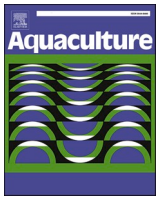
Aquaculture 609 (2025) 742776

Contents lists available at ScienceDirect

Aquaculture

journal homepage: www.elsevier.com/locate/aquaculture



Gender monitoring schema for aquaculture projects: Capturing the process of change

Kyoko Kusakabe [a,*], Victoria Syddall [b], N. Veena [a], Nikita Gopal [c], Chollada Wongpanich [a], Kafayat Fakoya [d], Alice Joan Ferrer [e], Arlene Nietes Satapornvanit [d], Malasri Khumsri [f], Sereyvath Prak [g], Meryl J. Williams [h]

[a] Gender and Development Studies, SERD, Asian Institute of Technology, Pathum Thani 12120, Thailand
[b] Ocean Research Consulting Advisory Ltd, Auckland, New Zealand
[c] ICAR-Central Institute of Fisheries Technology, Kochi, India
[d] Gender in Aquaculture & Fisheries Section (GAFS) of the Asian Fisheries Society (AFS), Selangor, Malaysia
[e] Division of Social Sciences, University of the Philippines Visayas, Miagao, Iloilo, Philippines
[f] Department of Fisheries, Royal Thai Government, Bangkok, Thailand
[g] Cambodian Institute for Research and Rural Development, Phnom Penh, Cambodia
[h] Faculty of Arts and Social Sciences, University of Technology Sydney, Australia

ARTICLE INFO

Keywords:
Gender monitoring schema
Aquaculture
Nature-based solutions
Process monitoring
Monitoring
Evaluation and learning (MEL)

ABSTRACT

Women are heavily involved in aquaculture, but their gendered knowledge and expertise continues to be ignored in the process of innovation and technological development. Since women's participation is crucial in promoting more extensive and sustainable aquaculture, this paper presents a gender monitoring schema for aquaculture to allow for women's meaningful participation. A review of current MEL systems, particularly in aquaculture, found that the plethora of gender indicators and MEL frameworks do not adequately capture the dynamics of changes in gender roles and relations. Given that shifts in gender relations can be subtle, the change process is crucial to capture so that the MEL process can further accelerate these shifts within the lifetime of the project itself. Noting that women's important role in extensive and sustainable aquaculture, for e.g., nature-based solutions (NbS), the MEL process focusing on NbS aquaculture has been developed. Three agentic processes (awareness, images of change, and agency) and two environmental processes (attitudes towards NbS practices and climate change) have been identified as the key domains for the proposed gender monitoring schema to capture the process of change towards gender equality in the context of climate change.

1. Introduction

Women perform up to 80 % of all aquaculture activities depending on the location and type of enterprise. But despite their significant contributions, women's participation in aquaculture is frequently unrecognized and underappreciated (Weeratunge-Starklof and Pant, 2011; Gopal et al., 2020; Ferrer et al., 2017). Although it is now common practice to incorporate gender into aquaculture projects, gender transformation in fisheries and aquaculture is yet to make headway (Cole et al., 2020). Using health projects as an example, Pederson et al. (2015) noted that the spectrum of treatment of gender issues in projects can be: gender unequal (perpetuating gender inequalities); gender blind (ignoring gender issues); gender sensitive (acknowledging the issues but not addressing gender inequalities); gender specific (acknowledging the issues and considering women and men's needs); through to gender transformative (addressing the causes of gender inequality and transforming gender norms and relations). Fisheries and aquaculture projects are often framed from a gender-sensitive perspective. The primary purpose of projects is typically to increase fish production through capture or culture practices that are predominantly identified as men's work (Aregu et al., 2017; Brugere et al., 2001). Women's participation in less intensive aquaculture is well-established (Veliu et al., 2009). However, this participation is perceived as a sign that women are not serious aquaculturists; and hence has not been used to its full potential to empower women (Brugere et al., 2001; Kusakabe, 2003).

Several gender analysis frameworks and monitoring indicators

* Corresponding author.
E-mail addresses: kyokok@ait.ac.th, Kyokok@ait.asia (K. Kusakabe).

https://doi.org/10.1016/j.aquaculture.2025.742776
Received 3 February 2025; Received in revised form 1 May 2025; Accepted 29 May 2025
Available online 31 May 2025

capture gender relations in communities and projects but challenges have been reported in documenting gender relations during the Monitoring, Evaluation, and Learning (MEL) process. The MEL frameworks themselves might be gender-blind. They might be focusing on the outcome and are hence unable to capture the subtle changes in gender relations. Even with the use of gender-sensitive frameworks, monitoring and evaluation officers may lack the necessary training and skills to identify the subtle shifts in gender equality.

This paper explores gender-transformative MEL, which may serve as a feedback mechanism for incorporating gender perspectives into project implementation and learning. In the following sections, literature on gender issues in aquaculture as well as existing MEL schemes are reviewed to identify what has been achieved in terms of gender integration and making aquaculture gender-transformative. Based on the review, this paper reflects on the gaps and missing elements in current efforts to achieve gender responsiveness and inclusivity in MEL of aquaculture projects. Capturing the process of change was identified as a key missing element, and therefore, the significance of documenting the process of change is presented followed by a gender monitoring schema that will be helpful in capturing subtle changes in the field during project implementation. The main goal of the paper is to present the prototype gender monitoring schema as a step towards the goal of making aquaculture more gender-transformative, and thus sustainable.

In our effort to develop a gender MEL schema, this paper focuses on sustainable aquaculture, especially on nature-based solutions in aquaculture. In response to environmental and social challenges due to commercial aquaculture being practiced globally (Perera et al., 2024), initiatives to shift away from intensive aquaculture towards more nature-based solutions (NbS) are taking place. Nature-based solutions, according to the definition of United Nations Environment Assembly of the United Nations Environment Programme (UNEP Environment Assembly, 2022:2) are "actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously benefiting people and nature". Small-scale extensive aquaculture is often considered a form of NbS aquaculture. Women's participation is especially noted in such nature-based aquaculture (Le Gouvello et al., 2022). IUCN's global standard for Nature-based solutions (NbS) have 8 criteria: NbS effectively address societal challenges; design of NbS informed by scale; NbS result in a net gain to biodiversity and ecosystem integrity; NbS are economically viable; NbS are based on inclusive, transparent, and empowering governance processes; NbS equitably balance trade-offs between the achievement of their primary goals and the continued provision of multiple benefits; NbS are managed adaptively, based on evidence; NbS are sustainable and mainstreamed within an appropriate jurisdictional context (Le Gouvello et al., 2023). Such a holistic view would be helpful in the development of gender monitoring schema that look not only at the production side of aquaculture but also how it impacts gender norms and relations.

2. Gender issues in nature-based solutions in aquaculture

In small-scale extensive aquaculture, women are mainly involved in household-based low-technology aquaculture under traditional patterns of ownership, rights, and power within the family and community (Galappaththi et al., 2022; Kruijssen et al., 2018). Researchers have noted that women do not have access to financial resources or extension services (Adam and Njogu, 2023). Men's knowledge of technological advancements is considered more important and given priority over traditional knowledge, while women's knowledge that is developed through their gendered roles in livelihood and care activities, specifically regarding the micro-environment around their homestead, is ignored (Kusakabe and Thongprasert, 2022). Subsequently, women are considered less knowledgeable, and hence they have weaker decision-making power than men in the household and in the community (Brugere et al., 2001).

Gender norms have a direct impact on women's roles in aquaculture, as well as their roles in the home and community. Gender norms also shape how women's roles are perceived and valued by their employers, business networks, families, and communities (Aregu et al., 2017). Women typically handle everyday maintenance duties like feeding in home-based aquaculture, while men handle infrastructure building, stocking, and harvesting. However, men are viewed as the pond's proprietors due to traditional practices of ownership over land and water resources, while women are viewed as assistants. Therefore, activities like feeding are seen as an extension of women's domestic duties, even when feeding is the key to the success of aquaculture (Ferrer et al., 2017). Men, however, are perceived to have the authority to make decisions and manage income from aquaculture (Kruijssen et al., 2018; Kusakabe and Thongprasert, 2022). Women are not only excluded from decision-making, they are also expected to handle any increase in aquaculture workload, in addition to their already demanding workload of reproductive work and farming (Veliu et al., 2009). Women are more likely to have larger roles in small-scale aquaculture than medium- and large-scale enterprises.

Household duties and unpaid care work at the community and household levels are viewed as women's primary responsibilities. These responsibilities directly affect women. They restrict participation in aquaculture, mobility in markets and business networks and access to essential training and services. In some regions, cultural norms that dictate women should keep to themselves and/or avoid "other" men are still very strong (Quisumbing and Kumar, 2011). Cultural conventions and gender roles create strong barriers to women's participation in aquaculture and economic opportunities as well as their negotiating power in the family and community (Harper et al., 2013; Kruijssen et al., 2018; Weeratunge et al., 2010; Islam et al., 2021). Cultural barriers turn into economic barriers which in turn shape the kind of aquaculture that is practiced and limit women from exercising the knowledge and skills.

Women and men have different experiences and observations as a result of the gender-based division of labor in the home, on the farm and in society. Such differences lead to varied knowledge. Development organizations, scientific communities, and governments frequently support new technologies that are developed without the participation of women from the communities and are primarily distributed to men because women's knowledge is not acknowledged (Nmeregini et al., 2020; Adam and Njogu, 2023). Extension strategies change once women's knowledge or cultural obstacles are acknowledged. For example, noting the limitations due to women's mobility and household responsibilities, aquaculture in homesteads using plastic tanks has been recognized to guarantee that women maintain control over their earnings and produce while balancing their reproductive responsibilities (Adam and Njogu, 2023; Gbigbi, 2021). When technologies are disseminated through women's groups, women's assets increase more relative to those of men (Quisumbing and Kumar, 2011).

3. Gender in monitoring, evaluation and learning frameworks

MEL frameworks are conceptual structures that guide how interventions should be monitored and their effects assessed. Gender integration processes range from basic checklists to full integration guided by participatory approaches with affected women. It considers how gender interacts with other forms of inequality, such as age, sexual orientation, and race. However, gender transformative approaches in MEL frameworks and tools in the aquaculture sector remain scarce (Phillips et al., 2016; Satapornvanit et al., 2016; Gonzalez Parrao et al., 2021).

For MEL to be inclusive, comprehensive, and adaptable, the interactions and procedures must be gender transformative. Since the divergent viewpoints of several stakeholders may impact on the governance of aquaculture systems (Nagel et al., 2024), women's viewpoints must be incorporated into and/or articulated in the process of aquaculture development. Inclusion of women's views influences how

aquaculture operations are conducted and policies are formulated, which in turn impact on women aquaculturists as well.

We have identified three primary categories of existing gender-transformative MEL techniques/schema:

1. Indicator-based MEL
2. Concept-based MEL
3. Story-based MEL

These are not mutually exclusive. These three categories of gender-transformative MEL approaches are discussed in the section that follows. We will refer to the use in fisheries and aquaculture wherever relevant. However, little work has been done for gender-transformative MEL in aquaculture. Section 4 examines the shortcomings of current MEL systems and suggests a way forward.

3.1. Indicator-based approaches to gender-transformative MEL

In 1995, the Beijing Platform for Action (BPFA) called for developing "gender-sensitive databases, information, and monitoring systems." The development of gender indicators has been remarkable in terms of quantity and quality. Gender indicators are powerful tools to show the progress towards gender equality in both policies and projects. These indicators have captured gender inequality in a range of areas including economic empowerment, political empowerment, bodies, and sexualities. In the field of agriculture, the Women's Empowerment in Agriculture Index (WEAI) is a significant development that allows for direct measurement of women's empowerment in agriculture through indicators derived from household surveys of women and men. The WEAI assesses the roles and degree of women's involvement in agriculture in five areas of empowerment: leadership, time, resources, incomes, and production (Alkire et al., 2013). Since its creation, WEAI has been used or modified by numerous organizations and sectors in over 50 countries. Project-WEAI (Pro-WEAI), Abbreviated WEAI (A-WEAI), and Pro-WEAI for Market Inclusion (pro-WEAI+MI) are some variations of WEAI (IFPRI, 2020).

Pro-WEAI is designed for evaluating agricultural development projects. It includes new indicators, such as freedom of movement and attitudes about intimate partner violence (IPV) against women (Yount et al., 2019; Malapit et al., 2019). Pro-WEAI is effective in its ability to detect project impacts on women's empowerment across multiple dimensions, for being well grounded in both empirical research and theory, and for enabling standardised assessment of women's empowerment (Seymour et al., 2023). It comprises both qualitative and quantitative information, and is made up of 10 indicators that measures intrinsic agency (autonomy of income, self-efficacy, attitudes about IPV against women, respect among household members), instrumental agency (input into productive decisions, ownership of land and other assets, control over use of income, access to and decisions on financial services, work balance, visiting important locations), and collective agency (group membership, membership in influential groups) (Malapit et al., 2019).

WEAI and pro-WEAI were further adapted to fisheries with the Women's Empowerment in Fisheries and Aquaculture Index (WEFI and pro-WEFI) (McDougall et al., 2021). Pro-WEFI followed the same indicators as Pro-WEAI but changed some to reflect the special context of fisheries, such as including pond and gleaning area in the ownership of assets to assess instrumental agency. Pro-WEFI has been used in performance monitoring within WorldFish projects. Adam et al. (2025) used Pro-WEFI to measure women's empowerment in aquaculture in northwestern Bangladesh and argued the usefulness in identifying the domains in which gender inequality is evident. Ragsdale et al. (2022) used WEFI in their analysis of fisheries value chains in Zambia but incorporated a scale on gender attitudes, showing how attitudinal change often precedes behavioural change.

Although indicators are a useful tool to measure social changes, they have some limitations. Noting that pro-WEFI has both quantitative and qualitative indicators, there is a tendency that the quantitative indicators tend to be highlighted more, since they are easier to record. Quisumbing et al. (2022) identified the limitations of quantitative analyses, while qualitative analysis provided more nuance and insight. The importance of integrated qualitative and quantitative research methods with mixed methods research is also emphasized to contextualize the scores (Malapit et al., 2019). Malapit et al. (2019) also emphasized the importance of measuring not only empowerment in agricultural development projects but also the projects' impacts on women's empowerment in other economic and social domains, such as savings and borrowing, household activities, and increased freedom of movement in public space. Other challenges include the need for highly skilled interviewers (Waid et al., 2022), the length of interviews and loss of nuances following translation of terms into local languages. The challenges require that the surveys be made simpler, shorter, and easy to integrate with other surveys (Seymour et al., 2023).

3.2. Concept-based MEL

Some MEL frameworks present general concepts to be considered while maintaining the framework's adaptability to local circumstances. For example, people's ideas for change within social structures and norms are the main emphasis of CARE's gender-transformation strategy, which aims to comprehend the goals and experiences of change by varied actors (Hillenbrand et al., 2015; CARE, 2017; Lau et al., 2021). Change is viewed as a process and MEL monitors the process of change to some extent and allows for the reporting of minor, gradual changes through using instruments such as progress markers and outcome mapping in social gender analysis. In contrast to indicators, progress markers describe a behavior rather than a change in state, and hence, can be modified during implementation, and take unintended consequences into account.

Specifically, for the coastal fisheries and aquaculture sector, Barclay et al. (2021) provide a thorough guide for gender equity assessment, including a general understanding of gender and social inclusion, and basic tools to carry out Gender Equality and Social Inclusion (GESI) assessments to be used as part of the MEL process. Arenas and Lentisco (2011) and USAID SUFIA, 2022 field manuals provide guidance on integrating gender into small-scale fisheries development projects. The approaches of these manuals are multi-dimensional (rights, opportunities, value, situation, agency) and multi-level, and give critical guidance at each stage of a project's lifecycle, including MEL. Although concept-based MEL is more flexible and can accommodate more nuance than the indicator-based approach, the overall conceptual framework is decided by the project managers and not the women themselves, making it less capable of accommodating unexpected outcomes and developments. The above literature is focused on fisheries and fisheries management and less on aquaculture. Hence adapting the frameworks to aquaculture still remains to be done.

3.3. Story-based monitoring

There are MEL schemes that rely on people's stories and offer more flexible methods than the concept-based approaches. Among the techniques that have been employed by researchers are the Participatory Narrative Inquiry (PNI), the Narrative Assessment methodology, and Most Significant Change (Zucchini et al., 2022; van Wessel, 2018; Dart and Davies, 2003). Reflexivity and cultural responsiveness have been flagged as critical elements (Kelly et al., 2021; Rogers et al., 2018a, 2018b). Reflexivity is defined as a set of continuous, collaborative, and multifaceted practices through which researchers self-consciously critique, appraise, and evaluate how their own subjectivity and context influence the research processes (Olmos-Vega et al., 2023).

Most Significant Change (MSC) is a technique for collecting qualitative data on changes occurring with program participants and

stakeholders in an inclusive and participatory manner (Davies and Dart, 2005). By using a storytelling approach, which is a traditional cultural artifact in many communities, people are able to narrate rich and complex stories in their own terms. It is engaging and can unearth unexpected findings. Different stakeholders and participants work together to select the most significant story and explain why they have selected them. There is feedback in the end where stakeholders and participants confirm that their voices are heard and valued. MSC does not have any pre-defined indicators to measure the success of the project, instead, local stakeholders are both co-producers and co-evaluators of knowledge and data. Participants gain the ability to think critically, take responsibility for their work, actively participate in the evaluation process, and formulate and express their thoughts about the influence of the program. This is similar to participatory monitoring series, which have empowered community members, especially women (Adam and Njogu, 2023; House et al., 2024) to express their own opinions. However, the propensity to hide issues and report selectively may hamper the ability of participatory methodologies to uncover patterns of conflict and disagreement or dominance and dependence among community members (Mosse, 2001). A small number of vocal participants do not fairly reflect the extent of change that has taken place for each person (Waffi, 2017).

MSC itself also has several drawbacks, including the need for resources to ensure that highly trained staff are available to collect and record stories. This is a time-intensive process that requires a relatively high level of analytical thinking. Although the selection of the stories is participatory, what and how it is recorded is based on the interviewers' perception rather than the interviewees'. Hence it can miss out on certain important aspects. However, the method is flexible and can be adjusted to suit different contexts and budgets. Such a narrative-based approach is also not new to fisheries. Cole et al. (2020) noted the use of theater to introduce a reflexive approach to participatory technology development in Zambia.

4. Gender monitoring frameworks: identifying the gaps

As the previous section illustrates, a number of gender monitoring frameworks/schemas and indicators have been developed, some of which have been specifically modified for use in fisheries/aquaculture. Indicators make it possible to compare progress across projects; and mixed methods research allows us to capture gender power relations. Techniques like WEAI and WEFI are designed to gather data quickly. Though some schemes capture incremental changes and the diverse experiences of women, capturing gender complexities has proven to be excessively complicated and time-consuming for field workers (Njogu et al., 2024). While the Gender Transformative Approach (Cole et al., 2020) takes the wider ecosystem around women into consideration, it is not operationalized into a monitoring schema. Several challenges have been identified by researchers while using existing gender MEL frameworks/schemas.

The first challenge is that because the indicators concentrate on results, they may overlook subtle and complex changes and the processes that lead to said results. Some qualitative approaches do try to document minor changes, but they still struggle to record gender relations that are dynamic and challenging to document, such as autonomy, decision-making, involvement, perceptions, and satisfaction. Small, gradual improvements are necessary to achieve gender equality, and these adjustments may eventually result in one or more revolutionary shifts over the course of generations (Mcdiarmid et al., 2021). By the time a change is acknowledged as an "outcome", it may be too late to seize the opportunity to make the necessary corrections in the project/program implementation. Therefore, the MEL process should be conducted at regular intervals to capture changes over the course of an activity, and not just at the end of an intervention.

A snapshot indicator is only able to record one dimension at most (such as a change in income), and even that may vary from day to day. Dimensions are complicated, ambiguous, subjective, and flexible ideas that may vary depending on the situation, time, and location; and can affect how people react to these changes based on the atmosphere, the subjects of conversation, or other occurrences that are completely unrelated to the project. It may also overlook unanticipated results. Additionally, what gets recorded depends on the MEL practitioners themselves, and minor shifts in gender relations may be overlooked if they are not dedicated to capturing them or not attuned to the cultural context.

The second challenge is that outcome-oriented indicators are unable to account for the dynamics of families, communities, and potential transformation paths. Since indicators and the traditional MEL both concentrate on project activities and outcomes, they are more used in determining whether the projected outcomes have been attained or not. However, gender relations are influenced not only by project activities but by various other factors. The narrow focus on project activity might ignore the changes that could be induced by other factors. Although some of the more qualitative methods are reflexive, they do not necessarily include a wider diagnosis or even perception of the social-ecological system. MSC overcomes this challenge through storytelling, but suffers from a need for highly qualified researchers to capture the complexity. A significant degree of analytical skill is required for such analysis, which is unavailable during the field-level monitoring phase. As a result, such analysis is frequently not done until the project evaluation exercise at the conclusion of the project. However, the project can make the required and timely implementation adjustments if the change process can be identified during the project monitoring stage.

The third challenge is – who gets to judge the change. The need for project management has led to the introduction of indicators and monitoring schemas, and the project implementers and evaluators typically appraise the results to suit their own needs. The opinions of the community may be included in some participatory projects, however they will only be included within the project report's parameters. Some approaches place a strong emphasis on reflexivity, however identifying implementers' and assessors' bias requires deliberate effort and calls for highly qualified personnel with strong analytical skills.

In summary, the current monitoring systems may be missing subtle small changes. Where does the initial indication of change take place? How can we detect it when it occurs? What causes the initial indication of change? What is the relationship between change and the project activities? How do we depict transformation from a holistic perspective? All these questions point to the importance of capturing the process in a wider context. The significance of processes in gender and development is covered in the following section.

5. The significance of documenting the process of change

The arguments presented above are supported by Batliwala and Pittman (2010), who contend that conventional monitoring and evaluation frameworks fall short of capturing the dynamic character of empowerment. They argue that current MEL methods typically place more emphasis on evaluating success against preset targets than they do on understanding the nuances of gender relations and examining how change occurs. This constraint may make it challenging to evaluate the actual benefits of aquaculture interventions on women's empowerment and social power dynamics since frameworks often measure outputs rather than outcomes.

Since gender analysis focuses on examining changes and transitions, gender and development literature emphasizes the significance of documenting the process. Since gender analysis aims to uncover shifts in gender relations, documenting these shifts is crucial. According to Kabeer (1999), empowerment is a transformational process. Empowerment is to give women the freedom to choose in situations where they were previously restricted or denied that option (Kabeer, 1999). Açıkalın (2011) emphasized the need to see development projects as learning processes to address gender equality, poverty alleviation,

organized action, and full engagement, in line with Kabeer's focus on documenting the process of gender and development change. Her research on a regional development program in Eastern Turkey shows that development initiatives were more effective when they adopted a comprehensive strategy, taking into account women's identities, social relationships, and economic and symbolic labor.

Cornwall (2016) developed these concepts further by examining the idea of empowerment as a process of awareness shifts and collective power. Empowerment is not something that can be granted by others but is about recognizing inequalities in power and taking action to bring about structural change (ibid). Cornwall (2016), drawing on previous feminist works (e.g., Batliwala, 1993; Kabeer, 1994; Rowlands, 1997; Sen, 1997) highlighted that empowerment is relational and essentially about altering power dynamics and acknowledging that it is a complicated, context-dependent process rather than a one-size-fits-all idea. Kabeer (2005) suggests that empowerment often starts as an internal shift shaped by beliefs and values that reinforce gender inequality. It includes both visible actions, like political participation, and intangible elements, such as agency, self-esteem, and personal motivation. Understanding how individuals experience change in relation to their goals, relationships, and personal growth is essential for any effort to measure gender transformation. By focusing on the agency and experiences of marginalized groups as drivers of social change, gender-transformative measurement evaluates both the process (how empowerment occurs) and outcomes (what changes) (Hillenbrand et al., 2015). This approach prioritizes the importance of capturing pathways of change alongside descriptive metrics to achieve meaningful and lasting impacts. The Feminist Learning System advocated by Haylock and Miller (2016) puts the spotlight on gender and power relationships to make sense of how nonlinear, complex social change happens. The most interesting part of this system is the view that MEL is part of the continuum of social transformation reinforcing women's rights and gender equality, highlighting the importance of process (Haylock and Miller, 2016).

In his edited book "Development as Process," Mosse (2001) went into detail on the value of considering development as a process since it is adaptable, allows us to gain knowledge from experience, and improves our ability to depict social relationships. In contrast to traditional monitoring, which views projects as a closed, regulated system, process-oriented approaches can document unforeseen developments and provide an explanation for the results. He maintained that process monitoring would help participants respond and adapt more effectively, based on a critical evaluation of participatory methodologies. Mosse (2001) argued that stories and observations are good ways of capturing the processes, especially so as not to miss out on the non-verbal cues and understand the context. The Most Significant Change Stories approach strategically focuses on stories but these tend to be analyzed by the trained enumerator and not by the community themselves.

To be accepted by field workers, Mosse (2001) emphasized the significance of both insider and outsider perspectives, the independence of process-oriented monitoring from routine processes, and simplicity. He also made the case that domains should be established in order to focus the data collection. Kusakabe (2012), in line with Mosse (2001), advocated for a case-based gender process monitoring system in which community representatives gathered positive and negative instances and discussed them orally during a regular group meeting. In addition to facilitating greater engagement from community women and project managers, the verbal discussion also acted as a capacity-building exercise for gender analysis.

Foregrounding "process" for monitoring also means that the knowledge is co-produced by all those involved in the monitoring. Process orientation not only addresses the barriers, but allows for greater co-production of knowledge and evidence by reflecting on power dynamics within the research process itself, local gender power dynamics, and structural power dynamics between aid actors and recipients (Potts et al., 2022; Warwick-Booth et al., 2024). For example, Brugere et al. (2020) introduced tubular net innovation through a gender-sensitive 'innovation-cum-empowerment' approach among the women seaweed farmers in Zanzibar. They rightly noted that "Innovation on its own is not sufficient for empowerment, and empowerment needs mechanisms to be triggered" (p.17) highlighting the importance of co-production of knowledge and innovation.

According to Ndege et al. (2024), farmers continue to feel excluded from the knowledge creation process since they believe they are only involved in the validation and not the development of innovation. Focus on the knowledge creation process allows us to operationalize an inclusive approach that guarantees individuals can participate, co-create knowledge, and co-design projects and approaches with a variety of stakeholders (ibid.). Since evaluators' power can influence how knowledge is co-created, it is crucial to be aware of power dynamics in this situation. Hanberger (2022) pointed out that the idea of what constitutes genuine knowledge was also influenced by the power that evaluators possessed. Therefore, in a realistic manner, it is critical to acknowledge and appreciate a range of experiential knowledge, incorporate local context information, allow for adaptability, and confront the power dynamics that are a part of evaluation procedures (Aston et al., 2022). The monitoring process's methodological decisions have the ability to both upend established power disparities and foster moments of empowerment (Ross, 2017). According to Rebien (1996), employing a participatory assessment technique could potentially reduce the uneven power dynamics between donors and recipients by giving the less powerful participant more control over the review process, as compared with other assessment techniques.

6. Gender monitoring schema: capturing the process of change

The section above discussed the importance of capturing the process of change in order to capture the subtle changes in empowerment. A process-oriented approach also leads to co-production of knowledge since it facilitates engagements of various stakeholders including the women farmers themselves in analyzing the process. Noting the lack of an existing MEL scheme that would effectively capture the process, we have developed a gender monitoring schema that can capture the process of change with engagement of women farmers throughout the process. Using nature-based solutions in aquaculture as an example, this section presents this gender monitoring schema. As previously noted, nature-based aquaculture is a good sector to illustrate the gender process monitoring schema since women play important but frequently overlooked roles in this field.

The schema's first premise is that gender equality in aquaculture would improve when women are acknowledged and actively involved in the activity (Elias et al., 2023; Mulema et al., 2020). The literature on inclusive innovation has covered these impacts on meaningful involvement in great detail. According to Sengupta (2016), the inclusive innovation strategy has claimed that participation empowers stakeholders to take part in the innovation. Additionally, it enables a more comprehensive examination of the challenges and opportunities for innovation, including its institutional, political, economic, and socio-cultural aspects (Joffre et al., 2017).

Sengupta (2016:12) pointed out that the "objective of innovation must be to enable and empower people at the periphery through awareness, accessibility and democratic deliberations rather than solely aiming at economic outcomes". In this context, when analyzing inclusion, it is crucial to consider political, cultural, social, and psychological viewpoints, including norms and values, in addition to income and economic results (Swaans et al., 2014). As Brugere et al. (2020) noted, engaging women through training and co-learning, the process of empowerment can be triggered through the introduction of innovation. Through engaging in the process of introduction of the new technology of tubular nets, women improved their self-esteem. Women have shown "more personal, deeper and more subtle changes" (p.16).

Numerous extension strategies, like Farmer Field Schools, which

provided rigorous experiential and community education through weekly on-the-field meetings, have long acknowledged the importance of farmer innovation (Choudhury and Castellanos, 2020). Research from farmer field schools indicates that this kind of approach boosted the involvement of women (Faure et al., 2012). In their study conducted in Mexico, Gelmiche-Tejeda and Townsend (2006) show that women and men have distinct reasons for engaging in aquaculture. Ignoring these reasons results in incorrect technology development and ultimately, project failure.

In discussing empowerment Kabeer (1999) identified that the ability to exercise choice is based on: resources (pre-condition), agency (process) and achievements (outcomes). Following these three components, we focus on agency as the process. As Cornwall (2016) noted, recognizing inequalities and taking actions are essential for empowerment. Aside from agency, Kabeer (2005) noted self-esteem and personal motivation as key. Sen (1985) defined agency as the capacity to establish and pursue one's own objectives and interests, which we use to better understand the process by which agency is exercised. To do this, we must comprehend how women view the world and how they make goals, or how they envision the changes to occur. Therefore, women's agency, their awareness and recognition of the situation that they are in, and the self-esteem and the confidence in setting goals and imagining how their world will change are important to capture changes in women's empowerment.

As discussed above, our design of the gender-transformative MEL is developed with NbS aquaculture as the context. Aside from these agency-related aspects of the process, given our focus on NbS in aquaculture, particular attention will be paid to how women view the environment and climate change in order to track their awareness, comprehension, and perceptions of these issues. Following Mosse (2001), we call these aspects "domains" in an integral approach for participatory process monitoring to capture the meaningful engagement of women in NbS aquaculture.

Based on the above review of literature, our team members, who have considerable community-based research and project implementation experiences, have discussed what domains should be included and how these domains should be named to capture the nature of our focus. We posit that monitoring the following five domains will be most useful to capture changes in gender relations: (i) awareness, (ii) image of change, (iii) agency, (iv) attitudes towards NbS aquaculture, (v) attitudes towards climate change, which may then be grouped into 2 kinds of processes – agentic and environmental.

6.1. Agentic processes

We have identified three domains within agentic processes; viz., awareness, image of change and agency through which decision-making and power flow from one to the next.

6.1.1. Awareness

An essential component of the transformation process is awareness. When do the women start to feel that they are important players in NbS aquaculture? When do they start to feel that their opinion matters and is heard? Capturing the moment of shift in awareness is a key component of process monitoring and the first step towards empowerment in the Longwe framework (Longwe, 1995). Awareness encompasses both self-awareness and increased recognition by others (Belingheri et al., 2021). Brugere et al. (2020) in their study of co-production of innovation with women seaweed farmers pointed out that through interactions and building social networks, awareness among women producers was raised and they started to reach out to others. The awareness is predicated on women's perceptions of their significance in aquaculture, their sense of leadership or influence over others, and their impression of when they are beginning to be heard. As a result of this self-awareness as well as the sense that they are acknowledged and supported by others, women experience higher confidence which in turn allows people to start or continue using NbS in aquaculture. Sen (1997) cited in (Cornwall, 2016, p. 356) pointed out that empowerment should go beyond merely granting access to resources; it should also entail raising awareness and questioning power structures.

6.1.2. Image of change

Creating an image of change is a crucial aspect of the capturing process. When do women start to see things differently? When do they start to change their time-use patterns to balance caregiving, production, leisure, and social activities? When do they start to elaborate on their future goals? The image of change is closely related to awareness as discussed above and captures women's own observations. Capturing their image of change shows how women begin to see themselves and the environment differently and begin to alter their behavior. Their image of change will lead to the domain on agency as discussed below.

6.1.3. Agency

Agency is both a process and action that leads to change and transformation (Penttinen, 2018). Agency is deeply related to process in decision-making. When women are more aware of themselves and start to see their environment and interact with the environment in a different way, they will also start to make decisions differently. What are the different patterns in the process of decision-making? How and when does it change? Who influences women's decisions?

Women's meaningful participation in aquaculture will be shaped by these agentic processes of awareness, image of change, and agency. It is important to note that although most of the monitoring information is through stories and narratives, we need to capture the phenomena and not only the feelings. Their verbal descriptions need to be supported by observations about changes in activities.

6.2. Environmental processes

There are two domains that are relevant to the environmental aspects of NbS. These two domains depict the process by which women relate to the environmental domain of aquaculture, in contrast with the three domains discussed earlier that are about themselves and how they relate to the sociocultural environment. Environmental aspects encompass the technological innovation aspect through their engagement in aquaculture. Working on NbS aquaculture is especially useful for this MEL, since the farmers will need to observe the environment and ecological systems and utilize their traditional/contextual knowledge. This engagement could initiate the co-creation of knowledge and innovation in aquaculture production. For example, for rice-fish production, which is one of the typical NbS aquaculture systems, how to improve the production heavily depends on the understanding of the whole ecological system in the farm.

6.2.1. Attitude towards NbS practices

The first is how people perceive NbS methods in aquaculture. Do they see any merits in NbS methods? How do they feel about the benefits in using NbS practices? This domain illustrates how women begin to view NbS practices differently. They may be initially unconcerned, but may begin to view NbS favorably and become more worried about the environment, chemical use, and the alleged financial and health advantages. Women's approach to NbS aquaculture would also shift as a result of changes in their awareness of environmental impacts of farming practices and inputs.

6.2.2. Attitude towards climate change

Perceptions about climate change is the other domain identified for monitoring within the environmental processes. How and when do the women realize the impact of climate change and begin implementing climate-adaptive production methods? What effects might climate change have on their participation in NbS aquaculture?

Contextualizing these domains is necessary to make the farming

specifically suited to the locality. Contextualizing needs to happen at all scales: individual, household, community, regional, and national. Not only do the domains need to be contextualized by scale, intersectionality also needs to be considered. We need to take into consideration individual differences and how a person's identities, circumstances, and endowment/ rights might have varying effects on involvement and its implications for gender equality. As feminist scholars have extensively addressed, contexts create different social/gender norms that impact on gender equality situations (Saeidzadeh, 2023).

To contextualize and capture complexities involved in measuring change, it is important that reflexivity is exercised (Harding, 1987; Swaans et al., 2014). Reflexivity is being aware of and questioning one's own values, implicit biases, prejudices, attitudes, thought processes, assumptions and actions leading to an awareness of one's own limitations; such as limitations of knowledge and biases (Bolton, 2010). It also maintains openness to new ideas and critical thinking skills (Fielke et al., 2017). Reflexivity is not new to aquaculture. Apgar et al. (2017) used participatory interventions to foster learning and support transformative change in aquatic agricultural systems using critical reflection to collectively revisit ideas about how change happens. Sharrock (2017) used similar approaches in other projects.

Taking a reflexive approach, the gender monitoring schema is designed to have regular interactions with farmers in the five domains identified. A list of key discussion points for each of the domains is developed in discussions with farmers and other stakeholders. Regular visits and interactions with women farmers are used as an opportunity to discuss different key discussion points in different domains. Since the purpose is to create meaningful participation on NbS aquaculture among women farmers, the interactions are not for technical extension (teaching or disseminating technology, information and knowledge), but for the process of co-creation of knowledge, where learning questions, discussions, exchanges and interactions are the core of the conversation. Through the process of interactions, as well as their progress in engagement in aquaculture and their observation of the environment and the people and community, women develop their own descriptions and narratives of their situation. Following the Most Significant Change Stories, the stories that are collected from the conversation are recorded and analyzed to note the changes in the different domains. The series of conversations is expected to lead to meaningful engagement, which will lead to positive effects on gender equality and women's empowerment.

Fig. 1 summarizes the domains and how the prototype monitoring schema is conceptualized. As seen earlier, there are a number of existing indicators to assess the current level of women's empowerment. Following pro-WEFI, the ultimate outcomes will be captured as intrinsic agency (*power within*) to overcome a subdued consciousness, instrumental agency (*power to*) achieve their set goals and, collective agency (*power with others*) to pursue common objectives. These various dimensions of women's agency are interconnected and essential to their wellbeing and empowerment (Yount et al., 2020).

Process monitoring is a slow and detailed technique that not only documents each person's contribution and benefits, but also their views and opinions. It is based on the process monitoring advocated by Mosse (2001). Inspired by MSC, the gender monitoring schema follows Mosse (2001) in defining domains so that it guides the interaction and discussion better and facilitates co-production of knowledge. By documenting the process of change and its impact on gender equality and aquaculture itself, the process also identifies the strengths and weaknesses of all actors including individuals, private and public sector actors. The context-dependent, reflexive, dynamic and culturally sensitive process for the mobilization of information and knowledge leads to a co-production of knowledge that could play a formative and transformative role in NbS aquaculture.

7. Conclusion

We propose a prototype gender monitoring schema for NbS in aquaculture to capture the subtle shifts in gender relations in the household and communities, and to institutionalize reflexivity and inclusivity in the monitoring process to guarantee that women farmers have the voice and control over the development process. Drawing from prior research on gender analysis in aquaculture as well as the creation of gender indicators, gender analysis, and monitoring frameworks, we have identified five crucial domains to monitor in order to document the process of change. We anticipate that, as a co-innovation strategy, this schema will be a step towards placing women farmers at the front and center of technical advancement and establish fair and just values for women, society, and the environment.

CRediT authorship contribution statement

Kyoko Kusakabe: Conceptualization, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project

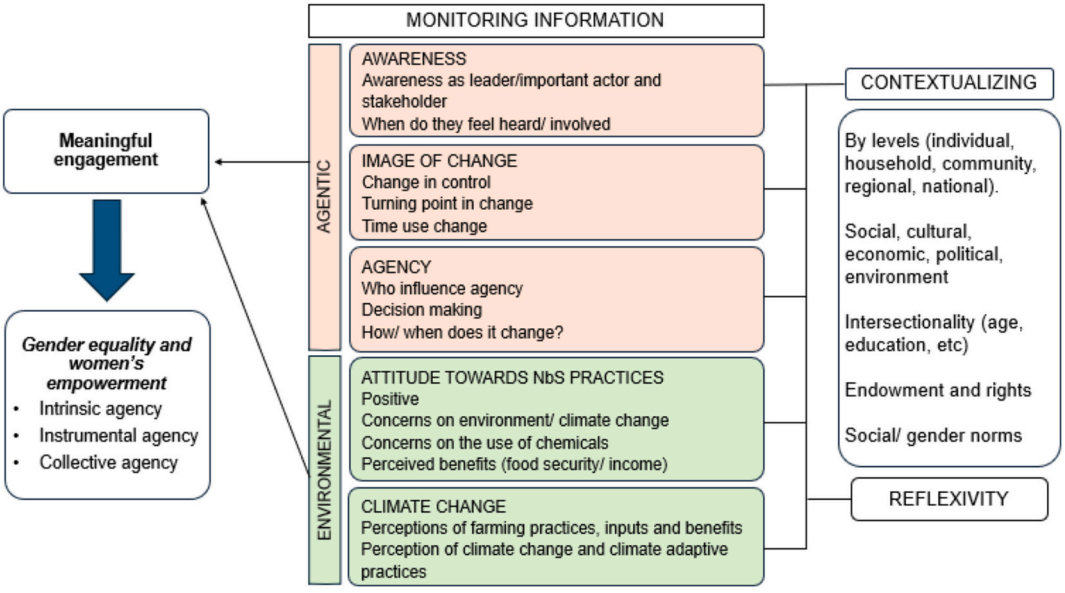


Fig. 1. Gender monitoring schema for NbS aquaculture.

administration, Funding acquisition. **Victoria Syddall:** Conceptualization, Writing – original draft. **N. Veena:** Writing – original draft, Writing – review & editing. **Nikita Gopal:** Conceptualization, Writing – original draft, Funding acquisition. **Chollada Wongpanich:** Writing – original draft, Visualization. **Kafayat Fakoya:** Conceptualization, Writing – review & editing, Funding acquisition. **Alice Joan Ferrer:** Conceptualization, Writing – review & editing, Project administration, Funding acquisition. **Arlene Nietes Satapornvanit:** Conceptualization, Writing – review & editing, Funding acquisition. **Malasri Khumsri:** Writing – review & editing, Project administration. **Sereyvath Prak:** Writing – review & editing, Project administration. **Meryl J. Williams:** Conceptualization, Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

This work was carried out with the aid of funding from the Government of Canada's International Climate Finance Initiative and the International Development Research Centre, Ottawa, Canada.

Data availability

No data was used for the research described in the article.

References

Açıkalın, O., 2011. Gender approaches in development projects: lessons from eastern Turkey. Ankara Üniv. SBF Derg. 66 (01), 1–26. https://doi.org/10.1501/SBFder_0000002192.

Adam, R., Njogu, L., 2023. A review of gender inequality and women's empowerment in aquaculture using the reach-benefit-empower-transform framework approach: a case study of Nigeria. Front. Aquac. 1, 1052097.

Adam, R.I., Rajaratnam, S., Sufian, F.D., Njogu, L., 2025. Measuring women's empowerment in aquaculture in northwestern Bangladesh using a project level women's empowerment in fisheries index (pro-WEFI). PLoS One 20 (1), e0314284. https://doi.org/10.1371/journal.pone.0314284.

Alkire, S., Meinzen-Dick, R., Peterman, A., Quisumbing, A., Seymour, G., Vaz, A., 2013. The women's empowerment in agriculture index. World Dev. 52, 71–91. https://doi.org/10.1016/j.worlddev.2013.06.007.

Apgar, J.M., Allen, W., Albert, J., Douthwaite, B., Paz Ybarnegaray, R., Lunda, J., 2017. Getting beneath the surface in program planning, monitoring and evaluation: learning from use of participatory action research and theory of change in the CGIAR research program on aquatic agricultural systems. Action Res. 15 (1), 15–34. https://doi.org/10.1177/1476750316673879.

Aregu, L., Rajaratnam, S., McDougall, C., Johnstone, G., Wah, Z.Z., Nwe, K.M., Akester, M., Grantham, R., Karim, M., 2017. Gender in Myanmar's Small-Scale Aquaculture Sector. CGIAR Research Program on Fish Agri-Food Systems, Penang, Malaysia (Program Brief: FISH-2017-12).

Arenas, M.C., Lentisco, A., 2011. Mainstreaming Gender into Project Cycle Management in the Fisheries Sector: Field Manual. https://www.fao.org/3/ba0004e/ba0004e00.pdf.

Aston, T., Roche, C., Schaaf, M., Cant, S., 2022. Monitoring and evaluation for thinking and working politically. Evaluation 28 (1), 36–57. https://doi.org/10.1177/13563890211053028.

Barclay, K., Mangubhai, S., Leduc, B., Donato-Hunt, C., Makhoul, N., Kinch, J., Kalsuak, J., 2021. Pacific Handbook for Gender Equity and Social Inclusion in Coastal Fisheries and Aquaculture, Second ed. Pacific Community https://coastfish.spc.int/en/component/content/article/494-gender-equity-and-social-inclusion-handbook.

Batliwala, S., 1993. Empowerment of Women in South Asia: Concepts and Practices. FAO – FFNC/AD, New Delhi.

Batliwala, S., Pittman, A., 2010. Capturing Change in Women's Realities. A Critical Overview of Current Monitoring & Evaluation Frameworks and Approaches. Association for Women's Rights in Development (AWID), Toronto, Canada, p. 42.

Belingheri, P., Chiarello, F., Fronzetti, Colladon, A., Rovelli, P., 2021. Twenty years of gender equality research: a scoping review based on a new semantic indicator. PLoS One 16 (9), e0256474. https://doi.org/10.1371/journal.pone.0256474.

Bolton, G., 2010. Reflection and reflexivity: what and why. In: Bolton, G. (Ed.), Reflective Practice: Writing and Professional Development. SAGE, London, UK.

Brugere, C., Felsing, M., Kusakabe, K., Kelkar, G., 2001. Women in Aquaculture. Asia Pacific Economic Cooperation. Project FWG 03/99.

Brugere, C., Msuya, F.E., Jiddawi, N., Nyonje, B., Maly, R., 2020. Can innovation empower? Reflections on the introduction of tubular nets to women seaweed farmers in Zanzibar. Gend. Technol. Dev. https://doi.org/10.1080/09718524.2019.1695307.

CARE, 2017. Applying Theory to Practice: CARE's Journey Piloting Social Norms Measures for Gender Programming. https://prevention-collaborative.org/wp-content/uploads/2021/08/CARE_2017_Applying-Social-Norms-Theory-to-Practice-CARE_s-Journey.pdf.

Choudhury, Afrina, Castellanos, Paige, 2020. Empowering women through farmer field schools. In: Sachs, Carolyn E., Jensen, Leif, Castellanos, Paige, Sexsmith, Kathleen (Eds.), Routledge Handbook of Gender and Agriculture. Routledge.

Cole, S.M., Kaminski, A.M., McDougall, C., Kefi, A.S., Marinda, P.A., Maliko, M., Mtonga, J., 2020. Gender accommodative versus transformative approaches: a comparative assessment within a post-harvest fish loss reduction intervention. Gend. Technol. Dev. 24 (1), 48–65. https://doi.org/10.1080/09718524.2020.1729480.

Cornwall, Andrea, 2016. Women's Empowerment: What Works (Version 1). University of Sussex. https://hdl.handle.net/10779/uos.23431232.v1.

Dart, J., Davies, R., 2003. A dialogical, story-based evaluation tool: the most significant change technique. Am. J. Eval. 24 (2), 137–155.

Davies, R., Dart, J., 2005. The 'Most Significant Change'(MSC) Technique. A Guide to its Use. CARE international and others.

Elias, M., Zaremba, H., Tavenner, K., Ragasa, C., Paez Valencia, A.M., Choudhury, A., de Haan, N., 2023. Beyond Crops: Towards Gender Equality in Forestry, Fisheries, Aquaculture and Livestock Development. CGIAR GENDER Impact Platform Working Paper. https://hdl.handle.net/10568/129708.

Faure, G., Desjeux, Y., Gasselin, P., 2012. New challenges in agricultural advisory services from a research perspective: a literature review, synthesis and research agenda. J. Agric. Educ. Ext. 18, 461–492. https://doi.org/10.1080/1389224X.2012.707063.

Ferrer, A.J., Francisco, H., Carmelita, B.M., Hopanda, J., Predo, C., 2017. Gender differences in participation, roles, and attitude towards mariculture operation: a case study in the Philippines. Asian Fish. Sci. 30S, 83–102. Special Issue (Gender in Aquaculture and Fisheries: Engendering Security in Fisheries and Aquaculture).

Fielke, S., Nelson, T., Blackett, P., Bewsell, D., Bayne, K., Park, N., Rijswijk, K., Small, B., 2017. Hitting the Bullseye: learning to become a reflexive monitor in New Zealand. Outlook Agric. 46 (2), 117–124. https://doi.org/10.1177/0030727017708490.

Galappaththi, M., Armitage, D., Collins, A.M., 2022. Women's experiences in influencing and shaping small-scale fisheries governance. Fish Fish. 23 (5), 1099–1120. https://doi.org/10.1111/faf.12672.

Gbigbi, T.M., 2021. Female fish farmers: how technically efficient are they? Evidence from delta state Nigeria. Aquat. Res. 4 (3), 250–259. https://doi.org/10.3153/AR21019.

Gelmiche-Tejeda, A., Townsend, J.G., 2006. Sustainable development and gender hierarchies: extension for semi-subsistence fish farming in Tabasco, Mexico. Gend. Technol. Dev. 10 (1), 101–126. https://doi.org/10.1177/097185240501000106.

Gonzalez Parrao, C., Shisler, S., Moratti, M., Yavuz, C., Acharya, A., Eyers, J., Snilstveit, B., 2021. Aquaculture for improving productivity, income, nutrition and women's empowerment in low- and middle-income countries: a systematic review and meta-analysis. Campbell Syst. Rev. 17 (4), e1195. https://doi.org/10.1002/cl2.1195.

Gopal, N., Hapke, H.M., Kusakabe, K., Rajaratnam, S., Williams, M.J., 2020. Expanding the horizons for women in fisheries and aquaculture. Gend. Technol. Dev. 24 (1), 1–9. https://doi.org/10.1080/09718524.2020.1736353.

Hanberger, A., 2022. Power in and of evaluation: a framework of analysis. Evaluation 28 (3), 265–283. https://doi.org/10.1177/13563890221102190.

Harding, S., 1987. Is there a feminist method. In: Social Research Methods: A Reader, 1 (45), pp. 456–464.

Harper, S., Zeller, D., Hauzer, M., Pauly, D., Sumaila, U.R., 2013. Women and fisheries: contribution to food security and local economies. Mar. Policy 39, 56–63. https://doi.org/10.1016/j.marpol.2012.10.018.

Haylock, L., Miller, C., 2016. Merging developmental and feminist evaluation to monitor and evaluate transformative social change. Am. J. Eval. 37 (1), 63–79. https://doi.org/10.1177/1098214015578731.

Hillenbrand, E., Karim, N., Mohanraj, P., Wu, D., 2015. Measuring Gender Transformative Change: A Review of Literature and Promising Practices. CARE USA. https://worldfishcenter.org/publication/measuring-gender-transformative-change-review-literature-and-promising-practices.

House, J., Amaral, N.M.S., Silva de Jesus, J., Gomes, J., Chew, M., Kleiber, D., Steenbergen, D.J., Stacey, N., 2024. Women's experiences of participatory small-scale fisheries monitoring in Timor-Leste. Marit. Stud. 23 (1), 1–20. Article 9. https://doi.org/10.1007/s40152-024-00352-6.

IFPRI, 2020. Pro-WEAI for Market Inclusion, Washington DC. Available online at https://weai.ifpri.info/files/2020/10/brochure_2020_pro-weai.pdf.

Islam, M.M., Khan, M.I., Barman, A., 2021. Impact of novel coronavirus pandemic on aquaculture and fisheries in developing countries and sustainable recovery plans: case of Bangladesh. Mar. Policy 131, 104611. https://doi.org/10.1016/j.marpol.2021.104611.

Joffre, Olivier M., Klerkx, Laurens, Dickson, Malcolm, Verdegem, Marc, 2017. How is innovation in aquaculture conceptualized and managed? A systematic literature review and reflection framework to inform analysis and action. Aquaculture 470, 129–148. https://doi.org/10.1016/j.aquaculture.2016.12.020.

Kabeer, N., 1994. Reversed Realities: Gender Hierarchies in Development Thought. Verso.

Kabeer, N., 1999. Resources, agency, achievements: reflections on the measurement of women's empowerment. Dev. Chang. 30 (3), 435–464. https://doi.org/10.1111/1467-7660.00125.
Kabeer, N., 2005. Gender equality and women's empowerment: a critical analysis of the third millennium development goal. Gend. Dev. 13 (1), 13–24.
Kelly, L., Whiteside, M., Barich, H., Tsey, K., 2021. Checking up to keep on track: an aboriginal-led approach to monitoring well-being. Eval. J. Australas. 21 (3), 132–145. https://doi.org/10.1177/1035719X211026412.
Kruijssen, F., McDougall, C.L., Van Asseldonk, I.J.M., 2018. Gender and aquaculture value chains: a review of key issues and implications for research. Aquaculture 493, 328–337. https://doi.org/10.1016/j.aquaculture.2017.12.038.
Kusakabe, K., 2003. Women's involvement in small-scale aquaculture in Northeast Thailand. Dev. Pract. 13 (4), 333–345. https://doi.org/10.1080/0961452032000112392.
Kusakabe, K., 2012. Case-based gender process monitoring. In: Reflecting on Gender Equality and Human Rights in Evaluation, p. 35.
Kusakabe, K., Thongprasert, S., 2022. Women and Men in Small-Scale Fisheries and Aquaculture in Asia: Barriers, Constraints and Opportunities Towards Equality and Secure Livelihoods. FAO. https://doi.org/10.4060/cb9527en.
Lau, J.D., Kleiber, D., Lawless, S., Cohen, P.J., 2021. Gender equality in climate policy and practice hindered by assumptions. Nat. Clim. Chang. 11 (3), 186–192. https://doi.org/10.1038/s41558-021-00999-7.
Le Gouvello, R., Brugere, C., Simard, F., 2022. Aquaculture and Nature-Based Solutions. Identifying Synergies between Sustainable Development of Coastal Communities, Aquaculture, and Marine and Coastal Conservation. IUCN, Gland. https://portals.iucn.org/library/sites/library/files/documents/2022-005-En.pdf.
Le Gouvello, R., Cohen-Shacham, E., Herr, D., Spadone, A., Simard, F., Brugere, C., 2023. The international union for conservation of nature (IUCN) global standard for nature-based solutions as a new opportunity for a sustainable development of marine aquaculture. Front. Mar. Sci. 10-2023. https://doi.org/10.3389/fmars.2023.1146637. Sec. Marine Fisheries, Aquaculture and Living Resources.
Longwe, S., 1995. Gender awareness: The missing element in the third world development program. In: March, C., Wallace, T. (Eds.), Changing Perception: New Writings on Gender and Development. Oxfam, Oxford, pp. 149–157.
Malapit, H., Quisumbing, A., Meinzen-Dick, R., Seymour, G., Martinez, E.M., Heckert, J., Team, S, 2019. Development of the project-level women's empowerment in agriculture index (pro-WEAI). World Dev. 122, 675–692.
Mcdiarmid, T., Pineda, A., Scothern, A., 2021. We are women! We are ready! Amplifying women's voices through feminist participatory action research. Eval. J. Australas. 21 (2), 85–100. https://doi.org/10.1177/1035719X21998479.
McDougall, C., Kruijssen, F., Sproule, K., Serfilippi, E., Rajaratnam, S., Newton, J., Adam, R., 2021. Women's Empowerment in Fisheries and Aquaculture Index (WEFI): Guidance Notes.
Mosse, David, 2001. Process-oriented approaches to development practice and social research. In: Mosse, David, Farrington, John, Rew, Alan (Eds.), Development as Process: Concepts and Methods for Working with Complexity. India Research Press, New Delhi, pp. 3–30.
Mulema, A.A., Kinati, W., Lemma, M., et al., 2020. Clapping with two hands: transforming gender relations and zoonotic disease risks through community conversations in rural Ethiopia. Hum. Ecol. 48, 651–663. https://doi.org/10.1007/s10745-020-00184-y.
Nagel, B., Anggraini, E., Buhari, N., Gray, S., Partelow, S., Schlüter, A., 2024. Mental models of aquaculture governance in Indonesia. Sustain. Sci. 1–21.
Ndege, N., Marshall, F., Byrne, R., 2024. Exploring inclusive innovation: a case study in operationalizing inclusivity in digital agricultural innovations in Kenya. Agric. Syst. 219, 104033.
Njogu, L., Adam, R., Farnworth, C.R., 2024. Assessing women's empowerment, participation, and engagement in aquaculture in Bangladesh. Aquac. Int. 1–29.
Nmeregini, D.C., Onuekwusi, G.C., Nzeakor, F.C., 2020. Constraints to women involvement in fish production in Anambra state, Nigeria. J. Agric. Ext. 25 (1), 75–84.
Olmos-Vega, F.M., Stalmeijer, R.E., Varpio, L., Kahlke, R., 2023. A practical guide to reflexivity in qualitative research: AMEE guide no. 149. Med. Teach. 45 (3), 241–251.
Pederson, A., Greaves, L., Poole, N., 2015. Gender-transformative health promotion for women - a framework for action. Health Promot. Int. 30 (1). March 2015, Original source. https://pubmed.ncbi.nlm.nih.gov/25231058/#&gid=article-figures&pid=fig-1-uid-0.
Penttinen, E., 2018. Gender, agency and violence. In: Gentry, C.E., Shepherd, L.J., Sjoberg, L. (Eds.), Routledge Handbook on Gender and Security. Routledge, London & New York, pp. 252–261. https://doi.org/10.4324/9781315525099-22.
Perera, O., Lefebvre, L., Hammadi, M., El Harty, K., Scholtz, L., 2024. Nature-Based Solutions in Small-Scale Aquaculture to Improve Food Security: Stories on Early Practice. Shamba Centre for Food & Climate, Geneva, Switzerland. https://static1.squarespace.com/static/62b1cc763de5423a3166f5e3/t/65c210cc2f54243882ffedb5/1707217113982/Shamba+NBS+in+small-scale+aquaculture.pdf.
Phillips, M., Subasinghe, R.P., Tran, N., Kassam, L., Chan, C.Y., 2016. Aquaculture Big Numbers. https://www.fao.org/3/i6317e/i6317e.pdf.
Potts, A., Fattal, L., Kolli, H., 2022. Engaging refugee women and girls as experts: co-creating evidence on sexual exploitation and abuse in humanitarian crises using creative, participatory methods. Evid. Policy 18 (2), 311–335. Retrieved Aug 15, 2024, from. https://doi.org/10.1332/174426421X16420949265777.
Quisumbing, A.R., Kumar, N., 2011. Does social capital build women's assets? The long-term impacts of group-based and individual dissemination of agricultural technology in Bangladesh. J. Dev. Eff. 3 (2), 220–242. https://doi.org/10.1080/19439342.2011.570450.
Quisumbing, A.R., Meinzen-Dick, R., Malapit, H.J., Seymour, G., Heckert, J., Doss, C., Johnson, N., Rubin, D., Thai, G., Ramani, G., Myers, E., 2022. Can Agriculture Development Projects Empower Women?: A Synthesis of Mixed Methods Evaluations using Pro-WEAI in the Gender, Agriculture, and Assets Project (Phase 2) Portfolio. IFPRI Discussion Paper 02137. https://ebrary.ifpri.org/digital/collection/p15738coll2/id/136405.
Ragsdale, K., Read-Wahidi, M., Marinda, P., Pincus, L., Torell, E., Kolbila, R., 2022. Adapting the WEAI to explore gender equity among fishers, processors, and sellers at Zambia's Lake Bangweulu. World Dev. 152, 105821. https://doi.org/10.1016/j.worlddev.2022.105821.
Rebien, C.C., 1996. Participatory evaluation of development assistance: dealing with power and facilitative learning. Evaluation 2 (2), 151–171. https://doi.org/10.1177/135638909600200203.
Rogers, A., Harrison, N., Puruntatameri, T., Puruntatameri, A., Meredith, J., Dunne, R., 2018a. Participatory evaluation is the sea eagle looking "long way wide eyed". Eval. J. Australas. 18 (2), 78–98. https://doi.org/10.1177/1035719X18778712.
Rogers, A., Radcliffe, D., Babyack, S., Layton, T., 2018b. Demonstrating the value of community development: an inclusive evaluation capacity building approach in a non-profit aboriginal and Torres Strait islander organisation. Eval. J. Australas. 18 (4), 234–255. https://doi.org/10.1177/1035719X18803718.
Ross, K., 2017. Making empowering choices: how methodology matters for empowering research participants. Forum Qual. Sozialforsch. 18 (3). https://doi.org/10.17169/fqs-18.3.2791.
Rowlands, J., 1997. Questioning Empowerment: Working with Women in Honduras. Oxfam.
Saeidzadeh, Zara, 2023. Gender research and feminist methodologies. In: Vujadinović, Dragica, Fröhlich, Mareike, Giegerich, Thomas (Eds.), Gender-Competent Legal Education. Springer Nature Switzerland AG, pp. 183–212.
Sataporvanit, A.N., Derun, Y., Gopal, N., Villacorta, G., 2016. NACA/USAID thematic studies on gender in aquaculture in Cambodia, Lao PDR, Thailand and Vietnam. In: Gender in Aquaculture and Fisheries: The Long Journey to Equality, 29S, pp. 127–145. https://www.asianfisheriessociety.org/publication/abstract.php?id=nacausaid-thematic-studies-on-gender-in-aquaculture-in-cambodia-lao-pdr-thailand-and-vietnam.
Sen, A.K., 1985. Well-being, agency and freedom. J. Philos. LXXXII, 169–221.
Sen, G., 1997. Empowerment as an Approach to Poverty, Working Paper Series 97.07, Background Paper for the UNDP Human Development Report. UNDP, New York.
Sengupta, Papia, 2016. How effective is inclusive innovation without participation? Geoforum 75, 12–15. https://www.sciencedirect.com/science/article/abs/pii/S0016718516301701.
Seymour, G., Faas, S., Ferguson, N., Heckert, J., Malapit, H., Meinzen-Dick, R., Quisumbing, A.R., Biljon, C.V., 2023. A Multi-Country Validation and Sensitivity Analysis of the Project Level Women's Empowerment in Agriculture Index (Pro-WEAI): IFPRI Discussion Paper 02201. International Food Policy Research Institute (IFPRI). https://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/136974/filename/137184.pdf.
Sharrock, Guy O'Grady, 2017. Response to: getting beneath the surface in program planning, monitoring and evaluation: learning from use of participatory action research and theory of change in the CGIAR research program on aquatic agricultural systems. Action Res. 15 (1), 35–38.
Swaans, K., Boogaard, B., Bendapudi, R., Taye, H., Hendrickx, S., Klerkx, L., 2014. Operationalizing inclusive innovation: lessons from innovation platforms in livestock value chains in India and Mozambique. Innov. Dev. 4 (2014), 239–257.
UNEP Environment Assembly, 2022. Resolution 5/5 Nature-Based Solutions for Supporting Sustainable Development, UNEP/EA.5/Res.5. https://digitallibrary.un.org/record/3999268.
USAID SUFIA, 2022. Gender Integration in Small-Scale Fisheries in Southeast Asia: A Training Module. USAID Sustainable Fish Asia Local Capacity Development Activity, Bangkok, Thailand. Unpublished Report.
van Wessel, M., 2018. Narrative assessment: a new approach to evaluation of advocacy for development. Evaluation 24 (4), 400–418. https://doi.org/10.1177/1356389018796021.
Veliu, Atdhe, et al., 2009. Gender Analysis of Aquaculture Value Chain in Northeast Vietnam and Nigeria, Discussion Paper 44. The International Bank for Reconstruction and Development/The World Bank. Available online at: https://documents1.worldbank.org/curated/en/954161468155727109/pdf/565860NWP0ARD01nder1Aquaculture1web.pdf.
Waffi, J.M., 2017. Evaluating women's empowerment: experimenting with a creative participatory self-evaluation methodology in Papua New Guinea. Eval. J. Australas. 17 (3), 40–43. https://doi.org/10.1177/1035719X1701700306.
Waid, J.L., Wendt, A.S., Sinharoy, S.S., Kader, A., Gabrysch, S., 2022. Impact of a homestead food production program on women's empowerment: pro-WEAI results from the FAARM trial in Bangladesh. World Dev. 158, 106001.
Warwick-Booth, L., Cross, R., Woodall, J., 2024. Obstacles to co-producing evaluation knowledge: power, control and voluntary sector dynamics. Evid. Policy 20 (1), 70–87. Retrieved Aug 15, 2024, from. https://doi.org/10.1332/17442648Y2023D000000008.
Weeratunge, N., Snyder, K.A., Sze, C.P., 2010. Gleaner, fisher, trader, processor: understanding gendered employment in fisheries and aquaculture. Fish Fish. 11 (4), 405–420. https://doi.org/10.1111/j.1467-2979.2010.00368.x.
Weeratunge-Starklof, N., Pant, J., 2011. Gender and Aquaculture: Sharing the Benefits Equitably. https://worldfishcenter.org/publication/gender-and-aquaculture-sharing-benefits-equitably.

Yount, K.M., Cheong, Y.F., Maxwell, L., Heckert, J., Martinez, E.M., Seymour, G., 2019. Measurement properties of the project-level women's empowerment in agriculture index. World Dev. 124, 104639.

Yount, Kathryn M., Khan, Zara, Miedema, Stephanie, Cheong, Yuk Fai, Naved, Ruchira T., . The Women's Agency Scale 61 (Was-61): A Comprehensive Measure of Women's Intrinsic, Instrumental, and Collective Agency (August 9). Available at SSRN: https://ssrn.com/abstract=3670180. or https://doi.org/10.2139/ssrn.3670180.

Zucchini, E., Carbon, M., Bosch, C., Felloni, F., 2022. Evaluation through narratives: a practical case of participatory narrative inquiry in women empowerment evaluation in Niger. Evaluation 28 (4), 426–445. https://doi.org/10.1177/13563890221123821.