Transdisciplinarity for Small-Scale Fisheries Governance

Analysis and Practice
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Too Big To Ignore (TBTI; toobigtoignore.net) is a global research network and knowledge mobilization partnership, funded by the Social Sciences and Humanities Research Council of Canada, and supported by 15 partner organizations and over 500 members from around the world. The network aims at elevating the profile of small-scale fisheries, arguing against their marginalization in national and international policies, and developing research and governance capacity to address global fisheries challenges.

ISSN 2212-6260
MARE Publication Series
ISBN 978-3-319-94937-6
https://doi.org/10.1007/978-3-319-94938-3

Library of Congress Control Number: 2018954963

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Cover illustration: Lobster traps of Newfoundland, Photo by JaeHong Jin, Portugal Cove-St. Philip’s, NL, Canada; July 2016

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland
Acknowledgments

This book results from the research that has been carried out by members of the Too Big To Ignore (TBTI): Global Partnership for Small-Scale Fisheries Research and colleagues around the world to help reveal the importance of small-scale fisheries to food security, well-being, livelihoods, community viability, environmental stewardship, and fisheries sustainability. We are truly grateful for the strong commitment and contributions of all the authors, many of whom have been the long-time support and leaders of TBTI. We appreciate the time and constructive comments from the many people who have reviewed individual chapters. We are indebted to Dr. Madeleine Hall-Arber, Massachusetts Institute of Technology’s Sea Grant Program, for the ardent support to TBTI and for kindly writing the book foreword. Our thanks go also to Nicole Franz of FAO and Sebastian Mathew of International Collective in Support of Fishworkers (ICSF) for their endorsement.

A very special thanks to Vesna Kereži, TBTI Project Manager, for her dedication to TBTI in general and for her fervent effort to bring this book, as well as the previous ones, to completion. Once again, we are happy to include this book in the Springer MARE Book Series, which was enthusiastically received by the series editor, Maarten Bavinck, and well supported by Springer staff, Fritz Schmuhl and Joseph Daniel. Svein Jentoft wishes to thank Daniela Kalikoski for her support during his sabbatical stay with FAO while working on this book.

TBTI is funded by the Social Sciences and Humanities Research Council of Canada (grant number 895-2011-1011), through the partnership program. We thank Memorial University of Newfoundland, St. John’s, Canada, for hosting TBTI and for the generous support that it provides, in terms of cash and in-kind contribution, which has made it possible for us to conduct our research and to build partnerships for sustainable small-scale fisheries worldwide.
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Chapter 22
The Principles of Transdisciplinary Research in Small-Scale Fisheries

Alicia Said, Ratana Chuenpagdee, Alfonso Aguilar-Perera, Minerva Arce-Ibarra, Tek Bahadur Gurung, Bonnie Bishop, Marc Léopold, Ana Isabel Márquez Pérez, Sérgio M. Gomes de Mattos, Graham J. Pierce, Prateep K. Nayak, and Svein Jentoft

Abstract The diverse characteristics, values, and importance of small-scale fisheries imply at least two key considerations. First, there is no tailor-made, one-size-fits-all solution to the problems and challenges facing small-scale fisheries; thus, policy and governance must be sensitive to the contexts. Second, the close relationship and interactivity between the natural and the social dimensions of small-scale fisheries suggests that knowledge and understanding about small-scale fisheries may need to

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© Springer International Publishing AG, part of Springer Nature 2019
R. Chuenpagdee, S. Jentoft (eds.), Transdisciplinarity for Small-Scale Fisheries Governance, MARE Publication Series 21,
https://doi.org/10.1007/978-3-319-94938-3_22
transcend the boundaries of academic disciplines. These are the premises for research and activities conducted in the Too Big To Ignore (TBTT) – Global Partnership for Small-Scale Fisheries Research. Taking a transdisciplinary approach to research, training, and learning about small-scale fisheries can help address real-world problems and reveal opportunities to move towards pragmatic solutions. In this chapter, we discuss what transdisciplinarity involves, what the underlying principles are, and what makes it distinct from other perspectives. We argue that transdisciplinarity in small-scale fisheries requires institutional and academic innovation at local and national scales that facilitates interactive and transformative learning.

**Keywords** Research techniques - Transdisciplinary lens - Knowledge integration - Trust

### 22.1 Why a Transdisciplinary Approach

Small-scale fisheries are diverse and operate within different political, economic, social, and cultural structures. These fisheries target a range of marine resources through different means of capture within inland, coastal, and marine environments, and exhibit various levels of adaptation and resilience as they engage in pre-harvest, harvest, and post-harvest activities. Although inherently heterogeneous, small-scale fisheries worldwide display important values that make them a significant component for sustainable fisheries (Johnsen 2018), playing a key role in providing food security and livelihoods to millions of people worldwide (FAO 2015), contributing to community cohesion and social networks (Jentoft 2000), and displaying strong stewardship ethics towards the protection of species and habitats (Nayak and Berkes 2011).

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Notwithstanding their fundamental roles in societies worldwide, the majority of small-scale fisheries are facing major challenges that affect their viability and sustainability. These include declining fisheries resources, competition with large-scale fisheries, restricted access to rights and markets, increased exposure to competition from global and corporate markets, and anticipated effects of climate change (Chuenpagdee 2011). The complexity of problems in small-scale fisheries makes them susceptible to ecological, social, political, and economic fluctuations, most of which are unpredictable, and, thus, communities are, most of the time, ill-equipped to deal with them.

Following Rittel and Webber (1973) and Jentoft and Chuenpagdee (2009), major problems in small-scale fisheries are considered wicked because they are not easily identified, agreed upon or solved. The problems are interconnected and interdependent and have no boundaries as they encompass social, natural, and governance systems. These characteristics pose a great challenge for fisheries governance and solving fisheries problems needs to go beyond studying fish stocks and conducting stock assessments, to understanding the socioeconomic realities of fishing communities, the political economy within which fisheries management is implemented, as well as the governing and regulatory framework that defines the context of small-scale fisheries (Bundy et al. 2008). If, for instance, engendering small-scale fisheries sustainability is focused only on the maximum sustainable yield of fish stocks, and does not cater for the social and economic realities of the sector, governance efforts are likely to fail (Symes and Hoefnagel 2010; Urquhart et al. 2011).

The need to broaden the perspective about the underlying causes of the problems is imperative when dealing with difficult issues such as marginalization, restriction of access to fisheries resources, and violation of rights that many small-scale fishers around the world experience. Some of these could have resulted from long histories of exclusion, such as the cases of indigenous communities (McCormack 2017). Marginalization could also be a consequence of neoliberal political economies that do not sufficiently cater for the regeneration of the small-scale fisheries (Pinkerton 2017). In essence, this neoliberal current could be infused by a country’s political economy, and fishers might lack the capacity to shield themselves and protect their rights within an era of burgeoning corporate growth (Pinkerton and Davis 2015; Lalancette 2016; Said et al. 2016). Resolving the marginalization issue would require a process in which all these possible links and interconnections are mapped out in a way that gives a holistic understanding of the situation.

This is a very challenging task due to the heterogeneity of the sector, the scale of the problem, and the dynamics that are reinforcing the situation. Essentially, issues and challenges of otherwise similar small-scale fisheries in two different settings would be distinct, and thus both would necessitate diverse knowledge and core expertise that articulate their context-driven realities. Some small-scale fisheries in developing countries, for example, have problems of declining fishery yields due to large foreign fleets fishing in their waters (Antonova 2016), whereas some fishing communities in developed countries are facing problems due to increased competi-
tion by uncontrolled recreational fisheries (Tunca et al. 2016). Addressing the fishers' resource access needs in developing countries would require a global inquiry that encompasses an understanding of, for example, the EU fisheries partnership agreements in place (Antonova 2016), while the issue of developed countries is more contextualized within their national political territory. What is similar in both cases is the need for different types of knowledge emanating from both the scientific and non-scientific spheres, including experts, members of the community, fishers, and policy-makers.

This way, the research becomes sufficiently extensive to give a detailed account of the situation including social, economic, and governance realities within which the problems are happening and, thus, the policies can be tailored accordingly. If policies do not fit the complexities of the fisheries systems, they might address the symptoms but not solve the root of the problem (Degnbol and Mccay 2007). As a relatively new approach that tries to facilitate the understanding of the complexity of small-scale fisheries problems, transdisciplinary research provides us with tools and methods to look at the concerns and to inform policies through a more holistic lens. In its full-fledged state, transdisciplinarity can also lead to transformations in institutions and their functions, and can result in innovation in the way they govern small-scale fisheries systems.

In this chapter, we define both the need for and the role of transdisciplinary research in small-scale fisheries sustainability, explore the principles and visions that underpin the transdisciplinary approach, and present a framework on how to integrate multiple knowledge types and values to address complex small-scale fisheries problems. We show how, by integrating theory and practice, and academic and non-academic knowledge, a transdisciplinary approach would: (1) introduce a new perspective and a way to understand the problem that can be easily grasped by multiple audiences; (2) open pathways for ongoing problem solving, where opinions about solutions are overtly discussed; (3) facilitate transitions and transformations with the ultimate goal of supporting the sustainability of small-scale fisheries and fishing communities; (4) provide an avenue to reengage in the problem-solving loop based on lessons learned; and (5) help to craft management and policy solutions that are tailored to the specific and agreed-upon diagnoses (McClanahan et al. 2009).

The following section explains how transdisciplinarity is an approach that goes between, across, and beyond different knowledge types to understand small-scale fisheries' diversity, complexity, and dynamics. The subsequent section describes the various principles of transdisciplinary research, and the application of a transdisciplinary lens that integrates the social, ecological, and governance domains. The penultimate section discusses transdisciplinary challenges and mechanisms to address them, and the conclusion section summarizes the role of transdisciplinarity and its contribution to propelling societal transformation for sustainable small-scale fisheries.
22.2 An Integrated Approach Through a Transdisciplinary ‘Lens’

Bringing together different and distinct disciplines and integrating them to investigate a research problem has been applied in small-scale fisheries research and studies. Choi and Pak (2006) refer to this concept as ‘multiple disciplinary’ research, while others use more common terms like multidisciplinarity and interdisciplinarity to describe their research. Examples of these are found in bio-economic theory (Cuervo-Sánchez et al. 2018), illegal, unreported, and unregulated fisheries (Gezelius 2008); poverty and segregation studies (Bavinck 2014); food and fishing systems (Nelson et al. 2013); inter-sectoral conflicts involving fisheries at sea (DuBois and Zografos 2012); human-rights approach to fisheries (Charles 2011); legal pluralism in fisheries governance (Jentoft and Bavinck 2014); the wellbeing approach (Weeratunge et al. 2013), and the interactive governance theory (Kooiman 2005). In different ways and to varying degrees, these approaches have applied the concept of a transdisciplinary approach to identify problems in small-scale fisheries (Box 22.1).

In this chapter, we focus our ‘lens’ in a way that captures these multiple approaches and to explain why investigating small-scale fisheries in their context necessitates a transdisciplinary approach, which not only looks in from different stances, but also creates holistic and integrated knowledge about small-scale fisheries. We submit that the transdisciplinary research approach enables the knowledge generation to go across, beyond, and over disciplinary boundaries (Kerne 2005), to produce a new form of knowledge that does not depend on any specific discipline (Choi and Pak 2006) (Box 22.1). In other words, through a transdisciplinary approach, different experts including local fishers, scientists, and policy-makers share and acquire skills from one another, and recombine the information to create

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**Box 22.1 The Main Differences Between Multidisciplinary, Interdisciplinary, and Transdisciplinary Research (Adapted from Choi and Pak 2006)**

**Multidisciplinarity** – a process where knowledge is produced by the combination of different disciplines. However, the knowledge remains within the boundaries of those fields and is drawn separately to address a problem.

**Interdisciplinarity** – a process where knowledge is produced by analyzing, synthesizing, and linking many disciplines into a coordinated and coherent whole. Through interdisciplinarity, new approaches and new methods may emerge as possible outcomes.

**Transdisciplinarity** – a process where knowledge is produced by bringing together the understanding of the natural, social, and governance domains, in a way that transcends each of their traditional boundaries. Innovation and transformation, also of the way we do sciences, may emerge as an outcome.
new knowledge that does not belong to any particular discipline. This means that the
group will create a set of knowledge about a fishery system by looking at the social,
natural, and governance systems, at their relationships and interactions, and how
they connect with the processes and the institutions that work at different temporal,
geographical, and organizational scales.

Specifically, this chapter speaks directly on the need to embark on a transdisci-
plinary journey to address sustainability in small-scale fisheries, using as a starting
point and following Kooiman (2005), the understanding of their diversity, complex-
ity, dynamics, and scale. We look at transdisciplinary research as a mechanism that
provides the context and environment for different experts to define and resolve
real-world sustainability problems (Lang et al. 2012). The approach can begin from
a multidisciplinary endeavour in which experts from various disciplines, such as
ecology, biology, economics, and sociology, come together to discuss a fishery
problem. Some of the experts can be interdisciplinary ‘by discipline’, such as
experts in ecological economics or human ecology who undertake a multiple disci-
plinary approach in their own research and practice. Other experts would include
people from local communities who bring forth knowledge based on their traditional
and practical wisdom gained from life experiences (Jentoft 2006), policy-makers
who have the capacity to speak about policy processes and are responsible for deci-
sion making, non-governmental organizations (NGOs), civil society organizations
(CSOs), and activist groups who aim to influence decisions in the fishery, and the
informed and concerned public who care about what goes on in the fishery. While
getting together, these different experts share their knowledge, and work towards
identifying the problem, and by the end of the research investigation, they will be
able to share “a conceptual model of the problem that integrates and transcends each
of their separate disciplinary perspectives” (Choi and Pak 2006, 355).

In other words, the transdisciplinary approach urges the assembly of disciplines
in recombining information in a way that “draws the mind to puzzle about connec-
tion between information elements” (Kerne 2005). An example could be identifying
the different links and connections leading to marginalization in resource access and
the rippling consequences thereto, including their impacts on the local communities
and the local economies. Social learning is an important component of the whole
transdisciplinary research journey, because through it, different team members are
exposed to the plethora of ideologies, theories, perspectives, and experiences of
their participating counterparts. Through this social learning – which is different
from the formal education learning – team members become better positioned and
confident to interact, and also are capable of developing the respect and empathy
needed to work in a heterogeneous team (Pohl and Hadorn 2008). The process of
social learning could be developed through the collection of what Clifford Geertz
refers to as ‘thick descriptions’ (Geertz 1973), in this case, about small-scale
fisheries.

The ‘thickness’ can be derived from different data sources including real-life
histories, stock assessments, monographs, narratives, and other inductive qualitative
and quantitative data analysis (Brown 2010). By collectively providing to the de-
velopment of the ‘thickness’ and highlighting the different links of the problem, a
transdisciplinary group would be in a better position to create new and shared knowledge about the problem and discuss innovative and imaginative ways of addressing it (Brown 2010). Agreement and consensus-building could become challenging throughout the process of knowledge sharing and integration, especially if the problem veers into different interconnected systems. As will be discussed in the next section, it is the role of the transdisciplinary team to ensure that the participants can collectively contribute to both the identification and the solution of the problem through the journey (Carew and Wickson 2010).

22.3 The Principles of a Transdisciplinary Approach

Like any other form of research, transdisciplinarity needs to follow principles to ensure that the process of investigation runs smoothly and that it retains its focus on resolving problems in small-scale fisheries sustainability. The following principles, and the process of implementing the transdisciplinary research described in the subsequent section, are derived from a process undertaken as part of TBti research cluster on the topic (see Aguilar-Perera et al. 2017 for details). The principles for transdisciplinary research are related to three aspects: (i) the ‘approach’ including the attitude of open-mindedness in knowledge integration; (ii) the ‘personal traits’ of the team members necessary to foster the interactive and transdisciplinary learning; and (iii) the ‘process’ of engaging in the transdisciplinary endeavour. Given that transdisciplinary research involves a process that goes beyond the normative practice of inquiry, these principles need to be given careful attention. Failure to adhere with the fundamental elements of, for example, stakeholder integration, would dilute the very foundation that makes the research different from other forms of multiple disciplinary attempts.

Approach Principles Transdisciplinary research is an ‘approach’ both in the framing of the problems and in the processes and tools required to address them. As part of problem framing, key principles include, but are not limited to, holistic, multi-scale, and systemic. In problem solving, principles include questioning the status quo, challenging stereotypes, thinking outside-of-the box, and building the creative and imaginative capacity of participants to conceive effective solutions. In this respect, transdisciplinarity should facilitate the flow of information necessary to provide timely and effective responses to local and urgent situations, strengthening local organizations, with an aim to enhancing quality of life and social wellbeing. Since addressing fisheries problems is not a task of a single person or any one discipline, skill sharing is needed for ongoing problem solving through collaborative, adaptive, interactive, and context-dependent processes. This may involve examining and assessing methods for knowledge production, integration, and communication (both among and beyond disciplines). Moreover, if research indicates that more stakeholders need to be included to provide detailed technical information, then identifying and involving the stakeholders have to follow specific criteria to
minimize conflict of interest. Stakeholder analysis may need to be performed, as suggested by Mitchell et al. (1997). Involving new team members would need re-sharing of the skills set, so everyone would be able to approach the problem in a level playing field. Trial and error is expected and therefore it is advisable for the transdisciplinary approach to start simple and expand gradually. Participants must be patient; anticipating and acknowledging that problem solving might take time, even years, depending on how successfully the tools are implemented in the different contexts.

**Personal Trait Principles** Human personality traits are important for transdisciplinary research. Team members need to develop an orientation towards working in groups, with people from different background, experiences, and disciplines. Being empathic is clearly indispensable since individuals need to be receptive and able to see problems from multiple perspectives and value the different opinions that develop through the process. Also, a positive attitude towards teaching, learning, and transforming is necessary, especially since transdisciplinary research ventures into complex and dynamic contexts that are difficult to pin down and can create frustration. As much as possible, individuals need to give an equal chance for others to participate. It is very common for individuals who are more vociferous than others to dominate the process in team-based research, hence, moderating these dynamics is a necessary personal trait skill that one might need to develop. This is a very important trait, which if not well developed, will make it difficult for team members to listen with sincerity and learn from each other.

Becoming open to new forms of knowledge is another important personal trait that might not feel natural, and one might need to adopt the right attitude to be more receptive. In some cases, opening up might require diligence, especially for those who find it difficult to think 'outside their discipline'. One must also acknowledge the restrictions imposed by the boundaries of their own disciplines. Bateson (1987) metaphorically explains how a discipline not only conditions its members to think within a box, but also to think that the box is not a box, and, thus, makes it difficult for an individual to conceptualize any other perspective of the box.

In some cases, specific and unique conditions pertaining to the sociocultural dimensions of the communities need to be catered for. When it comes to communication, for example, the electronic transmission of information might not be possible amongst those who are not computer literate. Moreover, the provision of narratives and thick descriptions by particular individuals might not be achievable if they do not have the tools to describe their story. In these circumstances, it might be necessary to provide specific platforms to elicit community participation, especially when the community itself is unable to value and access its own knowledge, or, due to everyday matters, is unable to reflect and write its story on the same level as the academic members within the transdisciplinary team (Hendricks 2010). Bringing in community-based experts or consultants facilitates the deliberative processes, and helps community participants to draw on their own wisdom. Ultimately, both the form of collaboration and the tools of integration determine the intensity of exchange.
between the different team members (Pohl and Hadorn 2008). All these human traits and adoption of tools to improve social learning and collaboration are indispensable, especially for the plurality of inquiry designs and various ways of knowing (Russell 2010).

Process Principles Transdisciplinary research should be a flexible approach that emphasizes social learning, experimentation, and an attitude of ‘learning by doing’ in complex systems (Griffith 2010). For example, fisheries management techniques should be developed and contextualized, through an iterative and adaptive process, to correspond with the characteristics of the small-scale fisheries. There is no fixed mechanism to attain the best measures for fisheries management, but several key process principles can be identified. These principles embrace inclusion of diverse viewpoints and knowledge and the need to recognize power relations at all steps (e.g. stakeholder identification, and knowledge access, production, sharing, and use) to ensure that potentially marginalized groups are meaningfully included. Moreover, assuring that these different knowledges are meaningfully integrated during the transdisciplinary approach is also critical.

Another important component is the development of trust amongst the different participants. Trust is earned over time and should improve when participants gain more experience of working and collaborating together (Harris and Lyon 2013). The development of a common ‘language’ is also an important principle that should be part of the social learning process, for it facilitates interactions and reconfigures our social discourse, especially when tackling complex issues. For example, discipline-bounded jargon can inhibit effective dialogue between different parties. Scientific jargon used in the academic disciplines could be difficult for participants from the fishing communities to understand, while local knowledge expressed in local dialects and languages of fishing communities could be challenging for nonlocals to comprehend (Jentoft 2006). The intensification of communication could be complemented by a social networking interface, such as through social media, that may be used to maintain an open forum in which different members can occasionally communicate and develop a solid relationship that goes beyond the actual ‘formal’ research network.

22.4 Implementing the Transdisciplinary Approach

The initiation of the transdisciplinary approach can vary but the entry point is usually an event or crisis identified by researchers, local stakeholders, policy-makers, and/or society. For example, resource depletion could be an issue raised by the fishers who experience a decline in yield, or it could be identified by scientists through stock assessments, or brought up by NGOs or CSOs. Once the problem is identified, the different stakeholders including researchers, community members, fishers, and policy-makers engage together to investigate the roots of the problem, how it is linked to the social, natural, and governance systems, and the scale within which the
problem is happening. Thus, transdisciplinary research can be initiated either by academics following a scientific project, or by the government agencies, which need to follow up on an issue raised by fishers and require new knowledge to revert the problem and establish a new policy, or by the community itself.

Following this starting point, the next step is the assembling of the research team and the collective design. The team members normally do not come together on their own. There are always one or two process initiators, who will need to identify the team members, based on specific criteria, which could include direct experience and knowledge of the particular fisheries or a broader understanding of the region. The team would then establish the scale of the problem, and start formulating ideas towards addressing the problem, keeping in mind that the solutions may lie outside of the context where the problem is situated. In other words, the problems of small-scale fisheries are rarely about what goes on in the sector, partly because the fisheries are not a closed system. Instead, fisheries problems are interconnected with other activities happening either in the same space or nearby. This implies that the team members from different disciplines and sectors would bring their most relevant knowledge and the broadest experience to look at the problem and its interconnectedness with the social, political and ecological realms.

Arriving to a consensus about the problem may seem unlikely since each participant will bring forth his or her own definition of what the problem is and what causes it. Most likely, a small-scale fisheries sector characterized by stock depletion, or overfishing, could be defined as a ‘market failure’ by economists, a ‘regulatory failure’ by fisheries managers, and a ‘community failure’ by anthropologists. A fisheries ecologist would see ‘data gaps’ for stock assessment, a policy-maker would perceive the need for ‘better monitoring and enforcement,’ and a fisher would see a ‘livelihood issue’ that determines his/her individual future. While all these definitions and perceptions are dependent on one’s knowledge and life experience, collectively they can provide a coherent insight of the problem. The different individuals can deliberate on whether stock depletion actually exists, and if it does, what could be leading to it, and with what consequences. Whilst sharing their knowledge, fishers might explain that they have seen a reduction in the catches in the past, which could then prompt the discussion about the historical trend and other types of changes that may have occurred.

At this point, the team members, taking this timeline into account, would start questioning why stock depletion is actually happening: Is it resulting from excessive effort from the small-scale sector, the large-scale sector, the recreational sector, or the combination? What has changed in the fishing patterns? Could it be a result of climate change? How is the market operating? What are the impacts on the formal market and on the community resilience? Is it a local or national problem? What is the national political situation around it? Is there a political will to address the situation? And ultimately, what should be done to reduce stock depletion? What will happen if the fishing effort of small-scale fisheries is reduced? How will small-scale fishers be affected if effort-reduction policy is implemented? What will be the livelihood impacts? What are the alternatives? Essentially, these questions can indicate why stock depletion is in fact a wicked problem, and answering it needs
multi-scale and multi-stakeholder approaches, depending on the context in which the approach is developed.

Throughout the transdisciplinary research process, the group would benefit from an exercise of switching the ‘lens’ we use to examine the issues. Figure 22.1 depicts three knowledge domains within which the primary research questions arise, i.e., natural science, social science, and governance. Questions would, thus, start from a single domain and then, through knowledge sharing and deliberation, the team would start making the links and make the question a transdisciplinary one. There are different ways in which this can be achieved. First, a disciplinary question in any given domain can move towards the transdisciplinary domain (e.g. a single arrow from one domain to the middle overlapping transdisciplinary area) and turn into a transdisciplinary question. Second, similar or related questions from more than one disciplinary domain can move to the transdisciplinary domain and synergistically form one transdisciplinary question (e.g. meeting of multiple arrows from different disciplinary domains in the transdisciplinary domain). Once the transdisciplinary question is arrived at, the transdisciplinary team is in a better position to deliberate on possible methods, strategies, and processes to move towards a transdisciplinary solution.

In practice, for example, the questions could be ‘what happened to the fish stock? (natural domain)’, leading to ‘how are fishing communities dealing with declining catches? (social domain)’, and ‘what management techniques can be implemented to resolve overfishing (governance domain)?’ Whilst belonging to different knowledge systems, evidently these questions are linked, and the approach to understand them must take into account this interconnectedness. The problem of the ‘lack of monitoring and weak enforcement’, for example, is an element that belongs to the governance domain, while the ‘incompliance’ would be in between the social and governance domains. Information about the ‘fish stocks’ would classify within the natural science domain. However, the ‘impact of declining stocks on the community resilience’ would feature in between the social and natural science domains.

By engaging in this approach, the transdisciplinary group would be able to dig deep within the problem to understand the root cause of why, for example, overfishing is happening and how to potentially reduce it. In this case, overfishing could be prevented through an allocation system designed specifically for small-scale fisheries, in a way that protects them from the recreational and industrial sectors. In sum, a transdisciplinary team must initially engage with domain-specific questions to identify connections and overlaps between them, and turn these questions into complex, but solvable, transdisciplinary questions. Through this process, the team collectively applies their expertise and knowledge systems, discusses the problem and arrives to potential solutions that could work.
22.5 Challenges in Transdisciplinary Research

As any other research design, transdisciplinary research can bring forth a number of challenges during the different stages of implementation. Difficulties can ensue during the process of problem identification and framing, perhaps due to political and conflicting issues that could affect the level of trust gained amongst the transdisciplinary team members. Linked to this could be the lack of integration across the different knowledge types, and other challenges including uncertainties and funding obstacles that could hinder the achievement of a real transdisciplinary research. In what follows, we describe some of the challenges that are common in transdisciplinary research and ways in which we can address them.

22.5.1 The Process of Problem Identification and Framing

We have shown in Fig. 22.1 how the transdisciplinary ‘lens’ can help identify the nature of the problem through the different social, natural, and governance domains. Identifying the nucleus of the problem and agreeing on the solutions to resolve the problem can be problematic. Some might not agree on how to frame the problem or

![Diagram of transdisciplinary research process](image_url)

*Fig. 22.1* Approaching a problem through a transdisciplinary lens. The transdisciplinary domain is where the three disciplinary domains overlap.
what the real driver behind it is. Others might contest the need for particular management measures as a solution to the problem. Disputes are a normal outcome of a transdisciplinarity process, and should be considered as part of a collective change and not a reason to give up (Msomphora 2016), as indicated in the researchers’ experiences in Box 22.2.

**Box 22.2 Researchers’ Experience with Transdisciplinary Research**

Collaborative research carried out in Mexico’s Lowland Maya area – Minerva Arce-Ibarra

In 1998, I was invited to join a research team addressing the sustainability of the Maya rainforest. As a former fishery biologist, my task was to address fishing pursued by Maya peasants at “cenotes” (sinkholes) interspersed in the forest. The team was multidisciplinary in nature, with a geographer, ethno-botanist, forest engineer, agriculture engineer, and a fishery biologist. During the second year of the project, some conflicts arose because of contestation of the leadership of the project and epistemic problems with the methodology. Furthermore, Maya authorities were hesitant in granting consent to enter their lands. The following year three team members left the project and a teacher and a lawyer joined, the latter mainly to address indigenous customary law. During this year, a Maya student joined the team, which facilitated the relationship with the Maya authorities for doing the research. Eventually, trust increased among the team members and they wanted to pursue more integrative work. This included, among others, hundreds of hours of discussions to address the use of systemic thinking, using “mind maps” to connect different fields of knowledge as well as using interdisciplinary concepts, such as ‘territory’, to address the sustainability of Maya forest and its resources. Since 2008, due to this collaborative research and my Ph.D. in Interdisciplinary studies (2007), I am able to address both the sustainability of Maya fisheries and the multiple productive cycles that Maya peasants carry out through the years.

Community-based research is a transdisciplinary venture – Prateep K. Nayak

In 2007, I started my doctoral fieldwork in Chilika Lagoon, India to understand the marginalization of small-scale fisheries. It is interesting to recall how my methodological approach was developed in different ways to respond to proposals from fishing community partners who advised me to implement open-ended questionnaires in a way that elicited the fisher’s voice. Following a successful implementation of the first two questionnaires amongst 30 selected households in two villages, I was further challenged by community leaders about the effectiveness of focusing only on two villages, which was somewhat exclusionary of the rest. With the hope that the results of this study could bring change, some fishing communities expressed their wish that the collection of their voices was as important and volunteered to be active col-

(continued)
Box 22.2: (continued)
laborators and contributors. At this point, I was intellectually flattered by the collaborative gesture from my fisher friends and their seriousness about the results, and effectively we covered a total of 150 villages. The questionnaire for this large census was drafted alongside the fishers, and was implemented with every fisher of the villages, through committee or village meetings. The scale at which this survey was conducted required extensive collaboration and commitment, and the overwhelming response was a true evidence of this. This prompted me to think about concrete plans to make these results public, and along with fishers of Chilika, we planned a state level policy workshop to present the findings and to elevate them through media coverage. This experience remained with me as a powerful image of transdisciplinary research that transcends artificial boundaries set by orthodox science.

From social sciences to transdisciplinarity in small-scale fisheries – Svein Jentoft

Transdisciplinarity is interaction where you are learning from people coming from disciplines other than your own, people with different backgrounds and experiences from what you have. When working in a transdisciplinary research project, you communicate with colleagues who often do not always share your worldview about what constitutes good science, what approach to follow, and what questions to ask. When working with other people from other disciplines, you are often caught by surprise, which may well feel intimidating; you may come to realize that your ideas have limitations, that your assumptions are erroneous. You are likely even to become a better scientist not within a different discipline, but with the discipline in which you belong. This only sounds like a paradox until you have had the transdisciplinary experience. This is what I learned from the FishGovFood project that Jan Kooiman initiated in early 2000, which led to the Fish for Life book (Kooiman 2005). The FishGovFood project, which involved many co-authors from different disciplines (social and natural sciences) engaging in discussions about concepts and arguments, was one of the best universities I ever attended. However, it did not stop with that. This way of working continued with the Povfish project, (Poverty Mosaics: Realities and Prospects in Small-Scale Fisheries; (Jentoft et al. 2011)), the TBSTI project, and a series of volumes. Thus this book, which sums up what we think about the merits of transdisciplinary approaches for small-scale fisheries, has a transdisciplinary history. This is how small-scale fisheries research should proceed. The current volume is just the end of the beginning.

The team members need to understand that working towards reaching agreement and a complete solution might be a long and contentious process. It is perfectly normal that, at this point, members may start experiencing fatigue and resentment to the process. Linke and Jentoft (2014) explain how fishers have resented their
Box 22.3 Indicators to Evaluate the Process of the Transdisciplinary Approach

- The level of transparency in the communication of knowledge
- Diverse membership in the transdisciplinary group
- The degree of active roles of the different members
- Dissemination of results to the various members
- Willingness of fishers to participate in research
- Knowledge integration at every step of the process
- Reflection and improved self-awareness

participatory role while engaging in knowledge-integration attempts since the policy-making individuals did not consider the fishers’ knowledge as relevant and did not take their ‘phronesis’ (wisdom-based knowledge) seriously, simply because it did not fit the ‘scientific’ domain of the maximum sustainable yield discussions. Feeling discouraged and frustrated, fishers felt that they were wasting their time and eventually left the process (Linke and Jentoft 2014).

Periodic monitoring of the process can mitigate these problems. Co-reflection on the participative process by the transdisciplinary team would be ideal (Roux et al. 2010). This could be done through a performance assessment such as an indicator-criteria system (Box 22.3) Participants can also assess the potential challenges encountered and provide a good guidance on possible reconsiderations on future pathways to ascertain that efforts and time invested are not in vain. Having said that, if the challenges persist and the problems that one ought to solve are likely to expand (e.g. other stocks start to deplete), imminent intervention through, for example, a ‘temporary fishery closure’ policy would need to be implemented despite the lack of perfect understanding (Dyball 2010).

22.5.2 Trust and Legitimacy Issues in Co-design of Solutions

A transdisciplinary team must develop sufficient trust and mutual confidence to transcend disciplinary boundaries and adopt a more holistic approach to recognize problems and co-design solutions (Harris and Lyon 2013). If trust is not gained, then the transdisciplinarity process to reach an ultimate goal might not be fulfilled. Problems of small-scale fisheries sustainability bring forth a number of trust and legitimacy challenges especially since the research team may hold different (possibly contradictory) agendas, and has to deal with complex situations that may require immediate actions to resolve the crisis. Trust issues could relate to questions about the validity of the knowledge-base or the management/policy options proposed. This can be an issue where there is distrust between the scientific community and the fishers due to a history of conflicting views about fishery stock abundance (e.g. Rochet et al. 2008). Other forms of trust issues can result from instances involving
lack of transparency in communicating information, or even worse, due to speculations about one’s personal interests related to, for example, elite capture in the allocation of fisheries resources (Sundström 2015). Signs of corruption amongst fishers’ representatives or policy-makers can hamper the legitimacy of the process, and can generate a culture of suspicion amongst fishers who may then refuse to join any other transdisciplinary project in the future. Moreover, if fishing communities do not believe or trust the process, they might not support the policies that are enacted, leading, therefore, to resistance and incompliance (Goti-Aralucea et al. 2018).

22.5.3 Lack of Integration Across Knowledge Types

A common challenge reported in transdisciplinary research is the integration of various knowledge types, both of academic and non-academic nature (Polk 2014). This mainly happens because participants are either reluctant or unable to leave their respective ‘comfort zone’ to engage in a truly joint endeavour (Bergmann and Jahn 2008). Resistance in scientists has been associated with the apprehension of them to adopt different methodologies and terminology that do not fit within the norms and expectation of their own discipline, making it difficult for them to fully engage in the social learning process (Cornell et al. 2013). Challenges have been recorded amongst individuals trained in the rigorous natural sciences who find the transdisciplinary process cumbersome (Aslin and Blackstock 2010). Problems of integration can also be a consequence of power relations related to social hierarchies and the hegemony of western scientific knowledge that does not easily accommodate indigenous and other forms of knowledge.

Moreover, lack of integration could result from the feeling that non-academics have less of a say in the process, or are only allowed to speak when they are asked to contribute. This is likely to happen when the discussions are more focused on the ecological sustainability and technical jargon deprives them from fully interacting in the process. When the focus is too much on the fish and the empirical evidence provided by scientists, and when the knowledge of the people is simply considered as anecdotal notes that do not penetrate the process, then knowledge integration becomes difficult (Linke and Jentoft 2014). Similarly, focusing too much on the people and forgetting about the fish can cause the same problem of knowledge imbalance and lack of fusion.

Problems of integration could also be deriving from the fact that members feel the approach does not give them sufficient space. Some might feel their knowledge is being subjugated by more vocal participants, who are perceived as more powerful and/or capable to get their story across and incorporated within the general narrative during the problem and solution identification processes. In some cases, capacity-building and training, within a realistic timeframe, could improve one’s ability to participate more actively. Moreover, different media can be used to enhance interaction and communication amongst members from different social segments. Rich picturing and board games, for example, have been considered as useful to probe
into knowledge systems that could be dormant or unutilized. In a particular case in the Philippines, board games enabled participants to engage in discussions on sea-scape management relating to long-ingrained conflict concerning the community (Wyborn and Clealand 2010). Simultaneously, self-reflection and questioning can be also effective to help scientists to acknowledge the existence of other kinds of knowledge. Ultimately, when the scientist becomes mentally prepared to orient him/herself towards transdisciplinary research, and is open to learn through new ways and methodologies from distinctive types of knowledge cultures, the process becomes easier, as described in the researchers’ experiences (Box 22.2).

### 22.5.4 Dilemmas for Transdisciplinary Researchers

Although the transdisciplinary process provides new forms of knowledge, and recently has been lauded as an ideal research tool to resolve complex sustainability issues (Brandt et al. 2013), there still remain major obstacles that restrain it from becoming a fully recognized and institutionalized practice. Most of the transdisciplinary work that is conducted is funded by projects that are in place for a few years, but with no assurance that further funding will be obtained.\(^1\) Moreover, academic institutions are still very much conventional with different faculties operating within disciplinary boundaries, making it difficult for multiple disciplinary research to take root (Cornell et al. 2013), although some disciplinary synergies have recently started sprouting in some universities.\(^2\)

Scientists investing in interdisciplinary research have also found it challenging to publish their work (Wise et al. 2017). Coupled with lack of funding towards these endeavours, it has been difficult for scientists to work towards developing a career that is more interdisciplinary. Given this backdrop, the future challenge is to retain the momentum of transdisciplinary research by training more individuals to be more ‘prepared’ to engage in transdisciplinary research ventures. If the future can be composed of more transdisciplinary research, then scientists investing in this future would have a less degree of risk in their careers, and would feel more fulfilled by their cross-disciplinary expertise (Aslin and Blackstock 2010).

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\(^1\)This mostly is a challenge to researchers that work in research and academia, as fishers and members of the community who engage in the transdisciplinary process still retain their livelihood from the sea and not from the research itself.

\(^2\)e.g. School of Anthropology and Conservation in University of Kent, UK and Interdisciplinary Research Excellence in the University of Southampton, UK.
22.6 Conclusion

The transdisciplinary approach contributes to the global discourse on small-scale fisheries sustainability, as promoted in the SSF Guidelines. It does this not only through provisioning research and knowledge, but also as a mechanism that seeks social transformation by providing the adequate tools to address complex societal problems inherent to natural resource governance. As both a framework and pedagogy, the transdisciplinary approach allows scientists, practitioners, fishers, and many other stakeholders to identify the problems and opportunities through an interactive and iterative process. This is why, through this chapter, we acknowledge the urge for integration of information from different academic and non-academic disciplines, and demonstrate how the transdisciplinary research needs to be accomplished in line with specific principles that engender a process of communication, facilitating problem identification and solutions. While there is no guarantee that transdisciplinarity would work or lead to better outcomes, embarking on a transdisciplinary journey is the first step in realizing that complex, wicked problems demand an approach which not only integrates multiple disciplines, but also transcends their boundaries and transforms the perspectives of the participants.

This chapter demonstrates why the transdisciplinary approach is challenging and requires effort, commitment, and relational skills. We reiterate on the need to involve various stakeholders, provide an enabling environment and sufficient space to engage, and make every team member an owner, rather than a guest, in the process. This approach helps reveal the multifaceted realities of small-scale fisheries and generates insights into the value of successful small-scale fisheries governance. This way, the team can generate the necessary knowledge-infused imagination needed to resolve pressing sustainability crises deeply entrenched in communities. On a final note, it is fundamental to acknowledge that transdisciplinarity requires both progressive effort and ongoing reflection, and must be sufficiently iterative to address potential gaps or failures that might be evident throughout any transdisciplinary endeavour.

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