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Adapting a Participatory and Ecosystem-Based Assessment Impacted by the Pandemic: Lessons Learned With Farmers in Tajikistan

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The paper presents a systemic and participatory assessment approach and scrutinizes how methodological changes necessitated during the Covid-19 pandemic implicated the process and its outcomes. The approach was applied in rural Tajikistan to evaluate changes effected by a development project that promoted the enhancement of biodiversity and ecosystem services in agrarian landscapes. The central building block of the assessment consisted of participatory workshops in 2018 and 2020 with farmers and other stakeholders to develop a systemic knowledge map and to evaluate the promoted strategies based on local expertise. The methodological basis was MARISCO (adaptive MAnagement of vulnerability and RISk at COnservation sites), a holistic and participatory approach to ecosystem-based assessment and management that requires well-trained facilitators. While the activities in 2018 could be implemented as planned, major changes in the work plan were necessary in 2020 due to severe travel restrictions and social distancing rules. Conducting virtual workshops was not possible, as it would have excluded key stakeholders from the process. Instead of conducting a comprehensive assessment workshop guided by two German MARISCO facilitators as originally planned, a series of short and small workshops could be realized. These workshops were facilitated by Tajik scientists after receiving virtual training from their German colleagues. Although it was possible to bring the assessment to a satisfactory conclusion, the methodological changes revealed significant drawbacks. Radical simplifications of the methods were necessary that led to reduced depth of the assessment and missed learning opportunities for participants. Limited experience in workshop guidance by the new facilitators posed challenges to the participatory process and the quality of its outcomes. While the adapted method created training effects that would otherwise have been missed, it also put additional pressure on the capacities of local partners. Our experience during the pandemic offers valuable lessons learned for future applications of systemic-participatory approaches. Whereas, a complete shift

to remote applications is problematic, there is a need to put greater emphasis on capacitating local partners. Methodological trade-offs are necessary for partially remote working processes, but principles of participation and systemic thinking should not be compromised.

Keywords: ecosystem-based sustainable development, MARISCO, participatory methods, biodiversity and ecosystem service assessment, sustainable agriculture, Tajikistan

INTRODUCTION

Given the increasingly severe consequences of resource overuse and impacts of global climate change, there is an urgent need for a shift toward more sustainable farming systems that conserve and enhance ecosystem services while being resilient to emerging threats (Gliessman, 2014; Gerten et al., 2020). However, identifying appropriate strategies is no easy task, as agroecosystems are always embedded in complex social-ecological settings that need to be thoroughly understood before making decisions that might turn out to be detrimental to their purpose. Even worse, well-intended, but poorly contextualized project interventions can create unintended negative consequences such as rebound effects or the marginalization of farming communities that do not have a say in regional decision-making (Padoch and Sunderland, 2013; McDonagh, 2015; Rasmussen et al., 2018; see, for instance, the critical discussion on "sustainable intensification"). Thus, the design, implementation, and assessment of strategies for sustainable farming requires a holistic, systemic perspective on the one hand, and a participatory approach that takes local perspectives and concerns seriously on the other. Participatory processes are needed not only to foster inclusivity and democratic decision-making, but also to benefit in very practical terms: often, the resource users themselves have a good knowledge of local agro-ecosystems and related stresses and threats and have developed practices of dealing with them (Berkes et al., 2000; Jiao et al., 2012). Thus, drawing on local knowledge is important as there are no blueprint solutions for sustainable agriculture, and adapted management strategies must take into account the specifics of the cropping system, the farm-specific management practices, and the socioeconomic conditions (Bloch et al., 2016).

Implementing such approaches on the ground faces manifold challenges, several of which have been widely discussed in the literature: for instance, the persistence of linear thinking in a complex world among decision-makers across sectors (Bratianu and Vasilache, 2010; Groves and Vance, 2015; Zweibelson, 2016), vested interests and unequal power relations between involved stakeholders (Larson and Soto, 2008; Sesan, 2014), and the ambiguous role of the facilitators or "participatory workers" in shaping the outcome of participatory processes (Kothari, 2001; Wakeford, 2017). In 2020, the global Covid-19 pandemic has added a new level: social distancing, lockdowns, severe travel interruptions, and shifts to virtual working modes constitute entirely new challenges to conventional participatory methods that heavily rely on face-to-face interaction and physical gatherings (see e.g., Hall et al., 2021; Köpsel et al., 2021). The implications for the outcome of these processes are potentially severe, and they further complicate already existing perils of participatory approaches.

Based on our experiences from a recent assessment mission on the social-ecological impacts of sustainable farming practices in two mountain districts of rural Tajikistan, this paper discusses how methodological changes necessitated by the Covid-19 pandemic implicated the participatory process and its outcomes. The aim of the mission was to conduct an impact assessment of a development project on the promotion of biodiversity and ecosystem-enhancing land-use approaches. Based on the MARISCO (adaptive MAnagement of vulnerability and RISk at COnservation sites) method, we embraced an approach that is both systemic and participatory. "Systemic" means that the analysis acknowledges that any situation is the result of the interaction of complex systems, where e.g., feedback loops, synergistic effects, and non-linear change necessarily characterize changes of the systems implying an inherent indeterminacy and unpredictability. Therefore, systemic analyses shall somehow reflect the complexity of consequences, drivers, and underlying factors of change. The methodological building block consisted of two comprehensive stakeholder workshops in 2018 and 2020 with farmers, NGO representatives, and Tajik scientists, with the latter assisting as co-facilitators of the process. In 2020, however, the pandemic forced us to overhaul our approach and to employ a partially remote working approach that heavily relied on the capacities of the Tajik scientists: after receiving virtual methodological training, the co-facilitators became facilitators of a series of short and simplified workshops with only a limited number of participants. These methodological changes compromised the assessment in a number of ways, affecting both the participatory process itself as well as its outcome. Among others, necessary reductions in methodological steps revealed a number of drawbacks, such as limited depth and significant compromises to the systemic approach. Moreover, the adopted assessment design also led to reduced traceability of group dynamics during the workshops, while at the same time putting additional pressure on the Tajik scientists who had little experience with participatory processes.

In this paper, we aim to provide a more detailed evaluation and reflection of these implications for our systemic and participatory assessment approach. In doing so, we address the following questions: How can MARISCO or other systemic-participatory assessment approaches be adapted to a (partial) remote working context without compromising their systemic approach? In what way does our methodological adaptation to "decentralize" participatory workshops and delegate their implementation to

less experienced co-facilitators risk jeopardizing key participatory principles? Finally, what are the lessons learned for future (adapted) applications of MARISCO and similar approaches through remote working processes? To answer these questions, we draw primarily on our personal experience during and reflections after the process. Our inquiry is guided by (a) our insights from past MARISCO experiences, (b) the principles and concepts on which this method is founded, and (c) theoretical and practical insights from participatory (action) research documented in literature.

In the following section, we provide a brief introduction of the project setting in rural Tajikistan, before presenting the MARISCO method in section the MARISCO Method. Section Envisioning and Implementing the Participatory Process then describes our originally envisioned assessment approach and the adaptations to the methodology that we applied during the Covid-19 pandemic to bring the project to a meaningful conclusion. In section Effects of the Methodological Changes on the Process and Its Outcome, we present and discuss in detail the consequences of these changes for the outcomes of the assessment, the participants, and the new facilitators, before providing an outlook for future applications and conclusions in section Conclusion.

PROJECT CONTEXT AND SETTING

Our assessment was part of a consultancy for the project "Biodiversity and Ecosystem Services in Agrarian Landscapes" (ICI-Biodiv) implemented by the "Gesellschaft für Internationale Zusammenarbeit" (GIZ) as part of the German International Climate Initiative (ICI) in selected regions of Tajikistan, India, and Kenya. The project aimed to strengthen the capacities of land users and their organizations, technical experts, and decision-makers in civil society and public institutions to conserve and promote biodiversity and ecosystem services in agrarian landscapes. As part of the project activities implemented in Tajikistan in 2017–2020, a variety of "land-use approaches" and techniques to enhance ecosystem services and (agro-)biodiversity were piloted by 38 selected farmers in the two mountain districts of Ayni and Rasht. As implementing partner of GIZ in Tajikistan, German Agro Action (Deutsche Welthungerhilfe e.V.) was responsible for promoting and facilitating these land-use approaches through technical and material support, workshops, and farmer field schools, among others.

To evaluate the effects of the implemented land-use approaches on biodiversity and ecosystem services, GIZ contracted the Leibnitz Center for Agricultural Landscape Research (ZALF) and the Center for Econics and Ecosystem Management to design and implement ex-ante (in 2018) and ex-post (in 2020) assessments in the project areas in Tajikistan and India (Mizoram). Our methodological approach was similar in both countries, but due to major difficulties in the collaboration with the local partner organization in 2019, in addition to the Covid-19 pandemic in 2020, only a fraction of the planned activities for the ex-post assessment could be realized in India. Therefore, this paper focuses only on the activities in Tajikistan, where it was possible to bring the assessment to a satisfying conclusion.

The methodological approach, described in more detail below, was developed by the four German authors of this paper. The authors AS and MS were responsible for workshop design and implementation, with logistical support in Tajikistan provided by German Agro Action. As described in more detail below, the participatory processes were co-facilitated by a team of four agricultural scientists from Tajikistan, who were contracted separately by German Agro Action and co-authored this paper (authors SK, BB, KZ, and SJ). In addition to the ex-ante and ex-post assessments, the objectives of the mission also included capacity building on the side of the Tajik partners through training, supervising, and monitoring by the German researchers.

Five villages with their respective watersheds were selected by GIZ and German Agro Action for project implementation, three in Ayni District (Sughd Province), and two in Rasht District (Districts of Republican Subordination). Both districts are characterized by a mountainous landscape with elevations ranging from about 1,300 to 2,100 m asl. The climate is continental, with relatively dry conditions in the valley bottoms and an increase in precipitation with elevation. Most farmland is irrigated through a network of water channels fed by glacial and snow meltwater streams, but rain-fed agriculture is also practiced on parts of the village cropland. The vast majority of farmers are smallholders: Based on data on Ayni district from 2008, Mandler (2013) finds that 17.4% of households/families do not hold any agricultural land, 68.9% have landholdings of up to 0.5 ha, and only 12.4% hold more than 0.5 ha. The pilot farmers of the project in Ayni have median landholdings of 0.25 ha (own calculations based on project data), thus reflecting the local structures reasonably well—with a possible bias toward slightly more well-off farmers. No reliable statistics on farm structures in Rasht District are available, but average landholdings are generally larger there. Pilot farmers in Rasht have median landholdings of 1.12 ha (own calculations based on project data). Among others as a result of these small landholdings, agriculture is barely sufficient to make a living, and most farming households rely on off-farm income to sustain their livelihood. In particular, remittances sent by household or family members who migrated abroad for work (mainly Russia), play a crucial role. Poverty rates are high in Tajikistan, and the country's economy heavily depends on remittances (Mandler, 2016; Murodova, 2018).

Until the dissolution of the Soviet Union in 1991, agriculture in Tajikistan was organized in collective-owned (*kolkhoz*) and state-owned (*sovkhoz*) farms. While some collective farms still exist, most of them have been converted into small-scale family (*dekhon*) farms through a series of land reforms since the 1990s. Still, all farmland in Tajikistan belongs to the state, and farmers are granted inheritable tenure rights through land certificates (Mandler, 2015, 2016). In Ayni and Rasht, farmers produce various crops including wheat, potatoes, fodder crops, tree fruits, and nuts, as well as a broad variety of vegetables both for household consumption and domestic markets. Most households own some livestock, making use of mountain pastures in summer. More generally, local farming systems must be regarded as embedded in complex mountain ecosystems of pastures,

forests, bushlands, glaciers, and riverside ecosystems, among others, that affect and are affected by agricultural practices in various ways.

Current farming systems in Ayni and Rasht are subject to a number of stresses and threats that were also identified by farmers during our MARISCO assessment, including soil degradation, low productivity of land, water scarcity, decay of and limited access to agricultural infrastructure, pest outbreaks, and uncontrolled livestock grazing, among others. The ICI-Biodiv project aimed to address these stresses and threats and to contribute to sustainable livelihood improvement of farmers through the promotion of a number of ecosystem-enhancing and biodiversity-enhancing land use "techniques" tailored to major agroecosystems found in the villages: irrigated and rainfed cropland, orchards, kitchen gardens, and to a lesser extent small-scale forest plots for which some farmers are being granted temporary use rights by the forestry department. Among others, the promoted techniques included intercropping, crop diversification, fencing, integrated pest management, and erosion control measures. These and other techniques were implemented by the 38 pilot farmers with support by the ICI-Biodiv project and promoted in the villages through farmer field schools and other activities. All of these project measures were designed by the project in consultation with local partner NGOs in Ayni and Rasht, and implementation had already begun prior to our engagement. Our task as consultants, in turn, was to implement a systemic assessment of the applicability and impacts of these interventions on local social-ecological systems, with a particular focus on their effect on (agro-) biodiversity and related ecosystem services. To do so, we designed and applied a participatory assessment approach that puts the perspectives, knowledge, and expertise of the farmers into the center.

THE MARISCO METHOD

The methodological basis of our assessment approach was MARISCO, a method designed to systematically assess the vulnerability of ecosystems—including agroecosystems—or landscapes subjected to human influence and to plan for adaptive management strategies aimed at reducing threats and stresses to these systems (Ibisch and Hobson, 2014). The approach is people-centered and ecosystem-based (Schick et al., 2018), with people considered as part of, not external to ecosystems. The perspectives and knowledge of resource users are therefore regarded as indispensable for thorough situation analysis and for developing sustainable management strategies. Originally derived from the Conservation Measures Partnership's Open Standards for the Practice of Conservation (Conservation Measures Partnership, 2013), its step-by-step procedure for participatory processes encourages participants to regard themselves as "citizen scientists" and to analyze human-induced threats and impacts on ecosystems from an integrated, ecological perspective. There exist a variety of participatory and systemic approaches for the analysis and management of ecosystems (Eelderink et al., 2020), and the benefits and challenges are well-documented in literature (Irvin and Stansbury, 2004; Reed, 2008). MARISCO differs from most approaches by placing greater emphasis on ecosystem functionality, system dynamics, change and future risks, with a particular focus on the effects and problems relating to climate change and by strictly following the ecosystem based approach (Secretariat of the Convention on Biological Diversity, 2004; Salvaterra et al., 2016; Schick et al., 2017). While methodologically distinct, MARISCO also shares strong similarities with approaches found in the field of agroecology—in particular, its holistic perspective and emphasis on knowledge co-production (see e.g., Méndez et al., 2013; Audouin et al., 2019; Anderson et al., 2021). By facilitating iterative processes of collective learning, MARISCO also integrates principles found in participatory action research (Bloch et al., 2016). MARISCO has been applied in various projects worldwide,[1] mainly as a participatory assessment and planning tool in the wider field of ecosystem conservation. The MARISCO method is founded on democratic principles and aims to empower people from all backgrounds who have a vested interest in the living environment around them to influence decision-making during planning and management of the living landscape. Through the varying setups of the working process, the method facilitates the co-production of knowledge, since participants, as well as facilitators, are provided with various opportunities to present their knowledge and to learn from others.

As outlined in detail in the MARISCO guidebook (Ibisch and Hobson, 2014) the method follows a stepwise process that can be adapted to individual project needs and is typically applied in a series of at least two participatory workshops (**Figure 1**).

The first part of the method is dedicated to systemic knowledge mapping and problem analysis of the project site by the involved stakeholders during a first workshop of at least 2 days. Using a method of systematic analysis and documentation with visualization tools, the perceptions, assumptions, and knowledge of the participants related to biodiversity, threats, and drivers of change are collected, ordered, and represented in the form of a so-called systemic knowledge map—a systemic situation model indicating cause-effect relationships (**Figure 2**). Usually visualized with custom-made moderation cards on a large wall display, the model consists of a varying number of interacting elements belonging to seven different categories: ecosystems and components, ecosystem services, aspects of human well-being and key ecological attributes as well as stresses, threats (drivers of stress), and so-called contributing factors. The elements of the systemic knowledge map are identified by the participants during open discussions. During a series of subsequent steps, the participants also evaluate the stresses, threats, and contributing factors according to a set of rating criteria on their states of criticality, dynamics, and levels of knowledge and manageability (see Ibisch and Hobson, 2014, 100 for a detailed description of the rating criteria).

After the first workshop usually follows an interim phase of consistency and plausibility checks, preliminary evaluation, and model digitization by the workshop facilitators. The next MARISCO phase is then dedicated to identifying, evaluating,

[1] See www.marisco.training

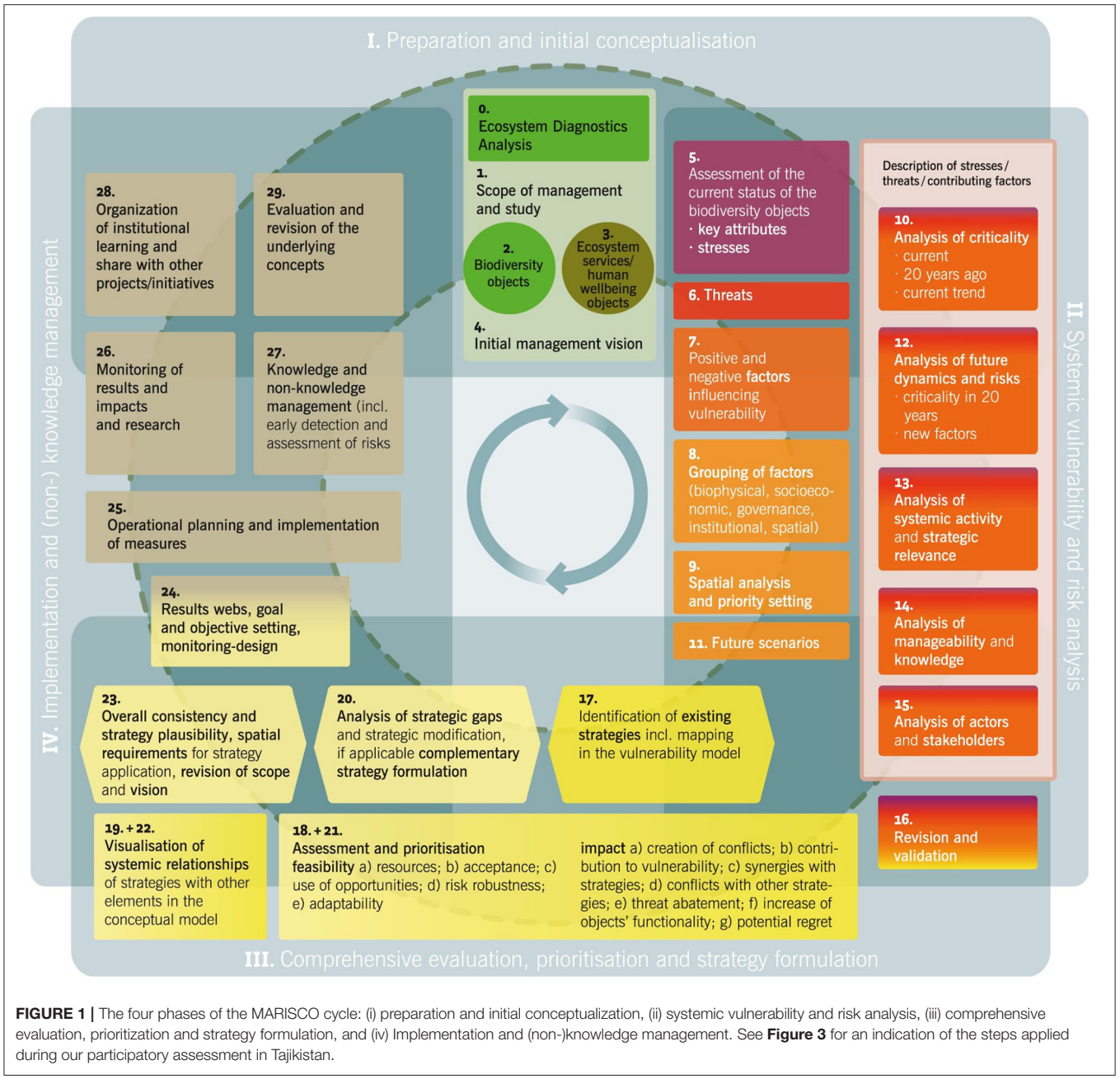

FIGURE 1 | The four phases of the MARISCO cycle: (i) preparation and initial conceptualization, (ii) systemic vulnerability and risk analysis, (iii) comprehensive evaluation, prioritization and strategy formulation, and (iv) Implementation and (non-)knowledge management. See **Figure 3** for an indication of the steps applied during our participatory assessment in Tajikistan.

and prioritizing strategies to address the identified problems on the basis of a second participatory workshop. The workshop starts with a revision of the systemic knowledge map and the outcomes of the problem analysis and rating. This is followed by several steps related to situating and evaluating existing problem-solving strategies of governmental and non-governmental actors, identifying gaps, and developing complementary or alternative strategies as well as systematically assessing their anticipated outcome based on cause-effect mapping and rating exercises (see also Schick et al., 2018).

In our assessment mission in Tajikistan, we applied MARISCO as an evaluation method that primarily relies on participatory methods of systemic knowledge mapping and analysis, but also integrates "hard data" collected through conventional scientific methods.

ENVISIONING AND IMPLEMENTING THE PARTICIPATORY PROCESS

Assessment Design and Implementation Before the Pandemic

The envisioned process of our systemic-participatory assessment of the social-ecological impacts of the project interventions in

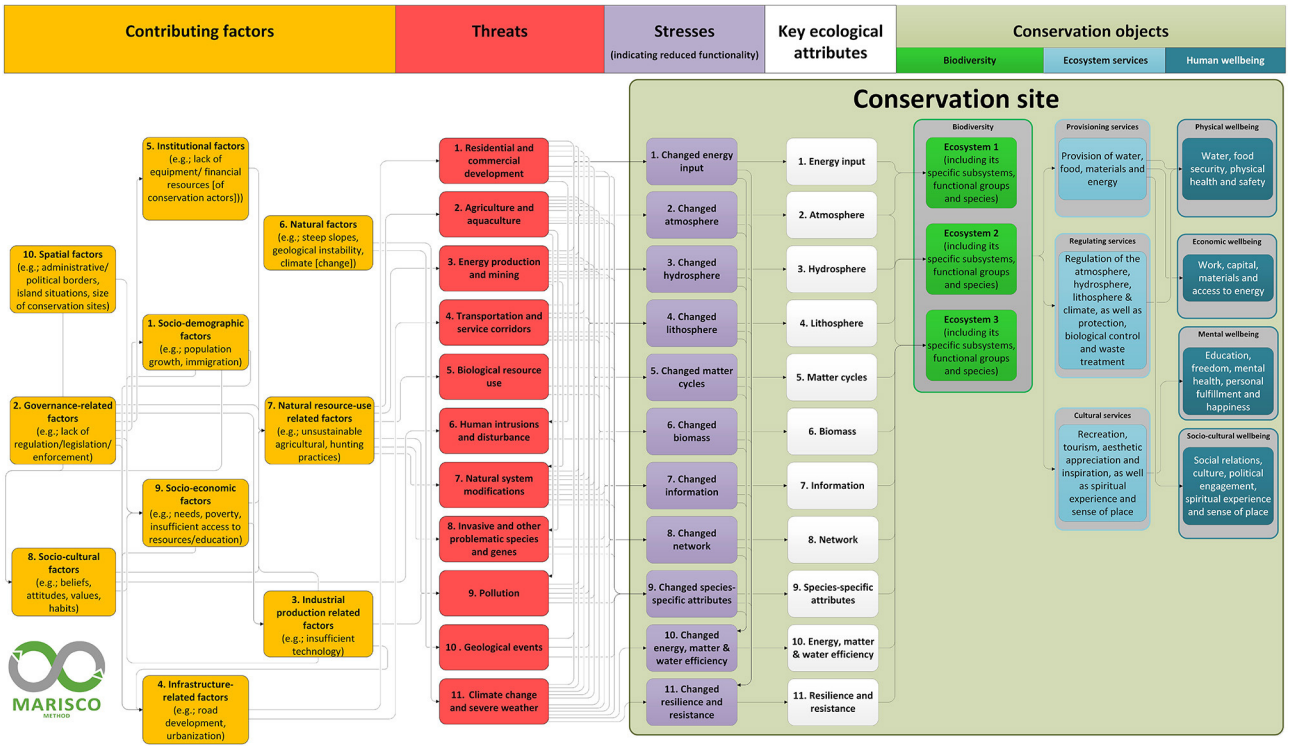

FIGURE 2 | A generic systemic knowledge map describing a hypothetical conservation site by means of eight distinct categories: contributing factors, threats, stresses, key ecological attributes, biodiversity objects, ecosystem services, and human well-being, as well as strategies.

rural Tajikistan consisted of two interrelated pillars: a series of participatory workshops, and empirical fieldwork. While the focus of this paper is on the first pillar, both are closely related: the research design for the fieldwork was part of the participatory process and the outcomes of both pillars would have been combined during a final workshop with the participation of all involved parties, contributing to a holistic assessment as the ultimate output of the mission (**Figure 3**).

At the beginning of the assessment in 2018, a team of Tajik scientists were selected by GIZ and German Agro Action, in consultation with the German researchers, through a public tender process. Their tasks were to take a hybrid role as participants (contributing with their expert knowledge) and co-facilitators of the participatory workshops, to co-design the assessment approach, and to conduct the empirical fieldwork. All four scientists were members of a research institute of the Tajik Academy of Agricultural Sciences that was selected based on their proposal, though the affiliation of some of them changed in the course of the project. Besides the quality of the proposal, the scientific qualification of the team members to conduct the empirical fieldwork were important selection criteria, rather than their level of experience with participatory processes. During the first workshop held on June 4–5, 2018, a total of about 25 participants—the Tajik scientists, 17 pilot farmers from both districts, two members of local agricultural administrations and two local NGO members—conducted a systemic analysis of the complex social-ecological systems of the study sites under the guidance of AS and MS. During this 2-day workshop held in the capital city Dushanbe, the participants defined the scope of the analysis and described and assessed the complex systems according to a given set of element categories using the MARISCO methodology. At the beginning, the facilitators gave a short explanation of the task ahead, as well as a definition of the specific element category (e.g., ecosystem services, ecosystems, and threats) addressed during each step. The participants identified the elements during open discussions and documented them on moderation cards. The task was considered completed once no new elements could be identified by the participants. The cards were then pinned to the wall and, if necessary, restructured by the facilitators to increase the logical flow, before the participants systematically evaluated the identified stresses, threats, and contributing factors. The outcome was a systemic knowledge map depicting the knowledge of the participants of the social-ecological systems and the problems they face. In total, the participants identified 16 elements of human well-being, 16 ecosystem services, 25 ecosystems and components, 16 key ecological attributes, 17 stresses, 31 threats and 87 contributing factors. In addition they made 810 evaluations for the rated elements. The highest ranked stresses were eroded soils, shortage of water and melting glaciers. Among the threats land degradation, pests and diseases were ranked the highest, while increasing number of livestock, corruption and global warming were identified as the most important contributing factors.

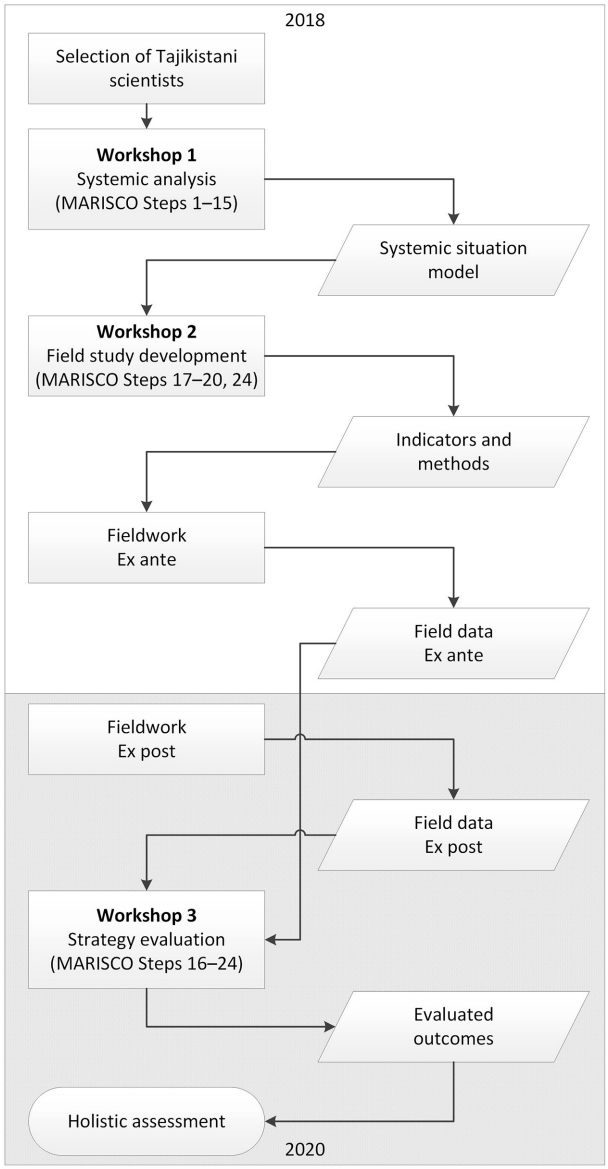

FIGURE 3 | Envisioned work process of the participatory approach. The following MARISCO steps were performed during the respective workshops: workshop 1–steps 1 to 15; Workshop 2–steps 17 to 20 and 24 (tentatively). According to the original work plan, the participants would have executed MARISCO steps 16 to 24 during Workshop 3. Instead, they only performed step 18.

The systemic knowledge map formed the basis for the design of the ex-ante assessment that was jointly developed on June 6 during a smaller non-participatory workshop by the four Tajik scientists, the German researchers, and two project staff members from German Agro Action. Using moderation cards designed for this task, the management strategies or "techniques" implemented by German Agro Action were preliminarily inserted into the systemic knowledge map to examine their postulated cause-effect relationships in addressing the identified stresses and threats. Based on this mapping exercise and under consideration of feasibility and available resources, we selected the strategies that should be evaluated through fieldwork, identified the agroecosystems for data collection, defined indicators, and specified the scientific methods for their measurement. Furthermore, a detailed work plan was developed for the implementation of the assessment in the selected agroecosystems by the Tajik scientists. All decisions were made by consensus. The fieldwork of the ex-ante assessment was executed between June and August of 2018 by the Tajik scientists and included measurements of plant biomass, plant diversity, soil samples on pilot and reference plots, as well as a survey with about 50 farmers (both pilot and non-pilot farmers) focusing on land-use practices, agricultural inputs and outputs, and socioeconomic data on the farmers' households and livelihoods. The data generated during the ex-ante assessment was partially processed and analyzed by the Tajik scientists, before being forwarded to the German researchers for completion. The findings were presented to the project staff in the form of a report. The process was accompanied by training of the Tajik scientists in the methodological steps by AS and MS, who also guided and supervised the overall process.

The original process foresaw that the fieldwork of the ex-post assessment would be executed 2 years later during the same season (June–August 2020), applying the same methods for data collection. The findings of the fieldwork would have been presented by the Tajik scientists during a comprehensive strategy evaluation workshop with the participants of the first participatory workshop and additional decision-makers from agricultural administrations and NGOs. During the workshop, the participants would have jointly evaluated the effectiveness of the management strategies to induce positive changes within the complex social-ecological systems, completing the theoretical and empirical findings of the assessment. For this purpose, the participants would have revised the systemic knowledge map to prove its consistency and to make modifications, if needed. By revising the evaluations of the various descriptors of the model elements, the participants would have had the opportunity to improve their understanding of how the drivers of stresses to the social-ecological systems and their dynamics can be addressed. It would have also set the stage for the evaluation of the different management strategies or "techniques" that have been implemented and promoted by the project. For this purpose, the existing strategies would have been mapped by the participants into the systemic knowledge map next to the elements that they address. The participants then would have linked the strategies with arrows to the specific elements, which has been shown to encourage participants to reflect on their assumptions about the effectiveness of the strategies, to identify potential blind spots, and to reduce avoidable risks. This process usually also reveals underlying factors, threats, and stresses of high strategic relevance that are not addressed by existing strategies. Moreover, the participants would have had the opportunity to propose modifications to the existing strategies and to develop complementary or alternative strategies to address the identified problems. In addition, the participants would have dedicated time to develop recommendations to improve the effectiveness of

management strategies in order to move toward more sustainable agricultural practices. The results of the additional MARISCO steps would have allowed for an in-depth and comprehensive analysis during the holistic assessment at the end of the mission in November 2020 as a basis for policy suggestions and potential follow-up projects in Tajikistan.

Adaptations Due to the Covid-19 Pandemic

While the activities in 2018 were implemented as planned, major changes in the work plan were necessary for the ex-post assessment in 2020 during the Covid-19 pandemic. The fieldwork of the ex-post study started in June 2020, but some components, such as the farmer surveys, were delayed by several weeks due to travel restrictions within the country. However, the final evaluation had to be adjusted more fundamentally.

When it became clear in mid-2020 that the participatory approach could not be realized as planned due to the severe work restrictions resulting from the Covid-19 pandemic, we discussed various options to bring our assignment to a satisfying conclusion. Due to funding reasons and other external factors, the mission could not be extended beyond November 2020, but for the facilitators AS and MS, it was not possible to travel to Tajikistan at all. A virtual workshop was out of the question, as it would have meant to exclude most of the farmers who participated in the first workshop due to their lack of access to reliable internet connection and required technical equipment. Asking the farmers to travel to Dushanbe for an online or hybrid workshop was considered unethical given the travel risks during a ravaging pandemic.

Moreover, conducting workshops virtually presents inevitable barriers to experiencing fully-fledged, in-person interactions and exchanges with other participants. In face-to-face interactions, people communicate through conscious or unconscious paralanguage, which includes facial expressions, body language, pitch, volume, and speech intonation (Clubb, 2007; Mwambari et al., 2021). Although video conferencing technologies are increasingly available for a broader audience (e.g., Zoom, Google meet), a lack of necessary knowledge among less privileged stakeholders to successfully use these technologies (see also Salma and Giri, 2021), partial loss of paralanguage, and absence of other benefits of physical presence remain major challenges of working in online settings. Workshops specifically suffer from these problems, as they typically provide a forum for networking, information exchange, and intensive group-based collaboration (Becerra et al., 2021). These interactions are strongly limited during virtual meetings. While it is possible to create virtual breakout groups, technical limitations often do not allow for lively discussions among all participants. The MARISCO method, in particular, is designed for broad participation where several participants contribute their knowledge simultaneously. This is usually done by using moderation cards that are collected and ordered by the facilitators or directly mapped by the participants into the systemic knowledge map. There are software applications available that provide similar functions (e.g., Miro, MURAL, Padlet), yet they require additional skills in order to be able to participate. Furthermore, such applications require good computer equipment and a particularly stable and fast internet connection. In Tajikistan, as in many other countries of the Global South (Armbrecht, 2016; Adam and Minges, 2018; Bahia and Suardi, 2019), access to the latter is expensive and severely limited, and remains a challenge even in the capital city Dushanbe.

For MARISCO, there are other factors as well that limit its applicability in virtual working modes: the physical experience of jointly developing and evaluating a complex knowledge map on a large wall display is an important motivating factor in the participatory process that reinforces a sense of ownership. In particular, to see one's ideas in one's own handwriting being part of the jointly developed systemic knowledge map usually increases the identification of the participants with the outcomes of the process.

Thus, after several consultations with German Agro Action and the project lead GIZ, the facilitators AS and MS proposed an alternative plan: Instead of one big centralized workshop facilitated by the German researchers with participants from all five watersheds, small decentralized workshops with identical programs were to be conducted by the Tajik scientists individually in each watershed. The new plan was approved by GIZ and German Agro Action, as well as the Tajik scientists, who had been in close contact with German Agro Action and agreed to take over the new tasks. There was consensus among all partners that this was the most appropriate solution given the seriousness of the Covid-19 pandemic. However, as changes in social distancing rules due to the dynamic pandemic situation could change anytime, it was uncertain until their implementation whether the workshops could be held. In case of cancellation, the only option left would have been to conduct phone interviews with the farmers, which would have drastically reduced the depth of the assessment further.

While the decentralized approach allowed for at least a minimum of physical interaction during the workshops, it also caused time constraints. Originally, the centralized workshop was planned to have a duration of 3 days, which would have provided the participants with ∼18 to 22 h to work on the diverse topics. Due to these modifications, the workshop duration had to be reduced drastically, resulting in a significant reduction of the available working hours. To cope with the time constraints and to enable the Tajik scientists to implement the participatory workshops, it was necessary to revise and radically simplify the methodological steps. Important steps of the MARISCO method, such as the revision of the systemic knowledge map (step 16 in **Figure 1**), the strategic gap analysis (step 20), the design and evaluation of complementary strategies (steps 20–22), as well as the development of results webs for the identified strategies (step 24) had to be omitted in the workshops. Basically, only step 18 of the MARISCO-cycle—the evaluation and prioritization of existing strategies through systematic rating exercises—could be implemented.

A "training for trainers" was conducted during a virtual working session with the help of a professional interpreter. The Tajik scientists were trained in the basics of organizing and facilitating participatory strategy evaluation workshops. This included information regarding the logistics necessary for the implementation of the workshops, as well as information about

the different techniques that can be used to steer the participatory process. The theoretical background of the methodology was not addressed during this capacitation.

The Tajik scientists then traveled to the villages and executed the participatory workshops, which were held on October 23 and 24 in Rasht and from October 28 to 30 in Ayni. They were partially accompanied by two project staff members from German Agro Action, who provided logistical support and took part as passive observers to monitor the workshop progress. After completion, the Tajik scientists sent the results to the German researchers for processing and analysis and prepared reports. Through these changes, it was possible to conclude the assessment despite the travel and work restrictions. However, the process and its outcomes were affected in various ways, as discussed in the following.

EFFECTS OF THE METHODOLOGICAL CHANGES ON THE PROCESS AND ITS OUTCOME

This section addresses the first two research questions raised in the introduction, scrutinizing how the methodological adaptations (a) possibly compromised our systemic approach, and (b) implicated the participatory process as well its underlying principles and outcomes. To do so, we draw primarily on our experiences and reflections during and after implementation, relating them to previous MARISCO experiences and to theoretical and practical insights from relevant literature. Of the four German authors, two (AS and PI) have facilitated dozens of MARISCO workshops in various regional and cultural contexts prior to this project, and two can draw on prior experience as facilitators of other participatory approaches (MS and RB). For the four Tajik authors, the participatory workshop approach described in this paper was their first experience of this kind, but they can draw on their first-hand experience from both the comprehensive MARISCO workshop in 2018 and the decentralized workshops in 2020. During the writing phase, we shared and discussed our experiences and reflections with each other during virtual meetings and email conversations, and made sure that the perspectives of all co-authors are reflected in our inquiry. In addition to personal reflections, other important sources informing this paper were meeting minutes and email conversions with project partners, internal workshop documents, and project reports from 2020 that were thoroughly reviewed before and while writing this paper.

We found that the methodological changes to cope with the pandemic situation affected the participatory evaluation process and its outcomes in two ways: first, through the methodological simplifications that were necessary for the new workshop design, and second, through the new facilitation roles and responsibilities within our team. These two aspects will be examined in sections Simplification of the MARISCO Approach and Effects of the new Facilitation Roles on the Participatory Process. Apart from our main objective of conducting a systemic and participatory project assessment, the changes in our approach also had important implications in terms of learning effects among the involved stakeholders and the newly-trained facilitators, which we discuss in more detail in sections Reduced Opportunities for (Horizontal) Learning Among Participants and Challenges and Learning Opportunities for Local Partners.

Simplification of the MARISCO Approach

In order to adapt the strategy evaluation workshops to the new circumstances and to enable the Tajik scientists to take over this task, the methodological steps had to be significantly curtailed. Yet, this compromised both the systemic aspects and depth of the analysis, and, potentially, led to a reduction in systemic comprehension by the participants.

The main reason for these reductions was the necessity to adjust the planned work steps to the new time budget. Time-consuming steps, in particular the revision of the systemic knowledge map, the mapping of strategies into the model and visualization of their systemic relationships, and the development of more systematic "results webs" had to be omitted. Yet, these steps are vital for participants to deepen their comprehension of the complexity of the given social-ecological systems and of the effects of project interventions. It cannot be determined exactly to what degree the omission of these steps affected the participants' further contributions to the assessment, but previous MARISCO experiences have demonstrated their significance. First, the revision of the model and particularly of the rating results of stresses, threats, and contributing factors at the beginning of the strategy evaluation workshop allows the participants to revise their previous work and to prioritize existing problems. Assisted by visual material prepared by the facilitators prior to the workshop (large posters displaying the digitized model and color-coded tables with the rating results), this exercise serves as an important entry point into the evaluation of strategies. Second, the tasks of mapping strategies into the model, visualizing their systemic relationships, and developing results webs often trigger valuable ideas and awareness of feedback loops and non-linear change that might otherwise have been missed. This was the case, for instance, in participatory ecosystem-based assessments conducted in northern Namibia with inhabitants of a protected area network. Guided by the MARISCO method, the participants identified a negative feedback loop resulting from the interaction of climate change impacts, hunger, poverty, high population density, and demand for land, which ultimately led to the degradation of the local ecosystems (Schick et al., 2018). The exercise of drawing results webs for individual strategies is particularly helpful in this regard: the threats and contributing factors likely to be influenced by the selected strategy are translated into assumed outcomes, which are then visualized in the form of detailed cause-effect relationships based on the connections predefined by the systemic knowledge map.

These methods of visualizing the systemic effects of strategies are particularly useful for two more steps that also had to be omitted, yet with different effects on the assessment: the strategic gap analysis and the development of complementary strategies. The gap analysis enables the participants to identify blind spots within the existing strategic portfolio, which have the potential to reduce the effectiveness of the strategies if their negative effects on the complex social-ecological system remain

unabated. The development of complementary strategies invites the participants to contribute their specific local knowledge and to unfold their creative potential, which has often been found to produce new information (Kloprogge and Van Der Sluijs, 2006) and to generate previously unconsidered and better-assessed solutions (Reed, 2008; Newig and Fritsch, 2009; Schick et al., 2017). Hence, it is a significant loss for the process that these steps could not be implemented.

Effects of the New Facilitation Roles on the Participatory Process

It has been argued that the quality of the outcomes of participatory processes is strongly dependent on the quality of the process that leads to it (Reed, 2008; Reed and Abernethy, 2018). Chess and Purcell (1999) evaluated the extent to which process and outcome goals were achieved through a range of participatory methods. They found that the success was not influenced by the choice of method, but by the way that communication and group dynamics were handled by facilitators as well as by the clarity of set goals and the quality of planning. Their findings highlight the importance of the facilitators for participatory processes. In order to enable the participants to express their full potential, facilitators have to be flexible enough to guide and adapt the process to the different and changing circumstances. Thus, it is possible that the replacement of experienced facilitators with beginners might have attenuated the quality of outcomes of the participatory evaluations.

The training sessions for the new facilitators had to be accommodated within the already-stretched time budget of the Tajik scientists, who had other professional obligations as well. Past training of MARISCO facilitators has shown that new facilitators will need at least 4 days of training in order to be able to steer a participatory assessment (yet, the supervision of the first applications of the method is strongly advised). In order to leave enough time for the completion of their existing assignments, we had to reduce the training to a virtual workshop of half a day. This time was merely enough to convey the necessary knowledge to plan and organize the workshops and to cover a minimum number of methodological details. However, it did not provide sufficient time for a thorough instruction in the underlying concepts and theoretical background of the methodology, hence the Tajik scientists had to rely solely on their personal experience to address the systemic relationships and complexities during the workshops. Nor was there sufficient time to teach the new facilitators all the necessary skills and techniques to successfully conduct the workshops.

Skills, such as the capability to maintain positive group dynamics, to handle dominating individuals, to encourage participants to question assumptions, and to re-evaluate entrenched positions are difficult to learn and tend to be developed through years of experience, intuition and empathy (Richards et al., 2007). Not only managing group dynamics in a manner that is sensitive to power relations, but also monitoring and recording them for subsequent interpretation of the process outcomes is crucial in this regard, but was limited in its depth due to a number of factors. The new facilitators were already burdened with many new and unfamiliar methodological tasks during the workshops and their time resources only allowed for rather brief reports on the workshop processes that served as the basis for AS and MS to analyze and interpret the results. Overall, however, handling group dynamics did work well, only in one of the five workshops it was difficult to make everyone's voice heard, as one dominant farmer, who was also the village *rais* (local leader), constantly attempted to force his opinion upon others. To monitor and analyze the effects of such dynamics on the different methodological steps in more detail, communication is key. Here, language gaps were a significant barrier: while the German scientists had no knowledge of Tajik and only one of them basic Russian skills, only one of their Tajik colleagues could communicate in English. Hence, throughout the assessment mission, deeper discussions were only possible with the help of interpreters. For the first MARISCO workshop in 2018 and the virtual training in 2020, a professional interpreter was hired—but during most of the working process, local project staff from German Agro Action took over this task. However, especially toward the end of the project in 2020, their availability was often limited. Generally, we find that the challenges of virtual meetings become significantly more severe when working with interpreters, as non-verbal communication is particularly important in this context and translating back and forth is more time-consuming, especially when audio latency is high due to slow internet connections.

The quality and delivery of the workshops were somewhat heterogeneous, because the Tajik scientists first had to familiarize themselves with the methodological steps. A particular challenge during the first workshops was to introduce the next tasks, for example, to explain the rating criteria for the evaluation of the identified strategies. In addition to the virtual training, their experiences and observations during the first MARISCO workshop in 2018 helped, but the greatest training effect was provided by the actual implementation itself. Thus, the tasks became easier and implementation more efficient with every workshop, which was reflected in the overall duration. While the first workshop had a duration of 8 h, the last workshop took only 4.5 h until completion, as the facilitators knew well by then what questions to ask, how to explain the tasks, and how to moderate the discussions in an effective manner. Nevertheless, the evaluation results of the five local workshops were generally consistent and existing differences between strategy evaluation outcomes from the different villages could usually be explained by local circumstances, such as the steepness of slopes or access to water, just to name a few.

Apart from these challenges, the change in workshop facilitators likely also created benefits for the evaluation process. As Reed and Abernethy (2018) point out, not only strong operational skills are crucial for successful workshop facilitation, but also the ability to bridge cultural and language differences. Thus, the fact that the new facilitators belong to the same country and ethnic group and speak the same mother tongue as the participants led to a reduction in communication gaps between farmers and facilitators. Possibly, this enabled a more straightforward, genuine, and critical discussion of the project interventions, their benefits, and problems as compared to a

workshop facilitated by German researchers who appear to be closely affiliated with international development organizations. Nevertheless, differences in positionality between the Tajik scientists and local farmers could play a role as well, possibly leading to other forms of bias in the outcomes: for instance, farmers might keep certain ideas for themselves, if they fear that their viewpoints and knowledge are deprecated by the respectable scientists guiding them through the workshop (Mistry et al., 2015). To avoid such situations, experience and training in participatory approaches are required—as well as a prior engagement by facilitators with questions of positionality and reflexivity (see e.g., Cook et al., 2005; Caretta, 2015; Pimbert and Barry, 2021), which is not typically part of natural science training in Tajikistan and elsewhere.

Overall, the role of facilitators is too multifaceted to give a definite answer on the degree to which the new responsibilities influenced the workshop process and outcome, as we lack a baseline for comparison. According to the Tajik scientists, the quality of their workshop results may have been only been 70 percent of what AS and MS would have achieved if they conducted the workshops, the reason being the higher experience of the latter with the MARISCO method and with facilitating participatory workshops. The degree of trust and honesty of farmers toward the facilitators, however, would have been either similar or lower toward AS and MS due to their very different cultural background.

Reduced Opportunities for (Horizontal) Learning Among Participants

There are other factors as well that possibly influenced the outcomes of the process, in particular regarding learning effects. As previously mentioned, the original process foresaw a centralized strategy evaluation workshop with participants from all five watersheds. One of the advantages of such a setup is that it provides a space for cooperation with and horizontal learning from participants from other villages. Since the workshops had to be executed individually for each watershed, these interactions were not possible. This presents a major disadvantage, since participants in previous MARISCO workshops greatly valued opportunities to report on their workshop achievements and to review and discuss the results of the other group while working through the methodological steps (Schick et al., 2018). There are many examples of the benefits of horizontal learning in literature (e.g., Patel and Mitlin, 2002). Tschirhart et al. (2016), for instance, demonstrate in case studies from northern South America how indigenous community members were significantly more receptive to solutions emerging from, and communicated by, other indigenous peoples, and that this approach was a significant motivating force for encouraging change in their own community. Likewise, the agroecology literature is rich in examples of how horizontal learning processes between farmers across territories have been instrumental for developing and spreading problem-solving strategies that are adapted to local contexts, while also supporting the autonomy and independence of farming communities (Anderson et al., 2020, p. 4, 2021, p. 69–76). In addition, the lack of direct exchange between farmers from different villages during the workshops probably affected the outcome as well, as the new facilitators observed: When comparing the first MARISCO workshop in 2018 with the decentralized workshops in 2020, in 2018 group processes were more dynamic and discussions more controversial due to the different visions that come together during a large workshop, which led to more complex and holistic results.

Generally, during the workshops in 2020 the participating farmers were less concerned about Covid-19 risks and hygiene precautions than the facilitators. Many of them would have been willing to travel to Dushanbe for a centralized workshop, as the first wave of the pandemic appeared to have passed and they would have appreciated this opportunity to exchange experiences and ideas with other farmers, besides personal benefits such as the opportunity to visit family members. However, they understood the reasons why this was not possible, accepted the local workshop format, and cooperated well with the new facilitators.

Besides horizontal learning, the decentralized workshop design implies another missed opportunity. As social distancing rules demanded the limitation of workshops to a handful of participants (apart from the facilitators), we decided to invite only farmers, as their knowledge and viewpoints were of priority for the prime objective of our mission—the evaluation of the strategies promoted by German Agro Action. However, this meant that other stakeholders, in particular decision-makers from local authorities and NGOs did not participate. This presents a clear disadvantage of our adapted approach, as the inclusion of decision-makers, even if it complicates group dynamics and power relations in the participatory process, is vital for the implementation of its outcome. While much of the literature on participatory methods has rightfully highlighted the need to include marginalized groups, low representation or exclusion of more powerful stakeholders and decision-makers can also undermine the process (Oteros-Rozas et al., 2015). First, decision-makers may oppose or not be very supportive of strategies and policy suggestions developed in processes from which they feel excluded (Blaikie, 2006). Second, inclusive stakeholder dialogues as envisioned in our comprehensive workshop can have a valuable learning effect among decision-makers, who are often not familiar with systemic approaches on the one hand, and with the viewpoints of local resource users on the other (Stevenson, 2012, p. 12). The omission of the MARISCO steps outlined in section Simplification of the MARISCO Approach deprived both the participants, as well as the Tajik scientists, of the opportunity to familiarize themselves with the systemic approach of the assessment and to see it implemented in a practical case in a familiar study region. This has likely hampered their understanding of the process and the outcomes of the holistic assessment, at least to some degree.

Challenges and Learning Opportunities for Local Partners

Participatory processes are uncommon in Tajikistan and not many people have experience with their implementation. This became evident during the selection of national research partners at the beginning of the assessment mission. While all of the Tajik scientists had conducted field research, their interaction with local actors was usually limited to interviews

and research logistics. Yet, as outlined above, conducting a workshop with several participants working together requires very different skills.

Therefore, basic training of the Tajik scientists in the MARISCO approach was part of the mission from the beginning. Usually, new MARISCO facilitators are accompanied by experienced facilitators during several workshops before they take on the task by themselves. Unfortunately, this was not possible in the context of this consultancy, since it would have required a much larger time budget for everyone involved. Given the limited amount of time, we opted for training on the job, while implementing the methods with local stakeholders. Past experiences have shown that active participation during workshops has a much higher learning effect than theoretical teachings. While the Tajik scientists had participated as experts and co-facilitators during the first two workshops in 2018, the strategy evaluation in 2020 comprised new methodological tasks. Hence the Tajik scientists had to rely exclusively on their capacitation during the virtual training. This created new challenges, since they had to execute unfamiliar tasks. However, the new facilitators became more secure with every additional implementation, and taking over the responsibility for workshop facilitation had clearly a much bigger training effect as compared to merely assisting AS and MS. Nevertheless, they were not without help: two project staff members from German Agro Action, who had some experience in participatory methods and had also attended the online training session, were present during the first workshops, and sometimes supported the Tajik scientists when explaining certain steps.

Overall, the experience brought with it significant learning results for the Tajik scientists, familiarizing them with new approaches and capacitating them to implement similar workshops in the future. From their perspective, it would have been ideal to conduct the workshops with AS and MS being present as observers who could occasionally correct them and provide detailed feedback, but the effect of learning by doing presented a valuable opportunity that would have been missed if the pandemic did not interfere with our work. Two of the Tajik co-authors now use the evaluation tools applied during the workshop for their own work, and we are hoping for new opportunities for joint MARISCO workshops as part of another ongoing research project in rural Tajikistan.

On the other hand, the implementation of decentralized workshops also resulted in additional workload. The implementation and documentation of the workshops required a considerable amount of time that had to be accommodated in the already-stretched time budget of the Tajik scientists, who had to coordinate their activities with their work duties at their respective institutions. The inclusion of these additional tasks led to time shortages on their side and compromised their capacities for writing detailed reports. Nevertheless, from the perspective of the Tajik scientists the opportunities to learn interesting new methods offering a fresh perspective on topics concerning their own work more than outweighed the additional workload.

Finally, the changes made in response to the Covid-19 pandemic had valuable learning effects for the German researchers as well. Their expectations on workshop performance by the Tajik scientists were exceeded, and this experience has shown that it would have made sense to give more responsibility to the Tajik co-facilitators already in the original work plan. For instance, they could have taken over moderation tasks with assistance by AS and MS, or moderated strategy rating exercises in parallel breakout groups. In this sense, this experience during the Covid-19 pandemic has provided valuable insights for future work with MARISCO, particularly regarding its adaptability to various workshop formats and the trade-offs to be made when radical simplifications become necessary.

CONCLUSION

Covid-19 has posed new challenges to participatory processes, with lockdowns, travel restrictions and social distancing measures often requiring teams to shift to predominantly virtual working modes (see e.g., Hall et al., 2021; Marzi, 2021). We presented a participatory assessment in rural Tajikistan where such a shift was not possible due to technical limitations and, most importantly, because it would have excluded key stakeholders from the process. Our approach to conduct small workshops guided by newly trained facilitators presents a compromise, which allowed for valuable face-to-face interaction, but also created new challenges and somewhat restrained the outcome. Radical simplifications of the applied MARISCO method were necessary, which compromised the systemic approach of the method considerably. Additional pressure was put on the new facilitators, whose limited experience with the approach also made it necessary to reduce the depth and detail of the assessment. Learning opportunities for participants were missed due to methodological simplifications and necessary reductions in workshop setup and duration. On the other hand, the methodological adaptations necessitated by the pandemic provided invaluable learning opportunities for ourselves that would otherwise have been missed: Taking the lead in facilitating a critical part of the participatory process effectively trained and enabled the Tajik scientists to conduct similar workshops in the future. For the German researchers, in turn, this experience has provided new perspectives on the methodological adaptability of MARISCO and on how to delegate more responsibility and control of the process to local partners.

Yet, we are skeptical that a complete shift to such decentralized applications of MARISCO or other systemic-participatory approaches will be feasible in the near future. Since social-ecological systems are notoriously complex, we argue that assessing and developing strategies of sustainable (agro) ecosystem management requires a systemic understanding of the local situation that can only be gained through in-depth analysis with clear methodological guidance. Our results have again shown that the successful implementation of such processes requires specific skills of process leaders, which are difficult to acquire during short online training sessions. Training series conducted over a longer period would be more fruitful, but also require more resources.

Consequently, within the limited time budget of a given assessment mission, there exists a trade-off between the time invested in training local experts and the time invested in the assessment or participatory process itself. Our experiences during the pandemic have highlighted the need to prioritize the former to the latter in order to reduce dependency from foreign experts, while building long-term collaboration and partnerships on equal footing. Not only pandemics, but also other crises such as violent conflicts can cause severe interruptions, and reducing power inequalities between external experts and local partners is a key principle of participatory processes in the first place. Here, not only civil society organizations, but also scientific institutions in the Global South deserve attention by international development projects promoting capacity building and sensitization toward more systemic and participatory approaches. The field of agriculture is particularly relevant in this regard, as research traditions are often dominated by specialized scientific sub-fields that do not embrace the complexity of social-ecological systems and the diversity of local perspectives. However, our experience has also highlighted the need to find a balance between empowering and overburdening local partners, which should also be factored in when planning for alternative scenarios in case of unexpected interruptions of the process.

While conducting participatory workshops virtually was not an option for our assessment in Tajikistan, in other cases, particularly in the Global North, this may be more feasible. The absence of a physical workshop setting creates trade-offs for group dynamics, but with the right tools and planning, even comprehensive approaches such as MARISCO can be implemented successfully when participation of all relevant stakeholders can be ensured and technical requirements be met. However, as mentioned earlier, virtual workshops have high entry barriers for marginalized groups, as they require access to technology and the specific knowledge to use it. While a shift to virtual working modes can in some cases also improve access to people how are otherwise excluded (see e.g., Roberts et al., 2021), for remote farming communities in the Global South, the opposite is much more likely. Therefore, a rapid global shift to virtual forms of participation carries the risk of further excluding marginalized stakeholders from participatory processes. In our view, in many cases there is thus no alternative to at least a certain degree of physical interaction, even in pandemic times. This is particularly the case when co-producing knowledge on sustainable resource use strategies. While there is a need to strengthen local partners, we find that truly participatory processes that take the complexity of local resource use strategies seriously need to be implemented in the field.

DATA AVAILABILITY STATEMENT

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

AUTHOR CONTRIBUTIONS

MS, AS, RB, and PI designed the participatory assessment approach, which was then implemented in Tajikistan by MS, AS, SK, BB, KZ, and SJ. MS and AS wrote the first draft of the manuscript and finalized the submitted version. RB and PI contributed to manuscript revision and writing. SK, BB, KZ, and SJ provided input to selected sections. All authors approved the publication of the content of the manuscript in its submitted version.

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