparts first-hand, about their experiences cemented the learning that took place. Studies have found that people are more likely to learn when they speak from their own experiences and teach others [42, 43], such as when participants presented or talked with local fishers. Peer-to-peer sharing also increases adoption of marine conservation technologies [39]. Learning is also more likely to occur when people have personal, first-hand experiences, such as when participants visited sites and spent time on boats [44, 45]. Experts refer to this direct participation and learning-by-doing, as "experiential learning" [44] or "participatory learning" [46]. Learning-by-doing helps participants better retain new information while also increasing their enthusiasm about the topic [47]. Finally, cultural activities during conservation-related exchanges allow participants to reflect on the influence of their cultures on management frameworks in their home countries and identify potential management interventions [20].

4.4 Post-FLE activities

Interviewees perceived financial and logistical programmatic support for FLE participants as vital to the success of the FLE. One organizer described how after the FLE, participants return home where "it's easy to get sucked into the day to day and lose the lessons, passion, and experiences gained at the exchange". Follow-up support helps to ensure that the lessons learned at the FLE are implemented and that the FLE's impact extends beyond just the event itself. For

example, organizers of the Guam-CNMI-Palau FLE have continued to visit the communities who participated, facilitating discussions amongst community members and helping launch future projects such as ones related to data collection or community engagement. Many times, organizers helped participants to plan and lead meetings with their own communities after their return from the FLE.

Not all FLE organizers, however, were able to provide as much follow-up support as they had wanted. Interviewees identified a lack of funding as a major challenge when providing follow-up support. For most cases, funding stopped after the FLE ended which limited the extent of follow-up work organizers could conduct with participants. Interviewees highlighted the importance of viewing FLEs not as a week-long event, but rather as an on-going process that requires continued collaboration and support among participants and organizers. The organizer of the Malaysian Fisheries Delegation Visits U.S. FLE was particularly successful at raising funds for post-FLE support. In funding proposals, the organizer presented FLEs as a small part in a larger program process. For example, the program was to introduce TEDs in the shrimp fisheries of Sabah, Malaysia, while the FLE played an integral part of this program by developing the necessary support for TEDs among Malaysian fishers and government officials. Framing the FLE as a small part of a larger program created buy-in from donors by updating them on any long-term impacts that resulted from the original FLE. The donors felt as if they were paying into the entire program, instead of just the FLE.

In addition to programmatic support, interviewees also perceived information dissemination about what was learned at the FLE as important to the FLE's success. Information dissemination typically consisted of local meetings or casual conversations with other community members or fishers. The main goal of this dissemination was for participants to share

with their home communities why they attended the FLE and what they learned during the FLE in order to inform and create discussions among community members. A particularly effective method of sharing information was documentaries. For example, organizers of the Jamaica-Belize FLE partnered with local filmmakers to produce documentaries on the FLE [48]. After the FLE, participants traveled to international conferences to present the short films and discuss the FLE's impacts. Some organizers had anticipated making documentaries about their FLEs, but they were never able to because of time and funding constraints. The organizer of the Malaysian Fisheries Delegation Visits U.S. FLE kept a blog [29] to report on the FLE's daily activities and to upload pictures. This blog turned out to be a useful tool to keep FLE donors updated. It was also valuable to have media coverage during the FLE. During Connecting Cultures to Save a Transpacific Ambassador, Japan broadcasted some FLE events. Organizers perceived this media coverage as influential in increasing awareness about the FLE.

The benefits of continued interaction among participants to learning and collaboration is also highlighted in previous studies [14, 35]. The study on stakeholder forums in the U.K. [14] found that the longer the duration of the interaction of the stakeholders, the more tangible the benefits regarding the original issue. Events with longer durations resulted in more permanent and stronger relationships between the stakeholders, including an increase in mutual trust and expansion of collaboration networks, which allowed the participants to "develop higher problem solving capabilities reaching well beyond the circumstances of the original issue" [14: 186]. The researchers of that study consider this longer time frame an essential investment in order to produce successful outcomes and recommend having an open-ended process of engagement among participants in any interactive learning environment. Results from another study [35] suggest that knowledge acquisition is higher when this engagement continues for at least two

years. Other studies have also noted time and finances as constraints in achieving successful multi-stakeholder approaches [3, 49].

5. Conclusions

This is one of the first studies to examine multiple FLEs and identify key factors that are perceived as important to their success. The author identified these factors by investigating the question: What are the key characteristics of successful FLEs? Based on this study's results, the author revised the original hypotheses as stated in the Research Design and Methods section:

Hypothesis 1 (disproven): In successful FLEs, FLE objectives must be explicitly defined beforehand.

Evidence: Some FLE organizers explicitly identified objectives before the FLE, whereas others never identified objectives and instead used a clear purpose to guide the FLE.

Finding: FLEs should follow a general purpose and when objectives are present, organizers should be flexible in following or adapting those objectives as best suits the general purpose and evolving circumstances.

Hypothesis 2 (disproven): In successful FLEs, participants must be mostly fishers.

Evidence: While most all cases involved participation by fishers, in some cases fishers were not the majority of the participants. In one FLE that focused specifically on managers, there were no fishers present. Other common professions represented include: managers, NGO representatives, and scientists.

Finding: When choosing participants, the participants' professions will depend on the FLE's purpose, but all participants should be influential individuals within their communities.

Hypothesis 3 (upheld with additions): In successful FLEs, activities must be mostly hands-on.

Evidence: Hands-on activities such as site visits, snorkeling, and time on boats were common across the FLEs and seem to play a role in creating pivotal moments that were crucial for achieving the intent of the FLE. It is also important to note, however, that presentations and conversations with local fishers were also common activities and perceived as valuable to the FLE process.

Finding: FLEs should include a combination of hands-on activities, informational presentations, and conversations with local fishers.

Hypothesis 4 (upheld): Post-FLE support for participants is important for FLE success.

Evidence: Both organizers and participants stressed the importance of conducting post-FLE activities and that FLEs should be viewed as part of an on-going conservation process as opposed to a one-time event.

6. Recommendations

The results of this study will guide future FLE organizers in planning successful FLEs, thereby increasing their effectiveness in improving fisheries management efforts. Funders of FLEs will also benefit from the results in that they now can invest in FLEs that are more likely to produce long-term benefits. Based on the results of this study, the author recommend the following when planning and conducting a FLE, organized by this study's findings:

Recommendations for FLE objectives:

- Design the FLE with an overarching purpose. Specific objectives may or may not be suitable for the FLE. If organizers do use specific objectives, there must be flexibility surrounding those objectives in order to adapt to unforeseen circumstances and to take advantage of unanticipated opportunities.

Recommendations for participant selection:

- Carefully consider who (e.g. fishers, government officials, NGO representatives, etc.) should participate in the FLE based on the FLE's purpose. Fishers' participation is important, but there should also be a diversity of other professions present when appropriate.
- It is optimal that participants are influential individuals in their communities. It is valuable to invite both conservation critics and advocates.

Recommendations for activities during FLE:

- Use a combination of activities that include, when possible, participants giving and hearing presentations and testimonials, visiting nearby marine management sites, talking with local fishers, and spending time in the water snorkeling or on boats with local fishers.
- The pivotal moments that are crucial for achieving the intent of the FLE are likely to occur when participants are on or in the water or listening to testimonials from their peers during site visits.

- Use cultural activities to enhance cross-cultural understanding among participants, especially when they come from notably different cultures.
- Use activities that formalize the FLE in order to recognize the commitment of participants and motivate their continued involvement. These activities could include signing commitments, giving certificates of completion, and having send-off ceremonies.

Recommendations for post-FLE activities:

- Provide post-FLE support to participants. This step was perceived as critical to the success of FLEs. Particularly valuable post-FLE activities include disseminating information (in person or through video) or helping participants implement a strategy learned during the FLE by facilitating community meetings or helping with program design.
- Include financial and logistical post-FLE support in the original proposal for the FLE in order to guarantee funding for these follow-up activities. FLEs should be viewed as an integral component of larger fisheries management initiatives.

This study included a wide range of FLEs around the world that involved different organizers and diverse participant groups and took place in varied contexts. This study's results and recommendations, therefore, should be applicable and relevant to future FLEs in nearly any fisheries context and could extend to other sectors. There were consistent parallels between this study's findings regarding FLEs and other conservation-related learning exchanges. These parallels indicate that this study may also be applicable to other learning exchanges outside of FLEs. It is important to note that the context of every FLE is different geographically, politically,

culturally, and financially. FLE organizers should carefully consider and account for the context and stakeholder dynamics in planning new FLEs.

This study demonstrated the importance of follow-up support after the FLE, but additional research is needed on the most beneficial form of support, as well as timelines and budgets for those follow-up activities. Researchers and practitioners should also work together to design methods for monitoring and evaluating FLEs. This evaluation should include the longer-term impacts, such as continued exchange of knowledge and expansion of social networks, that would not have occurred without the initial FLE [4].

Finally, the amount of time, resources, and coordination necessary for planning and executing a FLE should not be underestimated. The goal of this study was to provide guidance for FLE implementers towards increasing efficiency with funders' resources and maximizing the likelihood of success. This guidance is especially important as FLEs are increasingly used as tools to foster knowledge exchange among diverse stakeholders. While FLEs are perceived as effective for improving marine resource management, they should be used in combination with other fisheries management strategies in order to further advance marine resource management practices.

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