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# Research legitimacy as a precursor to effectiveness: the role of equitable partnerships in transforming aquatic food systems

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Competing interests in aquatic food systems pose challenges for small-scale food producers trying to secure their place in the blue economy. These challenges include development aspirations, pressure from conservation interests, climate and environmental change, and blue growth agendas. Research-for-development can contribute to improving outcomes for small-scale actors in aquatic food systems in the face of uneven development, but the legitimacy and effectiveness of research have been found difficult to operationalize. An “engineering mindset” that prioritizes technical innovations, academic definitions of research excellence, unequal research collaborations, and funding constraints currently inhibit conducting strategic and transformative research. Taking ownership, equity, shared analysis, and feedback as key principles for research-*in*-development can assist in moving from transfer of technology to recognizing and working within the specific political and institutional contexts of aquatic food systems.

## KEYWORDS

research-for-development, transformation, partnerships, equity, aquatic food systems

## Introduction

The competing—and potentially conflicting—demands for aquatic spaces (including oceans, rivers, lakes) that come with economic development under the banner of the blue economy present challenges for just and equitable development (Cisneros-Montemayor et al., 2021; Schutter et al., 2021). These competing interests, for instance between space for fisheries and shipping lanes, or power struggles over decision making and financial benefits, in turn make it challenging for small-scale food producers to secure their place in the blue economy. In addition to blue economic growth, coastal communities are exposed to effects of climate change and conservation pressures, making aquatic spaces and the people dependent on them particularly vulnerable to potential negative impacts (Gill et al., 2023). Research-for-development, broadly defined as research done to improve social well-being (Laws et al., 2013), can support these actors and mediate the threat of uneven development, especially when researchers and practitioners promote shared knowledge and recognize patterns of interaction between actors (Metcalf and Ramlogan, 2008; Anandajayasekeram and Gebremedhin, 2009). However, the legitimacy and effectiveness of research-for-development

have been found to be challenging to operationalize (CGIAR ISDC, 2021), compromising the ability of research to truly support transitions to, or reclamations of, sustainable aquatic food systems.

Building on our own experience in research-for-development in aquatic food systems, recognizing the systemic barriers that can challenge our attempts at improving social well-being for people in these systems, we argue that partnerships that involve food actors as meaningful partners can help better embed research in practice. Including a wide range of partners and making sure the right partners are involved can foster the productive interactions and interactive learning needed for solving complex problems. Co-production—the “collaborative weaving of research and practice” (Chambers et al., 2021, p. 1) has the potential to produce the knowledge and action needed for supporting actors in aquatic food systems. For research to be legitimate—defined as an ethical and fair process that genuinely includes and recognizes partners, and effective—defined as research that contributes to addressing problems and generating desired outcomes (CGIAR ISDC, 2021), an adjusted research practice is needed, one that builds on relationships of co-production that elevate local and indigenous control of natural resources.

Finding a suitable “mode” for co-production is key to successful relationships, where a balance needs to be struck between risk and opportunities of co-production: for instance, scientific knowledge production can contribute to building capacity, addressing local needs, and influencing policy change, but can also crowd out other expertise such as local ecological and experiential knowledge (Chambers et al., 2021). Indeed, even in partnerships that co-produce knowledge, scientific and expert knowledge [knowledge that can only be produced and challenged by specialists (Ponte and Cheyns, 2013)] have been found prone to assuming a dominant role, thus tipping the balance of co-production (Offermans and Glasbergen, 2015). It cannot be assumed that synergies will automatically arise from collaboration in (aquatic) food systems—there is no one suitable degree of participation in research, a level of co-production that guarantees optimal outcomes (Sumberg et al., 2003). Moving beyond simplistic views of co-production is necessary, with collaborators that span beyond traditional reaches of “fisheries” or “aquaculture” to include the wide variety of actors in aquatic food systems, e.g., non-governmental and community organizations, consumers and actors from related agri-food sectors. This wider collaboration is essential for reflection on the role of networks of actors in food systems transformation (Pound and Conroy, 2017; Klerkx and Begemann, 2020). And evaluating the legitimacy and effectiveness of such research should explicitly extend to the equity and justice implications of the research process and the adequacy of participation, to appreciate how outcomes are achieved and for whom.

This paper is structured as follows. In the next section we outline the importance of cultivating partnerships in research, involving the right partners, and building meaningful relationships. We then focus on the role of partnerships in addressing systemic problems rather than achieving incremental change. We finish with a discussion of principles that researchers can use when establishing and maintaining partnerships for research, and how these practices can (and should) translate into reflexivity in research as well as evaluation of that research.

## Relationships in aquatic food systems research

Unpacking the relational aspect of aquatic food systems and their dynamics can help navigate change within them while recognizing them as “complex adaptive systems” (CAS)—meaning that no one individual has full control over the system: rather, the patterns of interactions between individual actors are what bring about, or prevent, change (Brouwer et al., 2019). Aquatic food systems have been characterized as complex adaptive systems due to their ability to self-organize, learn and adapt (Mahon et al., 2008). As social-ecological systems, aquatic food systems display resilience when they can absorb human and ecological shocks by adapting while maintaining their function (Holling and Gunderson, 2002; Walker et al., 2004). It has been argued that to improve the capacity of food systems to change and adapt, more attention should be given to relationships and processes that bring about social change, rather than focusing solely on inputs and outputs to increase productivity and efficiency (Brouwer et al., 2019; Darnhofer, 2021).

Understanding how research-for-development fits into existing political, social, and economic contexts, and how it influences social change in CAS, can contribute to reaching goals of improving these systems and their resilience. However, outcomes of research are currently often measured with disregard for the complexity of relationships that played a role in the design, implementation and achieving results of the research (Douthwaite and Hoffecker, 2017). Indeed, at an ACIAR<sup>1</sup>-hosted food system summit dialogue focusing on the foundations of successful research-for-development partnerships, Prof Andrew Campbell, the CEO of ACIAR, said that “*not enough is invested in the arrows.*” The arrows referred to are the links between building blocks in theories of change. He was arguing that evaluation of research for development programmes tends to focus on the blocks alone (the activities, outputs, and outcomes) ignoring the feedback networks in which they exist. Not investing in, or not investigating the arrows means the relational aspects that enable research to contribute to development outcomes go unsupported and unnoticed. One consequence of this omission is a failure to examine research partnerships and critically assess if they are fit-for-purpose, and under what conditions the desired impact may emerge from these partnerships.

Cultivating equitable partnerships in research-for-development starts with a recognition of the context of the research, which is often colonial and Global North- as well as male-dominated, with associated power asymmetries (Snijder et al., 2023). Critically engaging with this context, along with investment (time, funding) in building and maintaining relationships, helps to place research partnerships within the wider system, which includes historic and contemporary inequities (Fransman et al., 2021). Working in partnerships, then, becomes an attitude or approach: one that embraces complexity caused by uncertainty, ambiguity and conflict inherent to human interaction (Mowles, 2014). Systems thinking and aiming for as much diversity as possible have been argued

1 Australian Centre for International Agriculture Research: <https://www.aciar.gov.au>.

to contribute to adequate inclusion of a variety of stakeholders in partnerships, whilst co-creation and shared language can contribute to mediating power asymmetries (Kaner, 2014; Brouwer et al., 2019).

Various frameworks are in use to assess the quality and outcomes of research-for-development. One example in the context of food systems research is the CGIAR Quality of Research for Development (QoR4D) framework. This evaluative framework uses four criteria to assess the extent to which research is contributing to development outcomes: relevance, scientific credibility, legitimacy, and effectiveness (CGIAR ISDC, 2021). Within this framework, experience of CGIAR leaders surveyed indicated that research legitimacy and effectiveness, key relational dimensions of the links between building blocks in theories of change, are found to be most challenging to operationalize in programs (ibid). The perceived difficulty of operationalising legitimacy and effectiveness indicates a need for practically incorporating notions of co-producing knowledge and paying deeper attention to power over priorities in partnerships. We propose that principles of participatory action research can support greater attention to the relational nature of research-for-development, as a central dimension across both legitimacy and effectiveness (Apgar and Douthwaite, 2013). We contend that investing in the metaphorical arrows (the processes that tie together activities, outputs and outcomes) can improve the ethics and fairness of research and strengthen the legitimacy of research practices, thus making them more likely to be effective. This often-overlooked feature of research practices is foundational in food systems and has been identified as critical for the way that scaling is conceptualized and evaluated (Prain et al., 2020; Sartas et al., 2020). It places an emphasis on individual research behaviors and attitudes, because more equitable collaborations for legitimate programming involve the sharing of both risks and benefits in the partnership, bringing together researchers and other partners to shape the links between building blocks.

## Relationships and systemic problem-solving

Considering the leading role of equitable partnerships in legitimate research, and the perceived challenges of operationalising legitimacy, a key question is how to ensure that the research process recognizes the interests, perspectives and contributions of partners as put forward in the QoR4D framework? Research has a vital role to play in rural development and food security, however, the pathways through which research can contribute to impact are long and complex (Horton and Mackay, 2003; Thornton et al., 2017). Research engages a multitude of actors throughout the knowledge production process—and is therefore inherently relational, whether co-productive or extractive. When the intention is to support outcomes for excluded and marginalized people, then relational approaches should support plural views and alternative pathways to emerge (Leach et al., 2010), including an acceptance of the tinkering process that actors within food systems engage in, with potential outcomes that are outside of conventional research-for-development (Douthwaite et al., 2017; Darnhofer,

2021). This becomes vital in the face of multiple pressures and pre-existing social injustices (such as colonialism, patriarchy, power asymmetries, corruption) facing people in aquatic systems (Gill et al., 2023), where an “engineering mindset” of scaling technologies [which tends to consider social problems as technical problems and leaves out politics and power as complicating factors (Laws et al., 2013)] is insufficient for resilience, and indeed when the aim to maintain the status quo could also mean perpetuating existing inequities (Darnhofer, 2021).

The complex problems of many systems, including aquatic food systems, have origins that go beyond disagreement and uncertainty; their origins include the systemic stability that can cause or perpetuate these problems (Arkesteijn et al., 2015). Systemic stability can take the shape of (formal and informal) rules and social practices, which can reproduce undesirable outcomes, such as poverty (Leeuwis et al., 2021). Because rules are aligned in the wider system, and social practices constitute networks of actors that are mutually dependent, the stability of the system is further entrenched (Arkesteijn et al., 2015). Tackling systemic stability as an avenue for system transformation requires a critical look at oneself and one’s own role in partnerships, and partnerships themselves can provide a conducive environment for consideration of the position of the researcher and research organization in the wider landscape of food systems governance (Schwarz et al., 2021). Only through reflexivity of one’s own position and the role of that position in maintaining systemic stability (and therefore the continued existence of complex problems) can legitimacy start to take shape, and eventually this may lead to research effectiveness in the sense that it solves the right problems, the origins of which lie in the stability of systems and associated power asymmetries.

Addressing and shifting power relations between different actors in aquatic food systems is central to building partnerships for impact. Even when employing participatory approaches to research, participants may still experience the least benefit from the research. Learning can be bypassed through over-reaching research methods by external experts that overlook rural people’s experiences and knowledge for solution-oriented research (Chambers, 1994, 2014). Indigenous researchers have highlighted how research has been exploitative of, and harmful to, the sovereignty and wellbeing of indigenous peoples, calling for use of indigenous methodologies to decolonize (e.g., Smith, 2021). Researchers in aquatic foods systems have pointed to gaps in research and practice related to gender and fisheries (Kleiber et al., 2015) and indigenous rights (Capistrano, 2010; Allison, 2011). More broadly, across development and conservation sectors, there is more explicit recognition of the need for processes like reconciliation, redress, revitalization of local practices and institutions to address power abuse and imbalances in research and practice (Armitage et al., 2019). When striving to improve equity and justice in aquatic food systems, doing research through equitable and just partnerships—the *how*—is just as important as the outcomes of such work—the *what*. We suggest that researchers start by examining their positionality whilst continually striving for a reflexive and accountable research practice individually and with their colleagues.

For researchers, shifting research practice into more equitable forms can be challenged by academic definitions of excellent

research (globally and academically relevant), which may or may not concur with research that is excellent at creating locally relevant and impactful change. While much research has both academic and practical applications, when the balance tips toward academic outputs it can result in deeply unfair practices that sideline local researchers and is inconsiderate to local partnerships (Braun, 2021; Watson, 2021). At the international level, there is a growing understanding that power imbalances influence the value given to different types of knowledge; “parachute science” defines a detached practice that overshadows national or localized research institutions that take subordinate roles in unfair arrangements. This requires active and meaningful collaboration to overcome (Asase et al., 2022), as well as a systemic change in research behaviors and attitudes within international research communities and structures that evaluate them. Whilst activities and outputs might carry scientific and/or policy credibility, it can take more time and effort for information and analysis to translate into impact in the communities or systems where the research takes place. These are the types of arrows that require investment through partnerships that (1) recognize and acknowledge gender, race, institutional and other power asymmetries; (2) actively work to address power asymmetries in both process and representation, and (3) seek to improve equity and justice in practice through policy and research use. However, current evaluation methods for quality of science tend to focus on progress along a linear pathway and against pre-determined quantifiable indicators (Douthwaite et al., 2017; Apgar et al., 2023), which separates legitimacy and scientific credibility. This focus on linear frameworks of evaluation means a lack of recognition of complexity and a lack of attention to the societal embeddedness of problems (Arkesteijn et al., 2015). In addition, short-term funding, and unrealistic expectations on the contribution of science to development have reduced the capacity to conduct strategic and transformative research (Leeuwis et al., 2018). Changes are needed to appreciate long-term investment in the arrows of the system in which research and development are taking place, as it contributes to legitimacy, and therefore the quality of research, and should be evaluated as such.

## Equitable partnerships for transforming food systems: principles

Partnerships that are equitable should allow for deliberation and continuous reflexivity on who decides what credible and legitimate research is. Who should do what, for what reason, and to what value? Continuously asking these questions is essential when striving to address the issues of legitimacy and effectiveness, and who decides whether these goals are achieved. As such, partnerships demand reflexivity on the role of values, beliefs, and practices (Locke et al., 2013), which is particularly relevant when operating within a results framework that demands (normative) development outcomes. If partnerships are to be helpful for addressing goals and issues that actors would not have been able to deal with on an individual basis (Glasbergen, 2011), then consideration of whose goals and issues are being addressed, and how, is needed too.

Building on earlier research in aquatic food systems, we propose incorporating principles from action research that can

help research-for-development to be implemented and understood as research-in-development (Douthwaite et al., 2017). This entails moving from transfer of technology to recognizing and working within the specific political and institutional contexts of aquatic food systems (Klerkx et al., 2012; Douthwaite et al., 2017). These principles are: ownership, equity, shared analysis, and feedback (Apgar and Douthwaite, 2013). Ownership refers to the vital role of participants in the research process, who define the problems to be addressed. Equity refers to recognizing and being mindful of who is in the partnership and who is not, how they participate, and what the power dynamics are. The dimensions of equity (recognition, procedural equity and distributional equity) have received attention in environmental justice research, but in conservation and development research, attention has been lacking, most notably on recognition and procedural equity (Friedman et al., 2018; Bennett et al., 2020). Shared analysis and data collection refers to joint responsibility of those involved, with the aim to improve understanding and action within aquatic food systems. Feedback refers to the process of sharing results to improve the potential of transformative learning. These principles contribute to the legitimacy of research-for-development by fostering genuine inclusion and recognition of partners, and to its effectiveness by improving the focus on real problems and desired outcomes (CGIAR ISDC, 2021). The principles also contribute to reorienting research from an engineering mindset toward an approach that recognizes and incorporates the beliefs, knowledge systems and power dynamics involved in transforming food systems (Leeuwis et al., 2021).

These principles are not new, and examples of approaches that employ them in aquatic food systems exist: a WorldFish programme ran between 2011 and 2015 in Bangladesh, Cambodia, Philippines, Solomon Islands and Zambia with a view to increase “capacity to innovate in an equitable way” for small-scale actors in aquatic agricultural systems (Douthwaite, 2016; Rice et al., 2019). This programme brought into practice principles of ownership, recognition and procedural equity, shared analysis and feedback through developing a shared problem definition and research protocol with small-scale fisheries and aquaculture operators, and through co-developing the capacity for these actors to analyse and interpret results. In addition, evidence from 11 cases in Africa, Asia and Latin America suggests that farmer-led research can increase the capacity to innovate through informal networks, not only by sharing research outcomes but also research approaches, thus applying principles of shared analysis, feedback and ownership in a terrestrial setting (Waters-Bayer et al., 2015). However, experiences from these programmes also suggest a difficult relationship with evaluation standards of research excellence. The science quality evaluation process assessed the WorldFish programme as doing too little to *enable* the traditional “pipeline of biophysical technologies” (Douthwaite, 2016, emphasis added). Similarly, the long-term and self-reinforcing impacts from farmer-led research were found to be missed by conventional impact evaluation (Waters-Bayer et al., 2015). These tensions may be caused by evaluation processes that gloss over social and institutional processes when analyzing technical innovations and practices (Meinzen-Dick et al., 2013). Indeed, this omission can mean that evaluation has a focus on the spread of technological outcomes, rather than the spread



of processes and approaches that constitute the capacity to innovate (Waters-Bayer et al., 2015). Without explicit recognition of the research process and relationships, current criteria of research excellence and evaluation approaches miss opportunities for learning. Addressing these limitations, reflexive evaluation approaches scrutinize how research contributes to or fails to challenge systemic stability, e.g., through maintaining or not challenging “existing, undesirable but normalized practices” that cause lock-ins and path dependence as underlying causes of development challenges (Arkesteijn et al., 2015, p. 102). Evaluation that allows space for considering the assumptions underlying the representations of problems can contribute to a more culturally responsive evaluation practice and challenge taken-for-granted power configurations (Bacchi, 2009; Archibald, 2020).

## Discussion: reflexivity and evaluation

Meaningful relationships for research co-production in aquatic food systems require close examination of positionality of researchers and research organizations, but also institutional recognition of the importance of procedures for critically assessing one’s own role. Both existing and new networks of relationships can influence power relations, research processes and the distribution of costs and benefits, and evaluation frameworks should recognize these dynamics. In particular, the goals of legitimacy and effectiveness, which were identified as requiring more effort to be truly incorporated into CGIAR research (CGIAR ISDC, 2021), could benefit from reflexivity in partnerships to continuously monitor CGIAR’s position in partnership networks more broadly. Adaptive partnerships that evolve toward more equitable forms can contribute to keeping research-for-development fit for purpose, credible and effective, in addition to being meaningful and respectful (Schwarz et al., 2021). Outcomes of co-production have been shown to benefit significantly from collaborative design and practice, expert facilitation, a supportive context, adequate monitoring, and high levels of social cohesion and trust (Chambers et al., 2021). Thus, there are both pragmatic and moral incentives for legitimacy being achieved through focusing on relationships in research-for-development programmes. By confronting all components of complex problems, from uncertainty to disagreement to the systemic stability that maintains them, research should provide a learning environment that challenges the “rules of the game,” thereby opening up pathways for food actors to secure a place in the blue economy.

## References

- Allison, E. H. (2011). Should states and international organizations adopt a human rights approach to fisheries policy? *MAST* 10, 95–116.
- Anandajayasekeram, P., and Gebremedhin, B. (2009). *Integrating Innovation Systems Perspective and Value Chain Analysis in Agricultural Research for Development: Implications and Challenges* (Vol. 16). Nairobi: ILRI (aka ILCA and ILRAD).
- Apgar, M., and Douthwaite, B. (2013). *Participatory Action Research in the CGIAR Research Program on Aquatic Agricultural Systems* (Program Brief AAS-2013-27;

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

MS and HE contributed to conception of the manuscript. MS wrote the first draft of the manuscript. HE, MA, and AR wrote sections of the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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CGIAR Research Program on Aquatic Agricultural Systems.). WorldFish. Available online at: <https://hdl.handle.net/20.500.12348/796> (accessed June 15, 2023).

Apgar, M., Snijder, M., Higdon, G. L., and Szabo, S. (2023). Evaluating research for development: innovation to navigate complexity. *Eur. J. Dev. Res.* 35, 241–259. doi: 10.1057/s41287-023-00577-x

Archibald, T. (2020). What’s the problem represented to be? Problem definition critique as a tool for evaluative thinking. *Am. J. Eval.* 41, 6–19. doi: 10.1177/1098214018824043

- Arkesteijn, M., Van Mierlo, B., and Leeuwis, C. (2015). The need for reflexive evaluation approaches in development cooperation. *Evaluation* 21, 99–115. doi: 10.1177/1356389014564719
- Armitage, D. R., Okamoto, D. K., Silver, J. J., Francis, T. B., Levin, P. S., Punt, A. E., et al. (2019). Integrating governance and quantitative evaluation of resource management strategies to improve social and ecological outcomes. *Bioscience* 69, 523–532. doi: 10.1093/biosci/biz059
- Asase, A., Mzumara-Gawa, T. I., Owino, J. O., Peterson, A. T., Saupe, E. (2022). Replacing “parachute science” with “global science” in ecology and conservation biology. *Conserv. Sci. Pract.* 4, e517. doi: 10.1111/csp2.517
- Bacchi, C. (2009). *Analysing Policy*. New York, NY: Pearson Higher Education AU.
- Bennett, N. J., Calò, A., Di Franco, A., Niccolini, F., Marzo, D., Domina, I., et al. (2020). Social equity and marine protected areas: perceptions of small-scale fishermen in the Mediterranean Sea. *Biol. Conserv.* 244, 108531. doi: 10.1016/j.biocon.2020.108531
- Braun, A. (2021). COVID-19 Lockdowns Show a World Without Parachute Science. *Hakai Magazine*, June 16. Available online at: [https://www.hakaimagazine.com/news/covid-19-lockdowns-show-a-world-without-parachute-science/?fbclid=IwAR0OWOPgg9R5tuh\\_r16ImexXSwoxgzOaHkQTRmV4tm6OAh8UwwfHVHmX\\_A](https://www.hakaimagazine.com/news/covid-19-lockdowns-show-a-world-without-parachute-science/?fbclid=IwAR0OWOPgg9R5tuh_r16ImexXSwoxgzOaHkQTRmV4tm6OAh8UwwfHVHmX_A) (accessed June 15, 2023).
- Brouwer, H., Woodhill, J., Hemmati, M., Verhoosel, K., and van Vugt, S. (2019). *The MSP Guide: How to Design and Facilitate Multi-stakeholder Partnerships*. Rugby: Practical Action Publishing.
- Capistrano, R. C. G. (2010). Reclaiming the ancestral waters of indigenous peoples in the Philippines: the Tagbanua experience with fishing rights and indigenous rights. *Mar. Policy* 34, 453–460. doi: 10.1016/j.marpol.2009.09.012
- CGIAR ISDC (2021). *Quality of Research for Development in Practice for One CGIAR*. CGIAR Advisory Services. Available online at: [https://cas.cgiar.org/sites/default/files/pdf/Quality%20of%20Research%20for%20Development%20in%20Practice%20for%20One%20CGIAR\\_0.pdf](https://cas.cgiar.org/sites/default/files/pdf/Quality%20of%20Research%20for%20Development%20in%20Practice%20for%20One%20CGIAR_0.pdf) (accessed June 15, 2023).
- Chambers, J. M., Wyborn, C., Ryan, M. E., Reid, R. S., Riechers, M., Serban, A., et al. (2021). Six modes of co-production for sustainability. *Nat. Sustain.* 4, 983–996. doi: 10.1038/s41893-021-00755-x
- Chambers, R. (1994). The origins and practice of participatory rural appraisal. *World Dev.* 22, 953–969. doi: 10.1016/0305-750X(94)90141-4
- Chambers, R. (2014). *Rural Development: Putting the Last First*. Routledge.
- Cisneros-Montemayor, A. M., Moreno-Báez, M., Reygondeau, G., Cheung, W. W. L., Crosman, K. M., González-Espinosa, P. C., et al. (2021). Enabling conditions for an equitable and sustainable blue economy. *Nature* 591, 396–401. doi: 10.1038/s41586-021-03327-3
- Darnhofer, I. (2021). Resilience or how do we enable agricultural systems to ride the waves of unexpected change? *Agric. Syst.* 187, 102997. doi: 10.1016/j.agsy.2020.102997
- Douthwaite, B. (2016). Beyond the pipeline model: new paths for agricultural research to enhance capacity to innovate. *Welt-Sichten. Dossier* 7, 9–10. doi: 10.1016/j.agsy.2017.04.002
- Douthwaite, B., Apgar, J. M., Schwarz, A.-M., Attwood, S., Senaratna Sellamuttu, S., Clayton, T., et al. (2017). A new professionalism for agricultural research for development. *Int. J. Agric. Sustain.* 15, 238–252. doi: 10.1080/14735903.2017.1314754
- Douthwaite, B., and Hoeffcker, E. (2017). Towards a complexity-aware theory of change for participatory research programs working within agricultural innovation systems. *Agric. Syst.* 155, 88–102.
- Fransman, J., Hall, B., Hayman, R., Narayanan, P., Newman, K., Tandon, R., et al. (2021). Beyond partnerships: embracing complexity to understand and improve research collaboration for global development. *Can. J. Dev. Stud.* 42, 326–346. doi: 10.1080/02255189.2021.1872507
- Friedman, R. S., Law, E. A., Bennett, N. J., Ives, C. D., Thorn, J. P., Wilson, K. A., et al. (2018). How just and just how? A systematic review of social equity in conservation research. *Environ. Res. Lett.* 13, 053001. doi: 10.1088/1748-9326/aabdc
- Gill, D. A., Blythe, J., Bennett, N., Evans, L., Brown, K., Turner, R. A., et al. (2023). Triple exposure: reducing negative impacts of climate change, blue growth, and conservation on coastal communities. *One Earth* 6, 118–130. doi: 10.1016/j.oneear.2023.01.010
- Glasbergen, P. (2011). Understanding partnerships for sustainable development analytically. The ladder of partnership activity as a methodological tool. *Environ. Policy Gov.* 21, 1–13. doi: 10.1002/etp.545
- Holling, C. S., and Gunderson, L. H. (2002). “Resilience and adaptive cycles,” in *Panarchy: Understanding Transformations in Human and Natural Systems*, eds L. H. Gunderson, and C. S. Holling (Washington, DC: Island Press), 25–62.
- Horton, D., and Mackay, R. (2003). Using evaluation to enhance institutional learning and change: recent experiences with agricultural research and development. *Agric. Syst.* 78, 127–142. doi: 10.1016/S0308-521X(03)00123-9
- Kaner, S. (2014). *Facilitator’s Guide to Participatory Decision-making*. Hoboken, NJ: John Wiley and Sons.
- Kleiber, D., Harris, L. M., and Vincent, A. C. (2015). Gender and small-scale fisheries: a case for counting women and beyond. *Fish. Fish.* 16, 547–562. doi: 10.1111/faf.12075
- Klerkx, L., and Begemann, S. (2020). Supporting food systems transformation: the what, why, who, where and how of mission-oriented agricultural innovation systems. *Agric. Syst.* 184, 102901. doi: 10.1016/j.agsy.2020.102901
- Klerkx, L., van Mierlo, B., and Leeuwis, C. (2012). “Evolution of systems approaches to agricultural innovation: concepts, analysis and interventions,” in *Farming Systems Research into the 21st Century: The New Dynamic*, eds I. Darnhofer, D. Gibbon, and B. Dedieu (Dordrecht: Springer Netherlands), 457–483. doi: 10.1007/978-94-007-4503-2\_20
- Laws, S., Harper, C., Jones, N., and Marcus, R. (2013). *Research for Development: A Practical Guide*. London: Sage.
- Leach, M., Stirling, A. C., and Scoones, I. (2010). *Dynamic Sustainabilities: Technology, Environment, Social Justice*. New York, NY: Taylor and Francis. doi: 10.4324/9781849775069
- Leeuwis, C., Boogaard, B. K., and Atta-Krah, K. (2021). How food systems change (or not): governance implications for system transformation processes. *Food Secur.* 13, 761–780. doi: 10.1007/s12571-021-01178-4
- Leeuwis, C., Klerkx, L., and Schut, M. (2018). Reforming the research policy and impact culture in the CGIAR: integrating science and systemic capacity development. *Glob. Food Secur.* 16, 17–21. doi: 10.1016/j.gfs.2017.06.002
- Locke, T., Alcorn, N., and O’Neill, J. (2013). Ethical issues in collaborative action research. *Educ. Action Res.* 21, 107–123. doi: 10.1080/09650792.2013.763448
- Mahon, R., McConney, P., and Roy, R. N. (2008). Governing fisheries as complex adaptive systems. *Mar. Policy* 32, 104–112. doi: 10.1016/j.marpol.2007.04.011
- Meinen-Dick, R., Bernier, Q., and Haglund, E. (2013). *The Six “ins” of Climate-smart Agriculture: Inclusive Institutions for Information, Innovation, Investment, and Insurance*. Washington, DC: International Food Policy Research Institute (IFPRI), 804–816.
- Metcalf, S., and Ramlogan, R. (2008). Innovation systems and the competitive process in developing economies. *Q. Rev. Econ. Finance* 48, 433–446. doi: 10.1016/j.qref.2006.12.021
- Mowles, C. (2014). Complex, but not quite complex enough: the turn to the complexity sciences in evaluation scholarship. *Evaluation* 20, 160–175. doi: 10.1177/1356389014527885
- Offermans, A., and Glasbergen, P. (2015). Boundary work in sustainability partnerships: an exploration of the Round Table on Sustainable Palm Oil. *Environ. Sci. Policy* 50, 34–45. doi: 10.1016/j.envsci.2015.01.016
- Ponte, S., and Cheyns, E. (2013). Voluntary standards, expert knowledge and the governance of sustainability networks. *Glob. Netw.* 13, 459–477. doi: 10.1111/glob.12011
- Pound, B., and Conroy, C. (2017). “Chapter 11—The innovation systems approach to agricultural research and development,” in *Agricultural Systems*, 2nd ed., eds S. Snapp and B. Pound (Cambridge, MA: Academic Press), 371–405. doi: 10.1016/B978-0-12-802070-8.00011-6
- Prain, G., Wheatley, C., Odsey, C., Verzola, L., Bertuso, A., Roa, J., et al. (2020). Development partnerships for scaling complex innovation: lessons from the Farmer Business School in IFAD-supported loan-grant collaborations in Asia. *Agric. Syst.* 182, 102834. doi: 10.1016/j.agsy.2020.102834
- Rice, M. J., Apgar, J. M., Schwarz, A.-M., Saeni, E., and Teioli, H. (2019). Can agricultural research and extension be used to challenge the processes of exclusion and marginalisation? *J. Agric. Educ. Ext.* 25, 79–94. doi: 10.1080/1389224X.2018.1529606
- Sartas, M., Schut, M., Proietti, C., Thiele, G., and Leeuwis, C. (2020). Scaling readiness: science and practice of an approach to enhance impact of research for development. *Agric. Syst.* 183, 102874. doi: 10.1016/j.agsy.2020.102874
- Schutter, M. S., Hicks, C. C., Phelps, J., and Waterton, C. (2021). The blue economy as a boundary object for hegemony across scales. *Mar. Policy* 132, 104673. doi: 10.1016/j.marpol.2021.104673
- Schwarz, A.-M., Eriksson, H., Ramofafia, C., Masu, R., Boso, D., Govan, H., et al. (2021). Three-decades of research integration—transforming to collaborative aquatic food systems research partnerships in the Pacific. *Front. Sustain. Food Syst.* 5, 757407. doi: 10.3389/fsufs.2021.757407
- Smith, L. T. (2021). *Decolonizing Methodologies: Research and Indigenous Peoples*. London: Zed Books Ltd.
- Snijder, M., Steege, R., Callander, M., Wahome, M., Rahman, M. F., Apgar, M., et al. (2023). How are research for development programmes implementing and evaluating equitable partnerships to address power asymmetries? *Eur. J. Dev. Res.* 35, 351–379. doi: 10.1057/s41287-023-00578-w
- Sumberg, J., Okali, C., and Reece, D. (2003). Agricultural research in the face of diversity, local knowledge and the participation imperative: theoretical considerations. *Agric. Syst.* 76, 739–753. doi: 10.1016/S0308-521X(02)00153-1

Thornton, P. K., Schuetz, T., Förch, W., Cramer, L., Abreu, D., Vermeulen, S., et al. (2017). Responding to global change: a theory of change approach to making agricultural research for development outcome-based. *Agric. Syst.* 152, 145–153. doi: 10.1016/j.agsy.2017.01.005

Walker, B., Holling, C. S., Carpenter, S. R., and Kinzig, A. (2004). Resilience, adaptability and transformability in social-ecological systems. *Ecol. Soc.* 9. doi: 10.5751/ES-00650-090205

Waters-Bayer, A., Kristjanson, P., Wettasinha, C., van Veldhuizen, L., Quiroga, G., Swaans, K., et al. (2015). Exploring the impact of farmer-led research supported by civil society organisations. *Agric. Food Secur.* 4, 1–7. doi: 10.1186/s40066-015-0023-7

Watson, C. (2021). Parachute science falls to earth. *Nature Index*, April 13. Available online at: <https://www.natureindex.com/news-blog/parachute-science-falls-to-earth> (accessed June 15, 2023).