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The scope of fisheries learning exchanges for conservation

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ABSTRACT

Over the past decade, fisheries learning exchanges (FLEs), in which representatives from different fisher communities come together to share marine conservation challenges and solutions, have been produced by a range of non-government organizations (NGOs) and federal agencies. This paper presents an overview of the history and scope of FLEs. A literature review, questionnaire, expert workshop, and key informant interviews were conducted. A content analysis was performed of the key informant interviews using a grounded theory approach. This paper offers a formal definition of a FLE, describes different configurations of FLEs, discusses the utility, common objectives, and common outcomes of FLEs, and outlines a research agenda for future work on FLEs. Organizers have found FLEs to have four main utilities: 1) FLEs leverage peer-to-peer sharing so that participants open each other's horizons for improving fisheries and fishing 2) FLEs catalyze and speed change, 3) FLEs are good for sharing thoughts that are difficult to receive and accept, 4) FLEs facilitate involvement and commitment from relevant parties needed for change. The most commonly documented purposes of FLEs were related to marine reserves, fisheries management strategies, bycatch reduction, and alternative livelihoods to fishing. The most common objectives among the FLEs surveyed were to encourage action or behavior, to openly exchange ideas, and to introduce new technology. As a result of FLEs the common outcomes were that participants were inspired to make changes, new programs were implemented, relationships were built and connections made, and participants enhanced their understanding of marine management strategies.

1. Introduction

Overfishing, a leading socio-environmental problem in the marine realm, has reduced biodiversity, modified ecosystem functioning, and is jeopardizing the wellbeing of the billion people who depend on seafood as their primary source of protein [1–3]. With more than a third of fish stocks worldwide overexploited or depleted [4,5] improving fisheries management has become a global priority. While fisheries scientists and managers have developed robust methods for assessing fish populations, they in general have only recently begun to embrace that managing fisheries depends on understanding and managing people [6]. As fisheries scientists increasingly focus on the human dimensions of fishing, attributes of fisheries success, such as robust social capital, are emerging [7].

Over the past decade, fisheries learning exchanges (FLEs), in which representatives from different fishing communities are brought together to share fisheries management and conservation challenges and solutions, have been produced by a range of non-government organizations (NGOs) and federal agencies. Organizers and participants believe learning exchanges are an important part of Integrated Coastal Management [8], and "tremendously valuable in educating and advancing fisheries management efforts" [9]. Exchanges give fishers the opportunity to gather and share information about best practices and local marine environments among themselves and among scientists, regulators and other fishing industry stakeholders [10,11].

As a relatively recent development within the resource management field, little has been written about the conceptual grounding of learning exchanges within the context of resource management. However, knowledge can be extrapolated from related more well-studied management tools. Employing the theoretical frameworks used in resource management reveals ways in which learning exchanges can be used as a tool in the development and dissemination of resource management best practices. These elements that learning exchanges share with other successful management efforts (e.g. multi-stakeholder collaboration,

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communities of practice, community-based management, co-management) include having platforms for personal interactions, fostering experiential and social learning, and cultivating social capital. Learning exchanges provide participants with hands-on, personal experiences, which are essential to experiential learning [12] and in turn help participants better retain information while also increasing their enthusiasm about the topic [13]. Learning exchange participants are also involved in the process of social learning, which has also been cited as important in resource management [14–17].

Providing platforms for the exchange of knowledge and sharing of ideas is a critical part of a successful resource and fisheries management plan; it is especially important for involving local communities in the management process [18–22]. Learning exchanges not only provide a platform for personal interactions, but they also typically bring together communities from afar that otherwise may not have had the chance to meet. This connecting of groups that had previously not interacted (what Bodin and Crona [23] refer to as "bridging ties") was proposed to be one of the most important factors in the creation of a successful co-management process [24]. In fisheries management, bridging ties are used to exchange critical information [25]. According to Grafton [21], the social ties that result from connecting communities, fishing, and regulators are "important in ensuring successful fisheries management outcomes." Although the general body of knowledge about fisheries management is helpful for understanding FLEs, clearly more research is needed both in terms of novel work and linking existing bodies of scholarship to FLEs through interdisciplinary studies.

To date, the success of FLEs has been officially defined and measured mainly by exchange organizers. These evaluations, which might be subjective and ad hoc, have been deemed positive enough that organizers repeat and replicate exchanges, and some organizations have established them as exchange series [9]. Ranging from local to international in participation, fisher exchanges are expensive, representing considerable investment by organizers (travel, venue, facilitation, administrative costs, and corresponding fundraising) and by participants (time, travel, and opportunity costs). Millions of dollars have been invested in putting on FLEs by NGOs and federal agencies. Even given this large investment, little evaluation has been conducted on the effectiveness of FLEs. Most of these are informal, internally-conducted evaluations [9]. There exist guidelines for exchanges in general [26,27] but these guidelines focus on agriculture and sustainable forestry and do not likely capture the nuances of managing marine and coastal systems [28]. Furthermore, it is unclear if these guidelines arose from an empirically-grounded, peer-reviewed process. Moreover the scholarly literature with a specific focus on FLEs is limited to two papers [22,29]. Given the great need for and scarcity of marine conservation funding, the intent of this research was to understand how FLEs work and deduce prescriptive guidelines in order to support practitioners of FLEs in maximizing their effectiveness.

This paper will give an overview of the history and scope of FLEs. It will offer a formal definition of FLEs, describe different configurations of FLEs, discuss the utility, common objectives, and common outcomes of FLEs, and outline a research agenda for future work on FLEs. This paper also serves as an introduction to the other articles in this special issue which include: 1) a comparative case study that elucidates "Key characteristics of successful fisheries learning exchanges" [30], 2) guidelines for consideration when organizing a FLE [31], and illustrative examples of how FLEs have 3) yielded intended and unintended consequences in community-based fisheries in Madagascar [32], 4) addressed sea turtle conservation during a tri-lateral exchange between the United States, Mexico, and Cuba [33], and 5) created a transpacific sea turtle conservation network between Japan, Mexico, and the United States [34].

2. Methods

In May 2013, the workshop *Fishermen Learning Exchanges for Conservation: An Examination of Lessons Learned (FLExCELL)* was held. It included twenty-one experts consisting of some of the world's most experienced organizers of FLEs and key fishers, as well as specialists in learning, fisheries management, and marine conservation, from nations throughout the Americas as well as Palau, Guam, and Madagascar. Twenty-five experts were invited and twenty-one were able to attend. The participants were identified based on publications, reports, and word-of-mouth about their work with FLEs for conservation. For each FLE represented at the workshop, an organizer and a participant were invited to attend the meeting. The organizers of each FLE nominated the participant invitee, the only constraint being sufficient fluency in English. Each individual present was considered an expert in their field of practice as judged by the organizers and their peers based on their previous activities. The organizers, in keeping with the guidelines of the workshop sponsor and host, which was the National Socio-Environmental Synthesis Center (SESYNC), strove for diversity in workshop participants. The objectives of this workshop were to: build community, devise a shared understanding of FLEs, compile lessons learned, and create a research agenda. The information presented in this paper is drawn from data collection efforts connected with this workshop.

Specifically, prior to the workshop an extensive literature review was conducted of published papers and grey literature about learning exchanges for natural resource management as well as theoretical concepts related to learning exchanges, such as experiential and social learning. This was summarized into a document that was distributed to all the experts in advance of the workshop, creating a common platform of language and knowledge. The content of this review was then augmented, shaped, and edited by the experts throughout the workshop to more fully reflect their combined knowledge of FLEs and related concepts.

Also in advance of the workshop, the experts completed a questionnaire. The questionnaire was pre-tested and revised before distribution via email to 25 experts. Four email reminders were sent to complete the questionnaire with a 68% response rate from those who were invited to attend the workshop. The responses were summarized into a document that was distributed before the meeting, then during the meeting the summary was presented to the group for a collective editing process. This collective process allowed the inclusion of expert knowledge from all present, not just the ones who had completed the questionnaire in advance, for a total of 24 contributors. This questionnaire asked them to define fisheries learning exchanges (termed fishermen learning exchanges in the document) and then bound the definition by listing inclusion criteria (characteristics a FLE must have), exclusion criteria (if these characteristics are present then the interaction cannot be considered a FLE), descriptive example(s) of typical FLEs, descriptive example(s) of atypical FLEs (based on their definition of a FLE this would be a FLE, but not everyone would consider it so), close but not (could almost be considered a FLE, but it is just outside the definitional boundary of a FLE). The questionnaire went on to request a list of past exchanges attended and future exchanges they plan to attend, as well as positive and negative lessons learned from the exchanges in which they took part.

During the workshop, experts participated in two of six breakout groups, which focused on tasks related to furthering research on FLEs and compiling expert knowledge of FLEs. The resulting products of the breakout groups underwent two rounds

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of review and revision before finalizing the workshop report [35].

During and following the workshop, interviews were conducted with 21 experts (19 who attended the workshop, two who did not) about the purposes and outcomes of exchanges in which they were involved. These interviews were transcribed (and translated when needed) and then analyzed with a grounded theory approach to content analysis using the qualitative data analysis program MAXQDA [36,37]. Grounded theory is an iterative process of hypothesis testing, theory construction, and theory revision that allows the identification of themes that arise from the data in a way that reduces researcher bias. The themes covered in this paper include key features of FLE, utility of FLEs, and common objectives and outcomes of FLEs.

3. History of FLEs

To understand the scope and application of FLEs, the history of FLEs was investigated. Drawing on the collective knowledge of the workshop participants, an extensive literature review, and online searches, 68 individual exchanges and exchange series (i.e. multiple exchanges over time with the same participants, communities, locations and/or topic matters) were identified. These FLEs occurred during 1995–2013. The first cataloged FLE, Southern Belizean Fisher Exchange, took place in 1995 for fishers to build their understanding of marine reserve benefits to ecology and tourism. The concept of FLEs appears to have taken hold in 2004 when five FLEs were held and after that point the rate of FLEs has consistently and substantially increased (Fig. 1). The geographic density of FLE sites is concentrated around the area where FLEs first occurred in the Americas with modest expansion to other regions (Fig. 2). The majority of FLEs have been organized (Fig. 3) by NGOs and primarily the immediate funders have been government or NGOs (supported by philanthropic foundations) (Fig. 4). The most commonly documented purposes of FLEs were related to marine reserves, fisheries management strategies, bycatch reduction, and alternative livelihoods to fishing. An informal survey of four FLEs showed that on average $2700 USD was spent per participant. Over 4 years of researching and cataloging 68 FLEs revealed that only 21% of the FLEs in the catalog have a final report (either a formal report or brief write up). Only 9% of FLEs involved some kind of evaluation and most of these were conducted internally not by outside neutral parties. Even if there are reports and evaluations that have not been uncovered by the years of research, one must question the utility of these reports and evaluations that are not readily available to the larger FLE community.

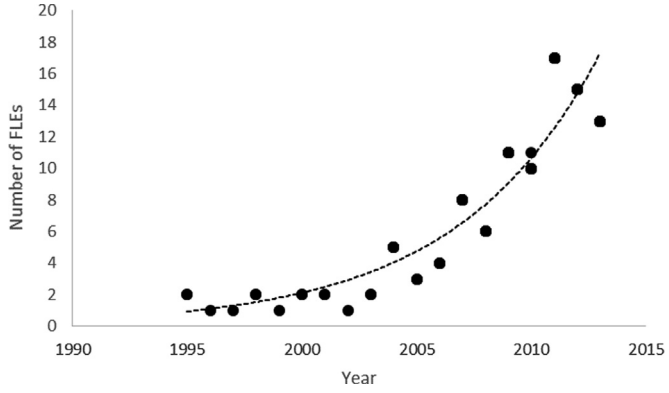

Fig. 1. Number of FLEs per year. For FLE series that were reported to have occurred over a range of years these are represented as having taken place every year of the range.

4. Definition and key features of FLEs

Conservation organizations, communities, and other actors around the world are currently organizing and participating in learning exchanges. These groups have used a variety of terms to describe learning exchanges such as, South-South exchanges [29], cross-visits [38], look and learn visits [39], and study tours [22,26]. Definitions of these terms also differ, but most have two central components: knowledge exchange and travel. In order to build the body of scholarly knowledge of FLEs and come to consensus understandings, there is a need for a widely accepted definition of a learning exchange to guide and bound research.

Through the questionnaires and discussions at the workshop, the experts developed a shared understanding of what defines a fishermen learning exchange. Subsequent research showed that exchange participants need not be fishers and in fact, successful exchanges often include non-fishers [30]. To reflect this, the term was refined to become “fisheries learning exchange” (FLE), highlighting the centrality of the topic of learning rather than the profession of the learners. Thus, a FLE is 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. With the general exception of the academics, the participants in the workshop strongly felt that “fishermen” was the best word for those who fished as a livelihood regardless of gender. Participants’ definition of peer allows it to be broadly construed as those involved in the fishing enterprise, which is connoted by the terms fishery stakeholder and wider community.

To elucidate common features of FLEs that would fall under this definition, the experts independently identified a total of 22 inclusion criteria covering the topics of exchange objectives, exchange participants, and exchange format. The experts also identified 15 exclusion criteria. Below are the most common criteria in that they were independently listed by approximately 30% or more of the 17 experts who responded to the questionnaire.

Inclusion criteria:

- The FLE must have a clear objective and deliberate questions must be posed by each party. (41%)
- Fishers should be the majority of participants. The participant list could be confined to solely fishers or could also include all associated stakeholders from tourism, government, etc. (41%)
- Fishers need to be from different communities and fisheries so that experiences do not overlap too closely. (35%)
- There must be a two-way (or more) exchange of conversation, information, etc. among peers. (29%)
- There must be an unbiased facilitator who is constructive, proactive, impartial, responsible, and respectful. (29%)

Exclusion criterion:

- There are intimidating factors that would limit the exchange of information, such as manipulative facilitators or government officials that would make fishers feel reluctant to share information. (35%)

The respondent experts listed a wide variety of exchanges examples that fall into the categories of typical FLE, atypical FLE, and close but not an FLE. The example with the highest frequencies of repetition within each category are listed below.

Typical FLE:

Fig. 2. Map of FLE participants' home countries (in black).

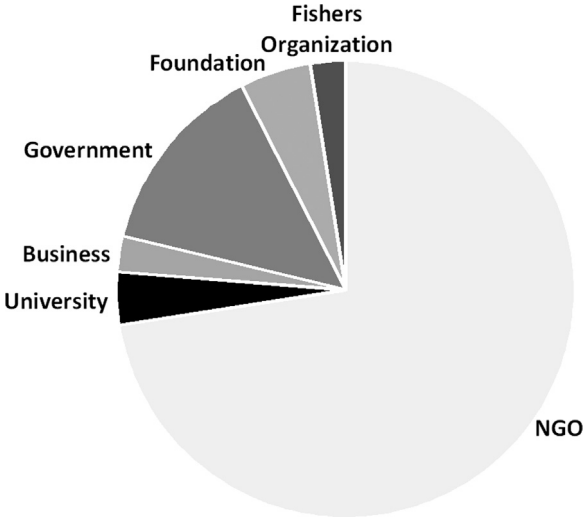

Fig. 3. Proportion of cataloged FLEs (n=40) organized by different types of organizations.

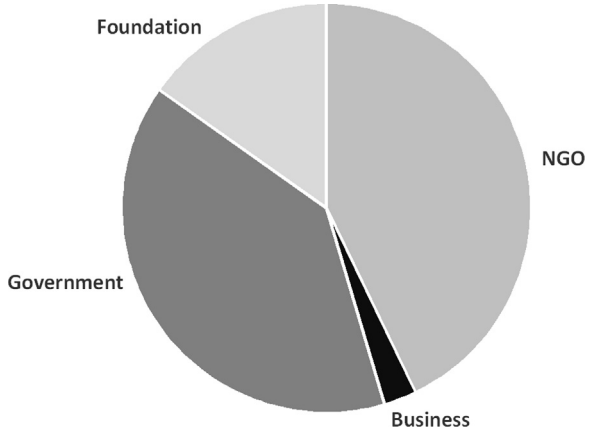

Fig. 4. Proportion of cataloged FLEs (n=29) funded by different types of organizations as the immediate funder.

- A typical learning exchange is an exchange of individuals (fisher leaders and representatives) from one community/country to another with specific objectives to learn about something, i.e. a fisheries management strategies that is being implemented. Participants will learn how the strategy works, what it entails, and what are enabling conditions to ensure the strategy can be implemented. A typical learning exchange involves a field visit and activities or workshops in gear building, specific fishing methods, or fishing co-op operations. (35%)

Atypical FLE:

- An atypical FLE would be two fishers conversing and exchanging ideas. (12%)

Close but not a FLE.

- Events that use a top-down approach, where fishers do not control and "own" the event are similar to but not FLEs. (18%)

Collectively the definition, criteria, and examples of FLE highlight that FLEs must include face-to-face interactions between people from different areas who have knowledge about fisheries to share. The FLE should largely include fishers and be crafted in accordance with fishers' objectives. However, this latter requirement to focus primarily on fishers could be an artifact of the original prompt to define *fishermen* learning exchanges. It is

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justifiable to expand the focus beyond fishers to those involved with fisheries, in light of the findings of Thompson et al. [30] that it is often warranted to expand participants to include those with professions other than fishing that are still relevant to the exchange topic. Furthermore, the key components of this definition for FLE might hold true for learning exchanges for natural resource management, in general.

5. Configurations of FLEs

The experts identified three typical configurations of FLEs: reciprocal FLE, model-transfer FLE, congress-style FLE. Although other configurations might exist, all the FLEs with which the experts had experience were covered by these three configurations. A reciprocal FLE is when delegations of fishers and other stakeholders from two or more communities reciprocally visit each other to share information and experiences, such as to identify and co-derive solutions to mutual problems (Fig. 5). For example, during 2005–2007, delegations from Mexico, Japan and Hawaii travelled among the three countries to share bycatch mitigation challenges and solutions, facilitated by the Grupo Tortuguero, the Ocean Foundation and the Umigame Association. As a result of this reciprocal exchange, bycatch mortality of endangered loggerhead sea turtles was dramatically reduced in Mexican waters, and the groundwork was laid for doing so in Japanese pound nets [40].

A model transfer exchange is when fishery/community representatives visit a model fishery/community to learn about a management solution, technology, or other beneficial information (Fig. 6). For example, in order to encourage the adoption of catch shares in international fisheries, the Environmental Defense Fund brought fisheries stakeholders from around the world to learn firsthand the benefits of the catch shares system of British Columbia. As a result, participants have initiated catch shares programs in numerous sites [41].

A congress-style exchange is when representatives of multiple fishing communities gather in a central location to exchange information, experiences, and/or solutions (Fig. 7). For example, Pescador a Pescador is a congress organized biennially by Comunidad y Biodiversidad (COBI) and Niparajá that brings together fishers and other stakeholders from Mexico and other countries to identify sustainability opportunities. In these exchanges, fishers collaborate on fishery management strategies and are given the opportunity to present their own management proposals to government authorities in a non-threatening environment [42].

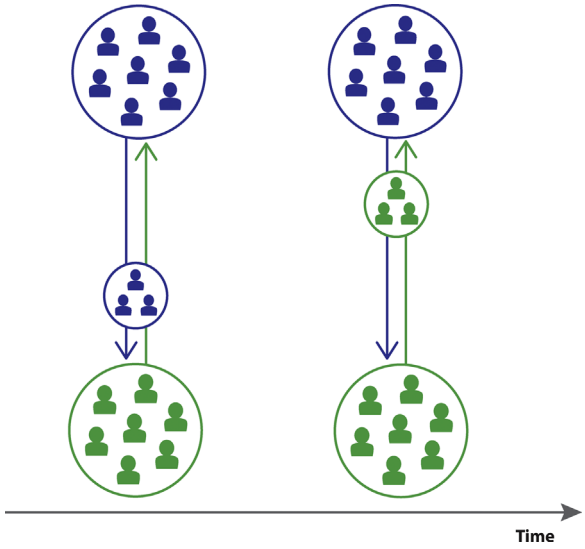

Fig. 5. Representation of a reciprocal exchange where delegations of stakeholders (small circles) visit each other's communities (large circles) over a certain period of time in order to share information and experiences. The arrows denote the exchange of information between communities.

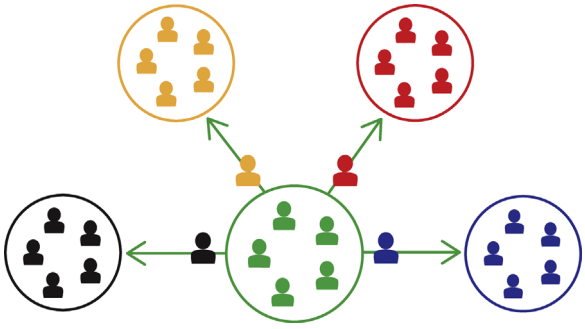

Fig. 6. Representations of a model transfer exchange where representatives from communities (outer circles) visit a model community (inner circle) to learn a management solution. The arrows denote learning about a new management strategy.

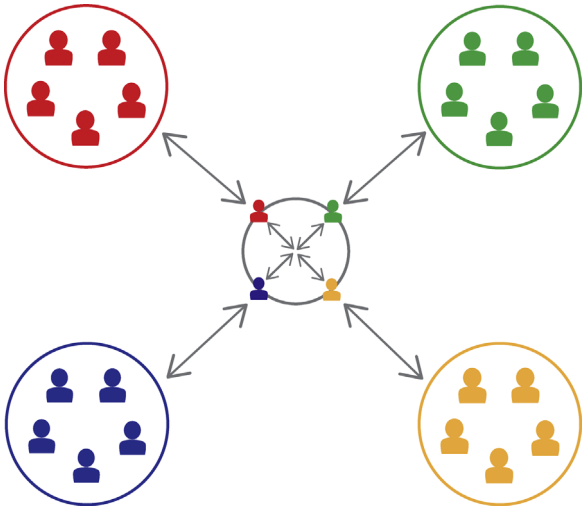

Fig. 7. Representation of a congress-style exchange where representatives of communities (large outer circles) come together (small inner circle) in order to exchange ideas and solutions. The arrows denote exchange of information.

6. Utility of FLEs

While specific FLEs may have a variety of objectives and outcomes, as general tools FLEs have four utilities as identified by the experts. FLEs are just one tool that can contribute to improved fisheries management, so potential exchange organizers should consider these utilities, as they contemplate which tool would be best for addressing the situation at hand. Multiple interviewees reference each of these four utilities, however presented below is one illustrative quote to further describe and expound upon each.

First, FLEs leverage peer-to-peer sharing so that participants open each other's minds, expanding the pool of ideas. One exchange organizer, mentioned this utility saying:

> Fishermen will open another fishermen's mind. But if you're not a fisherman, you have a hard time talking to a fishermen. That's why exchanges become so important, because fishermen from [home country] - if he goes to [host country] and talk to fishermen from [host country], they have the same wavelength, and so they can open up each other's mind. But if he goes to a lecture, 'Well okay, who's this guy doing lecture? 'There's need

for that, but to open mind that's getting peer to peer. Fishermen understand each other. They know their complaints. They're always complaining about fishing going down, costs going up. Same thing. But if fishermen from here share that story, pretty soon they realize,'Yeah, yeah maybe, maybe it's not so bad. Maybe I'm doing, maybe he's doing something that I should copy. Maybe I …' So open up the mind for dialogue, possibilities, solution. And I think this is where, that's the most important part.

Second, FLEs catalyze and speed change. As expressed by one exchange organizer:

I think this is a catalyst. So rather than just being a step in a process, or a cog in a piece of machinery, that this is actually a catalyst. This is something that takes and accelerates the process so that instead of it taking two years to see people buying into it, you can get them to buy into in two weeks. Because they've seen it and they've touched it and they've felt it and they've spoken it and they've listened to it and they've learned it.

Third, FLEs are good for sharing thoughts that are difficult to receive and accept. According to an exchange organizer:

And then another thing that I think is common in exchanges are fishermen can also say things to fishermen that I don't think is as easy for an external person to say to fishermen. So a fisherman can stand up and say,'Oh, yeah. We're doing all this great stuff', and some fishermen can be like,'You're full of shit.' You know? Like'All you're doing is, you're going to use up all your resources that way.' There's no way we can stand up at a meeting and tell all the fishermen, 'You're full of shit'. Not if you want to keep working in that community. And so those kinds of things to me are priceless.

Fourth, FLEs facilitate involvement and commitment from the relevant parties needed for change. As an exchange organizer explains:

Involvement is the key to commitment. If there's no involvement, there's no commitment. So a top-down decision, there's no involvement from the fishermen. A bottom-up decision, fishermen come to management with a plan, there's no involvement from management, no commitment. So it doesn't work. So if you can get everybody together and involved, you'll come up with a win-win situation, which is usually better than either of the parties could have imagined. So involvement is the key to commitment is probably the most useful principle that I can attribute to these fisheries exchanges.

7. Theoretical context of the utility of FLES

Examining the utilities of FLEs reveals similarities with other tools for cooperative management such as multi-stakeholder collaboration and communities of practice. Multi-stakeholder collaboration facilitates stakeholders' interacting in new ways to help yield novel future possibilities [43]. Communities of practice are groups of individuals that share a profession or craft and engage in collective learning [26,43]. However, each of these cooperative management tools have memberships and processes that lend themselves to achieving different outcomes. It is important to recognize that learning exchanges are not a subset of these other cooperative management tools. Learning exchanges are clearly different, so understanding of them cannot simply be extrapolated from scholarship on related social learning mechanisms, and thus FLEs are worthy of study. As a result, the decisions of whether to conduct a learning exchange and how to execute the exchange should be made with this distinction in mind [26].

Butler and Goldstein [43] distinguished between multi-stakeholder collaboration for planning and communities of practice in public management. Table 1 augments their comparison by contrasting each with learning exchanges for conservation and management (This broader category is intended to expand beyond the limited literature on FLEs to also include exchanges for other natural resources activities such as ranching). While learning exchanges share aspects of both multi-stakeholder collaboration and communities of practice, they are most closely related to multi-stakeholder collaboration. However, the utilities are quite different among all of the tools, because learning exchanges are often organized around participants' commonalities, such as profession, geography and goals. This method of organizing around participants' commonalities is in contrast to multi-stakeholder collaboration, which gathers diverse participants with often conflicting views. Furthermore, learning exchanges are not intensely focused on achieving set pre-determined outcomes, rather they focus on providing and improving the conditions that allow for flexible yet positive outcomes.

8. Common objectives and outcomes

Although FLEs can cover a wide range of objectives and outcomes, analysis of the expert interviews and documents about the FLEs in the database revealed three common objectives and four common outcomes that were frequently present in FLEs. There is a logical link between most of the common objectives and outcomes. This combined with the temporal aspect of the outcomes following the objectives suggest a causal link between the two. There is evidence that it is indeed the FLEs that are resulting in the observed outcomes. Multiple interviewees reference each of these common objectives and outcomes, however below is one

Table 1.
Distinguishing multi-stakeholder collaboration, communities of practice, and learning exchanges. Augmented from Butler and Goldstein [43].

	Multi-stakeholder collaboration	Communities of practice	Learning exchanges
Membership	• Is diverse • Is open to all stakeholders	• Is relatively homogenous • Is open to professional practitioners	• Is weighted towards resource users • Is open to relevant stakeholders
Process	• Relies on guided facilitation, mediation, and negotiation • Seeks to incorporate various perspectives • Draws on multiple forms of knowledge	• Relies on informal dialogue and interaction • Defers to the most experienced or strongest voice • Impacts tacit and informal knowledge and know-how	• Relies on hands-on activities and both formal and informal interactions • Seeks to incorporate various perspectives • Draws on multiple forms of knowledge
Utilities	• To resolve conflicts • To reach agreements • To execute a joint action plan	• To create or refine professional practice • To foster individual expertise • To improve collective problem-solving capacity	• To expand idea sets • To catalyze and speed change • To share sensitive information • To build partnerships and buy-in

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illustrative quote to further describe and expound upon each.

8.1. Objectives

The most common objective among the FLEs surveyed was to encourage action or behavior. Specific objectives that fall within this category and that were mentioned by multiple FLE experts include: to see effects of overharvests, to see the benefits of conservation, to provide training and capacity building, and to develop support for marine conservation strategies and bycatch solutions. For example one exchange organizer described the objective of forming marine protected areas (MPAs).

> one of the primary areas of focus for the exchange was MPAs, and you know the idea, it was part of a wider program or strategy to actually establish an MPA at one of these sites where I was working… the idea, in theory, was that the group would come away fresh from the exchange very excited and energized by what they had seen, and by the success story…and the value of fisheries reserves.

Often integral to the objective of encouraging action or behavior was the open exchange of ideas, which was another common objective of FLEs. One specific objective that falls within this category is to provide a forum for dialog. As one FLE organizer states:

> We wanted to get fishermen talking to fishermen about their problems, their solutions, their issues. And having NGOs as ours provided the opportunity to get together and the forum or the space, the dialogue space.

The third common objective was to introduce new technology, which is a subset of the overarching objective to encourage behavior or action. Of the various behaviors and actions mentioned in the interviews and documents this was the most concrete and consistent enough to rise to the level of the common objective. This objective is especially relevant to FLEs concerned with reducing ecological impacts and/or improving the financial benefit of fishing. Within the category is yet another level of sub-objectives mentioned by multiple FLE experts, which include: to introduce sustainable alternatives (e.g. aquaculture, tourism) and to share information about fishing gear in order to decrease bycatch. Here one FLE organizer recounts the events that led to an FLE to encourage the adoption of turtle excluder devices (TEDs) in order to reduce the death of sea turtles in shrimp fishing nets.

> And so that was the backdrop to the TED program. That I could get one or two or five or ten boats up and running, but there was always this outside influence from all the other fishers - and we're talking hundreds of boats in the fishery - just laughing and saying, 'What are you doing? Why do you want to bother with all that stuff? Let's just go catch shrimp like we always do.' And so eventually those TEDs got taken off the nets, and then people just never really bought into it. So I sat there thinking about how I might reverse that. And in [host country], the fishermen use TEDs all the time. And so I thought, 'If I could bring some of my guys over here, and they could see it, then that would be quite a revelation.'.

8.2. Outcomes

As a result of FLEs one of the common outcomes was that participants were inspired to make changes. There is a clear link between this outcome and the common objective to encourage action or behavior. In the words of one of the fishers who participated in a FLE:

> I mean I was quite amazed because I had looked at cases in [home country] where we said we can't build it back, we can't save it, we have no choice, you know when it's gone it's gone. But going to [host country] had really opened my eyes to a lot of alternatives because when I go to [host country] and see how they protect their area and zone their reef and save it and when I say I went there and snorkeled and look at what they got there, I never know that I would ever saw that amount of fish at one place at any one time and that what brings back my hopes and build my courage a lot, so it motivated and helped me and boosted me to try and work harder with the fishermen to try to save the reefs and if we protect the reef then we have a chance.

A second common outcome was that a new program was implemented. This too is clearly linked to the objective to encourage action or behavior. This recounting by a fisher participant explicitly credits the FLE for leading him to propose a new fish sanctuary that was accepted by the government.

> He had announced that time was I think it was about seven fish sanctuaries that would be created in [home country]. But on the southwest side, where I'm from, there was, it wasn't mentioned. You know. And I said, 'How come? ' And they said, 'There is nowhere for this to create. The areas that we look for have to be specific. It have to have, within a certain environment.'…So I said, 'Of course there's an area in my community, based on what I saw in [host country], there is some'… And I said, 'Yes, based on what I see from my exchange program, I know what you're looking for, and I know where it is.' And from that I send from my organization the government a proposal. And they look into it and they came and they assess it, and they look, and they said 'Yes. This is perfect.'.

A third common outcome was that relationships were built and connections were made. This outcome has also been found in studies on learning exchanges for integrated coastal management [8] and indigenous marine resource management [22]. As a result of both exchanges, participants felt that a larger professional network had been formed due to group collaboration and guest contributors throughout the exchange [8,22]. Logically, the achievement of this third common outcome was facilitated by the objective to have an open exchange of ideas. Several interviewees commented that the open exchange was critical for engendering trust, which is a building block for forming relationships. This causal chain was aptly described by one FLE organizer:

> You know it breaks down barriers and you get to know people one-on-one. You get to learn about who they are as people. Their families… So that was really very, very productive, and a very positive element to the exchange. And I think everyone felt that way. Just the idea of really getting to know each other. And particularly as far as the relationships between the fisherfolk and then the government representatives, once we got back, it remained that positive. And neither party took advantage of that deepening of the relationship. Of course the professional lines remained as they should. But just people understood one another much more, and had a much better idea of where each of us was coming from. And that took place for me as well.

The final common outcome was that participants enhanced their understanding of marine management strategies. This is another outcome that is been found by other researchers. Fletcher et al. document the benefits and lessons learned of a learning exchange between the United Kingdom and Japan on integrated coastal management [8]. In general, participants of the exchange became more aware of coastal problems and realized to what extent a country's culture, society, and history influence the coastal management practices adopted in that country. Stacey et al. also found that participants increased their knowledge of

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tools for implementing marine conservation as a direct result of an exchange focused on the Arafura and Timor Seas [22]. Again this outcome is predicated on the objective to openly exchange ideas. One FLE organizers gave an example of this outcome:

> When people from those places come to place like [host country] they see a lot of fish and see that communities are very much well-organized around management and they say, 'This is what we need to do. We cannot just rely on our central government to do management for us. We need to get organized at a community level for us to take ownership, and management responsibility for our resource.' So those are the sort of things that gets learned and shared in our exchanges. And we are setting it up that way to learn those kind of things that help them to see what the future of their fishery will be like if they don't take any active role in management.

9. Future research

Because exchanges are generally both costly and time intensive, they should be conducted in a way that maximizes effectiveness. Thus far, the limited documentation and research of learning exchanges has focused on their potential benefits, possible challenges, and lessons learned. Due to the fact that learning exchanges can vary from site to site in objectives, scope, and format, the lessons learned or knowledge generated through research on learning exchanges could be site specific and have less value across all learning exchanges [39,44]. Thus, the next step in FLE research should involve more comparative case study analysis of both retrospective and prospective case studies. These case studies should treat lessons learned (see [30] for a discussion of these) as hypotheses, testing them to determine if they are best practices that can be widely employed and seeking a range of circumstances for which each best practice would be relevant.

Furthermore, additional research needs to be conducted on what happens when exchange participants return to their communities. In a study on social networks in the Solomon Islands, Cohen [39] identified 'look and learn' visits as a way of promoting sharing of lessons among communities. It was unclear, however, the depth of learning that was happening during the visits and if what was gained in these 'look and learn' visits had any effect on the communities' actions back home [39]. Although other work on collective learning and ecotourism has examined the value of follow-up activities [45]. It is especially important to study what occurs when exchange participants return to their home communities, because, although social relations can encourage diffusion of knowledge and ideas, they can also make the adoption of new ideas difficult when exchange attendees return home [39].

Additionally, Fletcher et al. recommend more research on whether exchanges should be aiming for a specific audience, such as participants at certain points in their careers or with specific attributes, in order to maximize exchange effectiveness [8]. The utility of this specificity needs to be weighed against the benefits of having flexible goals for the FLE and a mix of proponents and critics [30].

Finally, future research should offer a clear benefit to the FLE organizers and participants. Workshop participants expressed a strong concern that funding for research on FLEs should not be diverted from funding for conducting actual FLEs. Collectively, the workshop participants designed a research model that would produce objective, empirical research on FLEs without hindering them operationally or financially. The major elements of this research model involved including in the research budget funds to help conduct the FLE or support follow-up activities. Another element was to provide objective evaluations of the FLEs, so that organizers could improve future efforts and also use the findings to substantiate requests for further support from funders.

10. Conclusion

This paper delved into the history and scope of FLE to begin developing a common conceptual framework to facilitate the growth of a community of FLE practitioners and to help guide coordinated research on FLEs. This paper reviewed the limited yet valuable literature related to learning exchanges, as well as integrated perspectives from the field of resource management. This paper presented a comprehensive definition and description of the history, features, utility, common objectives, and common outcomes of FLEs. Furthermore, given the lack of formal literature on this topic, papers such as this demonstrate the need for future research while also serving as a resource for future exchange organizers. Through collaboration among communities, organizations, and researchers, the benefits of learning exchanges can be realized, while contributing to resource and fisheries management efforts.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.marpol.2016.05.025.

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