

Chapter 4

SEPLS Well-Being as a Vision: Co-managing for Diversity, Connectivity, and Adaptive Capacity in Xinshe Village, Hualien County, Chinese Taipei



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Abstract Since 2016, a 600 hectare “ridge-to-reef” watershed of the Jialang River in Xinshe Village, Hualien County, Chinese Taipei, has been adaptively co-managed by a multi-stakeholder platform uniting two indigenous tribes (Fuxing and Xinshe) and four regional government agencies subordinate to the Council of Agriculture. The Five Perspectives of the Satoyama Initiative formed the core of the Xinshe SEPLS adaptive co-management model. The year 2020 marked the end of the short-term phase (2016–2019) and a transition period to the midterm phase (2021–2026) of the Xinshe “Forest-River-Village-Ocean” Eco-Agriculture Initiative (the Xinshe Initiative). How could the midterm management of the Xinshe Initiative most effectively enhance the Xinshe SEPLS well-being by 2026? To answer this question, we developed a set of 20 Localised Indicators of Resilience in the Xinshe SEPLS, analysed the concept of SEPLS well-being on the basis of the 5R conceptual framework (“ridge-to-reef”, risks, resources, and resilience), and contributed the results of our study to the midterm action plan of the Xinshe Initiative.

Keywords SEPLS well-being · Adaptive co-management · 5R (“ridge-to-reef”, risks, resources, and resilience) · Diversity · Connectivity · Adaptive capacity · Chinese Taipei

1 Introduction

1.1 Defining SEPLS Well-Being

“Societies in harmony with nature” is the overarching goal of the Satoyama Initiative and the 2050 vision reiterated in the zero draft of the Post-2020 Global Biodiversity

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Framework (Convention on Biological Diversity (CBD), 2020). The upcoming decades are expected to showcase diverse pathways towards achieving this vision at multiple scales, in different ecosystems and with a variety of stakeholders involved. Socio-ecological production landscapes and seascapes (SEPLS) have a high potential to provide invaluable and local-scale insights of their own (Nishi & Yamazaki, 2020).

One may wonder, however, what does harmony between societies and nature in SEPLS actually mean? Is it a win-win relationship, a balance, or the most desired state in SEPLS? Can it be put in concrete terms, observed, or even measured? To answer these questions, we propose the concept of *SEPLS well-being*.

The term “well-being” mainly derives from psychology and sociology studies where it is referred to as human well-being (Forgeard et al., 2011). It is generally defined as “the state of being or doing well in life; happy, healthy, or prosperous condition; moral or physical welfare (of a person or community)” (Oxford English Dictionary, 2021). Importantly, Dodge et al. (2012, p. 230) emphasise the non-static nature of well-being by calling it a “balance point between an individual’s resource pool and challenges faced”.

In a coupled socio-ecological system, like a SEPLS, we determine well-being to be a dynamic balance between the socio-economic and environmental *resources* available to a SEPLS and the socio-economic and environmental *risks* faced by it at a given point in time. As a SEPLS is subject to natural and human-induced, internal and external uncertainties, its good management should be capable of balancing out risks and resources in the most efficient way to realise, maintain, and enhance SEPLS well-being.

If the concept of SEPLS well-being can bring us one step closer to the vision of “societies in harmony with nature”, it might be well worth to explore its practical on-the-ground application within a landscape approach. For this purpose, we examine Chinese Taipei’s first ever experience with a multi-stakeholder platform for SEPLS revitalisation—the Xinshe “Forest-River-Village-Ocean” Eco-Agriculture Initiative (Xinshe Initiative).

1.2 Background: Xinshe Eco-Agriculture Initiative

The Xinshe SEPLS is a subtropical “ridge-to-reef” watershed of the Jialang River located in Xinshe Village, Fengbin Township, Hualien County, Chinese Taipei (Fig. 4.1a and Table 4.1). It covers an area of 600 hectares spanning from protected national forests of the Coastal Mountain Range, through production farmlands of two indigenous settlements (Amis Fuxing tribe (about 70 residents) and Kavalan Xinshe tribe (about 350 residents)) to the coral reef ecosystem of the Pacific Ocean (Lee et al., 2019, 2020) (Fig. 4.1b and Table 4.1). The landscape approach in the form of the Xinshe Initiative was introduced to the Xinshe SEPLS in October 2016 as a response to a number of socio-ecological challenges faced by the area over the years.

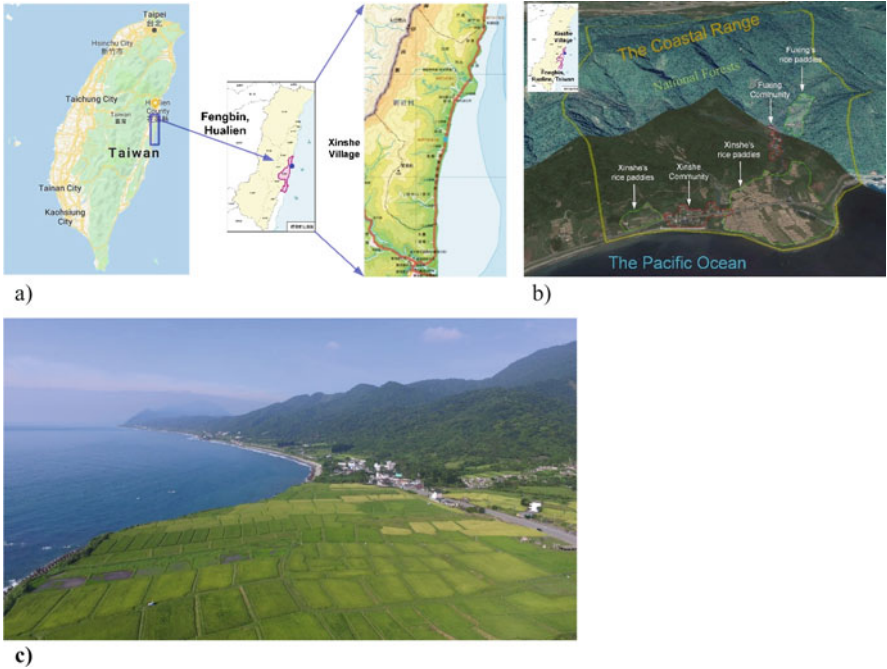


Fig. 4.1 Location (a), land-use map (b), and landscape-seascape (c) of the Xinshe SEPLS: Xinshe Village, Hualien County, Chinese Taipei (source: (a) and (b) Map data©Google, 2021, (c) photo taken by authors)

Table 4.1 Basic information of the study area

Country	Chinese Taipei
Province	Hualien County
District	Fengbin Township
Municipality	Xinshe Village
Size of geographical area (hectare)	1460
Number of direct beneficiaries (persons)	200
Number of indirect beneficiaries (persons)	665
Dominant ethnicity(ies), if appropriate	Indigenous Amis and Kavalan
Size of the case study/project area (hectare)	600
Geographic coordinates (latitude, longitude)	23°39'20.8"N, 121°32'21.8"E

Amis and Kavalan communities are widely known for their versatile skills as farmers, hunters, fishers, and gatherers who follow seasonal patterns and sustainably utilise the abundant resources of their surrounding environment all year round (Fig. 4.1c). Traditionally, the youth and the elderly, both men and women, all play indispensable roles in managing the SEPLS. Chinese Taipei’s rapid industrial development in the 1970–1980s, however, brought with it the convenience of modern agriculture (including the introduction of chemical fertilisers, pesticides,

and herbicides) and new socio-economic opportunities resulting in outmigration of youth to the cities. By the 2010s, depopulated and ageing, the Xinshe SEPLS was faced with deterioration of production farmlands, degradation of natural resources, loss of indigenous language and culture, and lack of incentives for the young people to return home.

The Xinshe Initiative (2016) became an effort to envision Xinshe SEPLS well-being by the means of SEPLS-wide promotion of eco-agriculture and uniting the sectoral efforts of three government agencies subordinate to the Council of Agriculture (COA) engaged in the area since 2010: Hualien Forest District Office (HFDOFB, since 2010), Hualien Branch of Soil and Water Conservation Bureau (HBSWC, since 2011), and Hualien District Agricultural Research and Extension Station (HDARES, since 2014).

Eco-agriculture in the context of the Xinshe Initiative is defined as “a fully integrated approach to agriculture, conservation and rural livelihoods” (Scherr & McNeely, 2008, p. 480) at the Xinshe landscape-seascape scale (Lee, 2016). The initial sectoral expertise of the three COA agencies working in the Xinshe SEPLS provided an opportunity to thoroughly address each of the three pillars of eco-agriculture: biodiversity (HFDOFB), production (HDARES), and livelihoods (HBSWC). For more information, please see Lee et al. (2019) in Volume 5 of the Satoyama Initiative Thematic Review.

The Xinshe Initiative further aligned the ecological, social, and economic aspects of eco-agriculture with the Five Perspectives of the Satoyama Initiative¹: (a) ecosystem health and connectivity, (b) sustainable resource use, (c) traditions and innovation, (d) multi-stakeholder governance, and (e) sustainable livelihoods. These five eco-agricultural perspectives formed the thematic building blocks of the management cycle (“planning-implementation-evaluation-adjustment” stages) and the short-term action plan of the Xinshe Initiative (Fig. 4.2).

The Xinshe multi-stakeholder platform was established as a core mechanism for operationalising the Xinshe Initiative (Fig. 4.2). The main actors within the platform included primary stakeholders (representatives from the Fuxing and Xinshe tribes), secondary stakeholders (the four COA regional agencies) (the Eastern Region Branch of Agriculture and Food Agency (EBAFA) joined the above three in 2018 to support the “marketing” pillar), and the facilitator (National Dong Hwa University (NDHU—the authors)). Other relevant government agencies and tertiary stakeholders (non-governmental organisations, community organisations, and private enterprises) also partook in multi-stakeholder platform meetings when necessary (Lee et al., 2019).

From the very beginning, the Xinshe Initiative was projected as a decade-long revitalisation effort to be carried out in short-term (3 years) and midterm (7 years)

¹For the Xinshe Initiative, the initial Five Perspectives of the Three-Fold Approach for the Satoyama Initiative were slightly modified from their original version (IPSI Secretariat, 2014, p. 9): (a) resource use within the carrying capacity and resilience of the environment, (b) cyclic use of natural resources, (c) recognition of the value and importance of local traditions and cultures, (d) multi-stakeholder participation and collaboration, and (e) contributions to socio-economies.

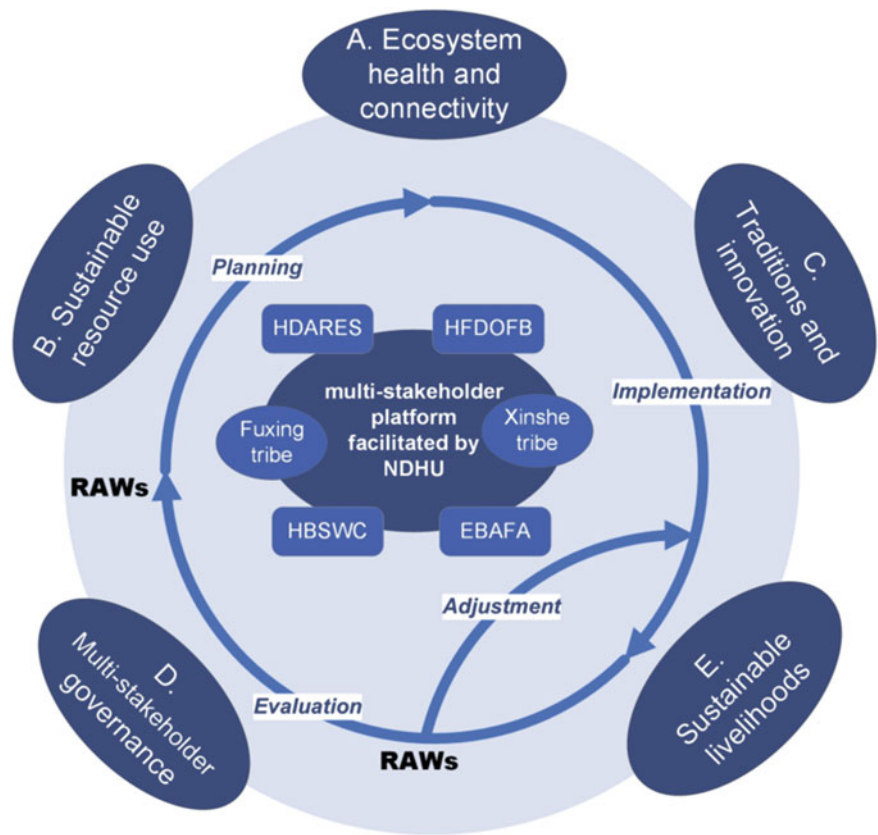


Fig. 4.2 The Xinshe “Forest-River-Village-Ocean” Eco-Agriculture Initiative and its adaptive co-management model based on the Five Perspectives of the Satoyama Initiative (source: prepared by authors). *HDARES* Hualien District Agricultural Research and Extension Station, *HFDOFB* Hualien Forest District Office, *HBSWC* Hualien Branch of Soil and Water Conservation Bureau, *EBAFA* Eastern Region Branch of Agriculture and Food Agency, *NDHU* National Dong Hwa University, *RAWs* resilience assessment workshops

phases. Ten years were deemed as a realistic enough period of time to allow the local elderly to observe the positive trends towards enhancement of Xinshe SEPLS well-being, and for the youth to return home to new opportunities and to take over the SEPLS’ management in the long term.

1.3 Rationale: The Xinshe SEPLS Well-Being as a Midterm Vision

During the initial 3 years of the Xinshe Initiative, the multi-stakeholder partnership was characterised by several notable features. Firstly, it was a time of learning to

work together in the cross-sectoral (between government agencies), cross-settlement (between Fuxing and Xinshe tribes), and cross-knowledge (expert and local) dimensions (Lee et al., 2019). Secondly, it allowed for “harvesting the low-hanging fruit”—accomplishing the most urgent action tasks based on the immediate challenges faced by the communities. Thirdly, the short-term phase laid out the “stepping stones” for issues to be addressed in the midterm phase (Karimova, 2021). In sum, these were the foundation years towards achieving Xinshe SEPLS well-being.

The year 2020 marked the end of the short-term phase (2016–2019) and served as a transition period between the phases. Evaluation of the short-term phase and planning for the midterm phase (2021–2026) were carried out at this time. At this pivotal stage of the Xinshe Initiative, multiple stakeholders pondered on a question: *How can the midterm management of the Xinshe Initiative most effectively enhance Xinshe SEPLS well-being by 2026?* Our research team saw this as an opportunity to give a practical application to the concept of SEPLS well-being and to contribute the results of our study to the midterm action plan.

2 Methods

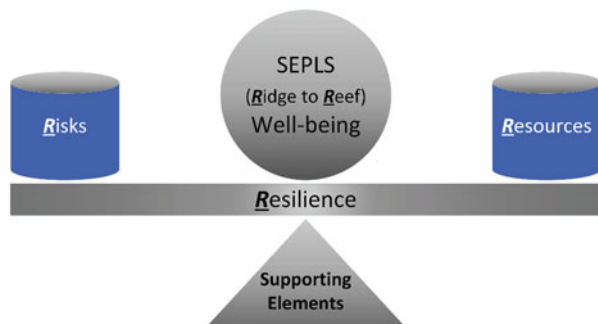
2.1 The 5R Conceptual Framework

Our analysis of the Xinshe SEPLS well-being integrated the familiar concepts of “ridge-to-reef” (R-to-R), risks and resources (2R), and resilience into a 5R conceptual framework (Fig. 4.3).

We adapted Dodge et al.’s (2012, p. 230) model where well-being is positioned at the centre of a see-saw as “the balance point between an individual’s resource pool and the challenges faced”. Internal and external socio-economic and environmental threats, pressures, and challenges of SEPLS are placed into the *Risks* box, while the strengths, opportunities, and skills of all SEPLS elements (human and natural) are put into the *Resources* box.

The see-saw itself is envisioned as *Resilience*—a dynamic process in which a SEPLS utilises its available resources in order to adapt and grow in the face of risks,

Fig. 4.3 The 5R conceptual framework (adapted from Dodge et al., 2012)



yet retaining its essential structure and functions (Brown, 2016; Ford et al., 2020; Carpenter et al., 2001). Having identified this fifth “R” in our conceptual framework, we employed community-based resilience assessment workshops (RAWs) as a tool (Lee et al., 2020; Fig. 4.2). Also, pictured as a supporting frame of the see-saw (lower pyramid structure in Fig. 4.3), our conceptual framework supposes that certain supporting elements are required in order to fulfil the 5Rs.

Therefore, we outlined the following objectives for our analysis: to elicit the socio-economic and environmental risks and resources of the Xinshe SEPLS at the end of the short-term phase, and to identify the supporting elements for propelling Xinshe SEPLS well-being in the midterm phase.

2.2 Resilience Assessment Workshops

We define resilience assessment workshops (RAWs) as a series of community-based activities aimed at the evaluation of socio-ecological resilience in a SEPLS, organised for the purpose of providing a problem-oriented feedback to the “adjustment” or “planning” stages of its adaptive co-management cycle (Lee et al., 2020; Fig. 4.2).

RAWs were first carried out in the Xinshe SEPLS in 2017–2018 during the “evaluation-adjustment” stages of the short-term phase. At the time, the original set of 20 Indicators of Resilience in SEPLS (Bergamini et al., 2014) was directly translated into the Chinese language and applied in RAWs (Lee et al., 2020). Mirroring the Five Perspectives of the Satoyama Initiative, the 2017–2018 RAWs played a crucial role in yielding community-based adjustments to the short-term action plan and received positive acclaim from both the Fuxing and Xinshe communities and the government agencies. This experience resulted in RAWs becoming the official “evaluation-adjustment-planning” tool of the Xinshe Initiative.

In 2020, however, RAWs were entrusted with the more complex task of evaluation and planning for the midterm phase (Fig. 4.2). It meant that at this stage the indicators for measuring resilience had to be *comprehensive* enough to reflect the multitude of challenges and opportunities in the Xinshe SEPLS, *relevant* enough to the local context and the action tasks of the Xinshe Initiative, and *comprehensible* enough to be easily understood by the local communities.

For this reason, the process of conducting the 2020 RAWs consisted of three consecutive stages: pre-RAWs (developing a set of 20 Localised Indicators of Resilience in the Xinshe SEPLS—Appendix A), core RAWs (conducting a series of 12 RAWs in the Fuxing and Xinshe communities), and post-RAWs (communicating assessment results to the multiple stakeholders and producing a bottom-up midterm action plan for the Xinshe Initiative). A detailed description of activities during each stage is presented in Appendix B and an evaluation sheet sample of Perspective A (Indicators A1–A4) in Appendix C. Please see Sun et al. (2020) for the photographs of the 2020 RAWs.

2.3 Resilience Assessment as the Xinshe SEPLS Health Check

As RAWs are a *community-based* tool for assessing resilience in SEPLS, it is imperative that the local people fully understand the purpose of this exercise, its benefits for the community, and, first and foremost, the meaning of what is being measured—resilience itself. The feedback from the Fuxing and Xinshe communities after a series of initial RAWs in 2017–2018 (Lee et al., 2020) and opinions voiced by government representatives during the 2020 pre-RAWs’ preparatory workshop (Appendix B) warned us that *comprehensibility* was key. While the purpose and the benefits of RAWs were clear, the concept of resilience remained rather vague and was deemed “too academic” for both the local people and the government officials. How could we explain it better?

For the 2020 RAWs, we found a solution by not only providing a definition of resilience in “risks-resources” terms but also using the analogy of a human body and human health—something that all participants were most familiar with (Fig. 4.4). We started by referring to a healthy human as one who does not get sick easily and who recovers quickly even when some ailment occurs. We noted that the same could be said about a resilient SEPLS—it is less vulnerable to risks and has a strong capacity to adapt (find resources to cope with risks). Then we explained that similar to a human body being comprised of multiple organs which form its ten main systems, SEPLS is also home to numerous multifunctional natural and man-made elements.

In the same way that a doctor performs a health check (e.g. blood pressure, blood tests, temperature check) to find out the functionality of systems and organs within a

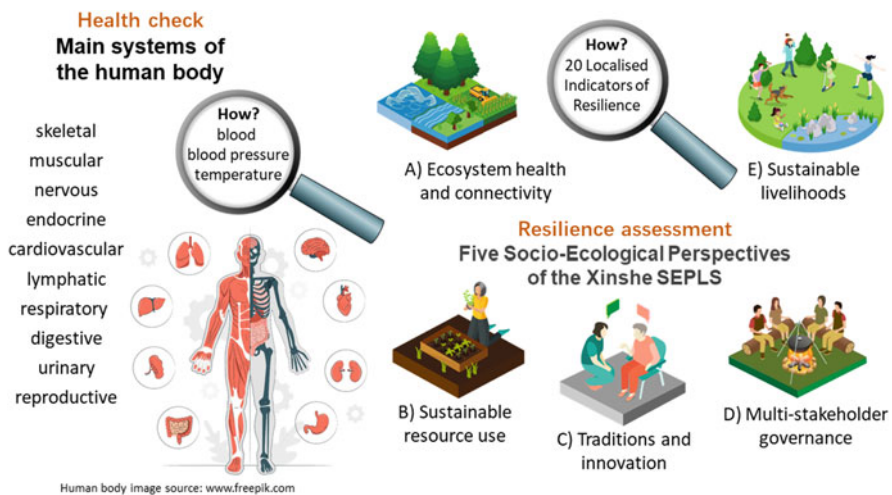


Fig. 4.4 Resilience assessment as the Xinshe SEPLS health check analogy (source: prepared by authors, with the human body image elements adapted from www.freepik.com (2021))

human body, a resilience assessment measures risks and resources within the Five Perspectives of a SEPLS with the help of the 20 Localised Indicators of Resilience as a measurement tool. We further emphasised that resembling the interconnectedness between the main systems in a human body, SEPLS elements also form a nexus pattern of their own. Thus, we encouraged participants in RAWs to be mindful of how risks and resources within one perspective could be linked to risks and resources within another.

3 Results and Discussion

3.1 Risks and Resources of the Xinshe SEPLS

Design of each perspective-related evaluation sheet (Appendix C) implied two types of assessment results: quantitative (scoring of indicators based on 1 star “very low” to 5 stars “very high” (Fig. 4.5)) and qualitative (discussion of risks and resources based on the participants’ scoring decisions and priority ranking of indicator-relevant local examples of specific action tasks (Fig. 4.6)).

In the following Sects. 3.1 and 3.2, we make a particular use of the qualitative assessment results to discuss the socio-economic and environmental risks and resources within each of the five perspectives (Fig. 4.6, upper part) and elicit the supporting elements for the Xinshe SEPLS well-being (Fig. 4.6, bottom part). In Sect. 3.3, we come back to Fig. 4.5 by showing how the scoring results for the 20 Localised Indicators guided the choice of ten thematic priority areas for the midterm action plan of the Xinshe Initiative.

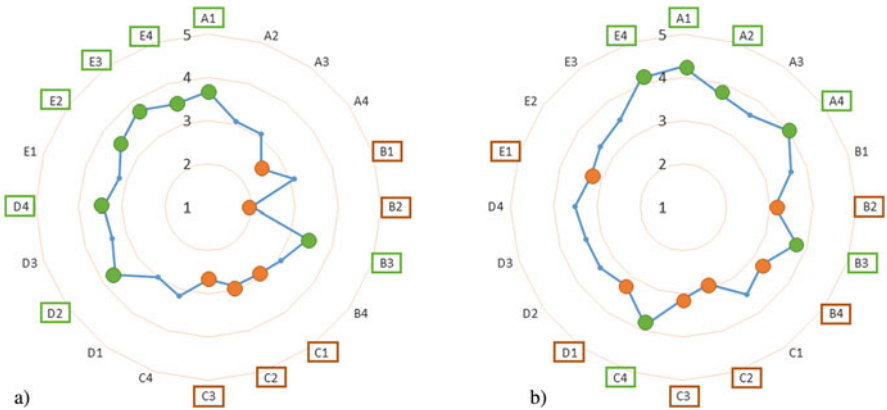


Fig. 4.5 Scoring results for 20 Localised Indicators of Resilience in the Xinshe SEPLS: (a) Fuxing tribe, (b) Xinshe tribe. Marked in green—indicators with (relatively) highest scores (3.42–4.25), in red—indicators with (relatively) lowest scores (2–2.85) (source: prepared by authors)



Fig. 4.6 The 5R of the Xinshe SEPLS well-being (source: prepared by authors)

Ecosystem Health and Connectivity

The “ridge-to-reef” natural environment of the Xinshe SEPLS is subject to a number of environmental and human-induced stressors. Heavy rains brought by seasonal monsoons (January–March and May–June) and typhoons (July–September) create a risk of floods and landslides (in the Fuxing area in particular). In the 1990s, in order

to minimise the risk of natural disasters to community livelihoods (Perspective E),² a series of dams were constructed on the Jialang River. Together with excavator dredging of the river basin, these engineering constructions have become a serious obstacle for the spawning migration of fish and shrimp (21 rare varieties).

To date, conventional agricultural practices (Perspective B) are among the main human-induced risks to Xinshe ecosystem health. Given the undoubtable convenience of synthetic fertilisers and herbicides, physical constraints of the aged population, and a lack of young labour force, promotion of eco-agricultural production in the Xinshe SEPLS is a complex task. High nutrient concentration rates (N and P) from fertiliser overuse (mainly in the Xinshe community) can adversely impact the quality of drinking and irrigation water, which in turn can put stress on the coral reef ecosystem downstream.

In addition to the socio-economic risks, the scenic beauty of the Xinshe landscape-seascape has become a strong attractor to a growing number of tourists driving along the Coastal Highway #11. In early to mid-2020, following the international travel restrictions imposed by the Chinese Taipei Government in response to COVID-19 (19 March 2020), domestic tourism rose substantially (Karimova & Lee, 2021). As a result, littering, trampling on the paddy fields, and noise pollution became common phenomena in the Xinshe SEPLS. The residents also expressed their concerns about the risks of landscape fragmentation and threats to eco-agricultural production caused by such recent “construction invasions” as utility poles, high-voltage streetlights, and solar panels.

Having listed the above threats to SEPLS ecosystem health, the Fuxing and Xinshe communities, however, noted the intrinsic diversity of SEPLS elements and their functions as an invaluable resource. To them, floral and faunal diversity of the surrounding forests, aquatic and biotic resources of the Jialang River, agro-biodiversity of eco-friendly farmlands, and marine resources of the Pacific coastal zone can provide a strong buffer to natural and man-made threats. Also, participants in RAWs highlighted the imperative role of SEPLS-wide promotion of eco-agriculture during the short-term phase of the Xinshe Initiative in fostering the “forest-river-village-ocean” connectivity across the SEPLS. In their opinion, positive changes are already visible.

Sustainable Resource Use

Discussion of sustainable resource use in the Xinshe SEPLS was focused on common natural resources (forest, river, and ocean) and agricultural farmlands.

Due to the legally protected status of the national forests, their risks seemed to be of the least concern. Meanwhile, both communities pointed out unsustainable fishing

²In many cases, a risk or a resource within one Perspective was closely correlated to a risk or a resource within another Perspective. We demonstrate these nexus relationships by listing other relevant Perspectives in parentheses (here: Perspective E).

practices, including overfishing and intrusions from outsiders, as the highest-ranking resource-related risk in the Xinshe SEPLS. Electric fishing in the Jialang River and the trawl nets of commercial vessels in the nearby Pacific coastal zone have made Fuxing and Xinshe residents not only concerned about the fish stocks and ecosystem health (Perspective A), but also question traditional land rights of the communities (Perspective D).

In addition to looming threats from conventional agriculture, eco-agricultural production in Xinshe SEPLS is at risk from disturbances caused by wildlife (Formosan macaques, wild boar, wild hare, and barking deer). In the Fuxing community, for instance, where wildlife can easily roam into the production farmlands, the farmers' crop diversity is substantially limited. They have given up on growing any sweet vegetables (sweet potato, corn, or beetroot) as those are particularly targeted by the wildlife. Moreover, disappearance of native plant and animal varieties is also a big concern especially in the face of an increased risk of alien species' encroachment.

A well-established community-based monitoring of local resources (forest patrol, river brigades, and coral reef check-up teams) was listed by the RAWs' participants as the most immediate counterweight to the resource-use risks in the SEPLS. The traditionally diverse and sustainable ecosystem-based production activities of the indigenous communities (farming, hunting, fishing, arts and crafts, weaving, and culinary art) were highlighted as well (Perspective C). Improvement of eco-agricultural farming practices with the help of extension services and training provided by government agencies (HDARES and HFDOFB) was noted to be a valuable resource to tackle risks in production farmlands.

Traditions and Innovation

Outmigration, ageing, lack of young people, and, as a result, limited human and temporal capacities for documentation and transfer of traditional culture and knowledge pose by far one of the biggest risks for the Xinshe SEPLS. Disappearance of the indigenous Amis and Kavalan languages and loss of knowledge and practical skills of the elders are greatly feared by the locals. Return of out-migrated local youth to their homeland was the main hope voiced by almost everyone throughout RAWs (in this context as well as for all other perspectives).

In the meanwhile, since the introduction of the Xinshe Initiative, the locals have gained more hope in the future of their traditions and culture. They noted, for example, the important role that the weaving of traditional and modern knowledge plays in addressing such SEPLS issues as pest and wildlife management, reintroduction of native species and local seed varieties, and improvement of planting technologies (Perspective B). Diversity of knowledge, skills, and

experiences of the elderly and youth, men and women, Kavalan, Amis, and Bunun³ indigenous community members within the SEPLS is also highly valued by the locals. Particularly worth noting is the influential role of the Xinshe Primary School—the only educational institution in the Xinshe Village—as the centre of cultural and community cohesion.

Though local resources for cultural documentation and transmission are rather limited, there is a growing interest from research and media communities attracted to the Xinshe SEPLS either by the uniqueness of its indigenous culture and its scenic beauty or by the Xinshe Initiative itself—Chinese Taipei’s one-of-a-kind multi-stakeholder initiative. Remarkably, this interest is both a risk and a resource for the SEPLS. On the one hand, if ethical considerations are not properly addressed, intellectual property rights to folklore and language resources end up lost to outsiders and the communities receive no benefit. On the other hand, it can be seen as an advantage: trained professionals can assist in documentation and promotion of traditional culture and knowledge as well as spur public interest and support towards the Xinshe SEPLS.

Multi-stakeholder Governance

In the Xinshe SEPLS, we view multi-stakeholder governance as a “double-layered” phenomenon, which includes the social capital of the Fuxing and Xinshe communities (the “inner layer”) and the cooperation of multiple stakeholders across the platform (the “outer layer”).

On the “inner layer”, RAWs’ participants have mentioned a limited participation of community members in SEPLS revitalisation activities (including the Xinshe multi-stakeholder platform itself) which stems from their unawareness, lack or interest, or distrust. Participation in community development projects (even those related to the Xinshe Initiative) is often at risk of benefit-sharing disputes within the communities. Also, despite the urge for young people to return to the SEPLS, they are often faced with the difficulties of cultural (language, local traditions, and customs), social (participation in local institutions), and economic (search for jobs) adaptation. This can lead to further misunderstandings and conflicts. In recent years, the threat of selling land and property to outsiders is a direct result of lack of prior communication among community members.

The “outer” layer of Xinshe multi-stakeholder governance is mainly at risk of water-related disputes between the Fuxing and Xinshe tribes related to the upstream-downstream management of the Jialang River’s water quantity and quality (Perspective B). Until now, most concerns have been addressed on a person-to-person rather than a community-to-community basis, while many participants from the Xinshe community voiced the need for the latter.

³The third, less populous, indigenous group in the Xinshe SEPLS.

One of the strongest social capital resources in the Fuxing and Xinshe tribes is *Mipaliw*—a traditional tribal co-working and cooperation mechanism of “neighbour helping neighbour”. The tribal age-grade system (in the Xinshe community) is another source of cohesion. Diversity of knowledge, skills, and experiences of community members within and outside of the SEPLS (including the youth residing in the cities) ensures a human resource pool.

Diversity of organisations within the communities (tribal councils, community development committees, indigenous language promotion centres, art workshops, etc.) and community projects supported by government agencies, private enterprises, and NGOs are resources for enhanced social inclusiveness, skill-building, and employment opportunities (Perspective E). Also, over the short-term years, the Xinshe multi-stakeholder platform has encouraged dialogue between young leaders from the Fuxing and Xinshe tribes and an enthusiastic collaboration across the platform on a number of SEPLS issues.

Sustainable Livelihoods

As mentioned in Perspective A, the proneness of the Xinshe SEPLS to natural disasters (typhoons, landslides, and floods) endangers community safety with a particular vulnerability of the elderly. Road conditions and traffic safety are also a matter of concern. Frequency of traffic accidents significantly increases during the rainy seasons due to the steep slippery road conditions in the Fuxing community, and during the holiday seasons on the busy Coastal Highway #11 passing through the Xinshe community.

Other livelihood risks are related to a lack of employment opportunities that prevents young people from returning to the SEPLS (Perspective D). A long-term pursuit of eco-agricultural production (Perspective B) as an income-generating activity may be hampered by marketing obstacles such as limited access to processing technology and equipment, as well as difficulties with organic and environmentally friendly certification, and a lack of marketing channels and skills.

A cross-generational adaptive capacity (past experiences of the local elders, Perspective C) to natural and socio-economic calamities is surely one of the most valuable livelihood resources in the SEPLS. Potential diversity of ecosystem-based income-generating activities (Perspective B) such as eco-agriculture, fishing, farming, eco- (marine) tourism, environmental interpretation, and arts and crafts can also generate a pool of employment opportunities. In the meanwhile, the good reputation of the Xinshe Primary School as one of Chinese Taipei’s exemplary rural schools creates a strong incentive for the young people and their families to return to the Xinshe SEPLS.

An already evident connectivity between eco-agricultural production and human (physical, mental, spiritual) and ecosystem health creates a strong stimulus for proceeding with environmentally friendly production activities. Also, a gradual emergence of community-based local product brands (rice, tea, and natural dye) and experimenting with various marketing channels (weekend markets, indigenous

product exhibitions, and online platforms)—especially at times of COVID-19—all contribute to fostering the marketing capacity of the Xinshe SEPLS.

3.2 *Resilience: Supporting Elements for the Xinshe SEPLS Well-Being*

With the risks and resources of the Xinshe SEPLS identified, we return to the 5R conceptual framework (Fig. 4.3) to take a closer look at the supporting elements of the see-saw structure of SEPLS well-being. Our analysis revealed three of them: diversity, connectivity, and adaptive capacity (Fig. 4.6, bottom).

Diversity is the basic supporting element. It represents diversity of all kinds and across all socio-economic and ecological risks and resources of the Xinshe SEPLS: of ecosystems and their functions (forest, freshwater, farmland, and marine), of wild and cultivated floral and faunal varieties (biodiversity, including agro-biodiversity), of soil micro- and macro-organisms (soil biodiversity), of resource use and production activities of the local people (farming, hunting, fishing, gathering, ecotourism, arts and crafts, and culinary art), of knowledge types (traditional and modern) and knowledge holders (the elderly and the young, men and women), of skills and expertise within and outside the SEPLS (including the youth residing in the cities), of capacity-building and partnership opportunities, of ecosystem-based income-generating activities, of diverse marketing channels (weekend markets, indigenous product exhibitions, and online marketing), and of past adaptation experiences and coping strategies (cross-generational adaptive knowledge).

Connectivity is the second supporting element that links the “many diversities” of SEPLS in a way that keeps them functional. Connectivity implies the nexus patterns *within* risks and resources (i.e. how occurrence of one risk may lead to another or how mobilisation of one resource may encourage mobilisation of another) and also *between* them (addressing risks with resources and the “spillover effect” on other risk-resource interactions). It ensures a reciprocal relationship and consideration of a “cause-effect” interdependence between all elements in the SEPLS in multiple dimensions: natural-to-natural (“ridge-to-reef”) (forest-river-farmlands (as an ecosystem)-ocean), human-to-human (within the settlements, between the settlements, and across the multi-stakeholder platform), and human-to-natural (all aspects of sustainable resource use). With connectivity in mind, for instance, the link between fertiliser overuse, coral reef bleaching, diminishing fish stocks, and restrained fish spawning migration becomes evident. This should naturally lead to more sustainable production methods such as a shift to eco-agriculture.

Adaptive capacity is the third supporting element of Xinshe SEPLS well-being. We see it as the ability to mobilise diverse socio-economic and ecological resources and connect them in the most suitable way in order to face socio-economic and ecological risks. Adaptive capacity is the dynamic element that propels the see-saw of Xinshe SEPLS well-being forward and enables it to change and grow over time

while maintaining its essential structure and functions. We note that along with diversity and connectivity, it is adaptive capacity that supports the resilience of the Xinshe SEPLS.

3.3 Adaptive Co-management for the Xinshe SEPLS Well-Being in the Midterm Phase (2021–2026)

Now we come back to the question asked by the multiple stakeholders in early 2020: *How can the midterm management of the Xinshe Initiative most effectively enhance Xinshe SEPLS well-being by 2026?* Answering this question was an essential part of the post-RAWs' analysis and planning process (Appendix B).

Indicators with the lowest scores (marked in red in Fig. 4.5) pointed out the aspects of SEPLS management that were of the highest concern to the local communities and required further improvement. These included B4 and D1—sustainable use and traditional rights in relation to common resources (river and ocean); B1, B2, and C3—self-sufficiency and appropriate technology in eco-agricultural production, and conservation and reintroduction of native species; C1 and C2—transfer and documentation of traditional ecological knowledge (TEK) and return of migrant youth; and E1 and E3—traffic safety, elderly-friendly infrastructure, and marketing capacity. Multi-stakeholder governance (Perspective D) was emphasised by almost all RAWs' participants as an important mechanism to maintain and enhance partnership for common objectives.

Thus, based on the scoring results (Fig. 4.5) and an in-depth discussion of environmental and socio-economic risks and resources in the Xinshe SEPLS (Fig. 4.6), we were able to outline ten thematic priority areas for the midterm phase of the Xinshe Initiative—two problem-oriented themes for each of the five perspectives (Fig. 4.7). To stipulate division of responsibilities among the multiple stakeholders in relation to the previously existing and newly emerged action tasks, we further combined the ten themes into the “4 + 2 + 1 Model” (three colours in Fig. 4.7: “4” red, “2” blue, and “1” green).

Four thematic areas in red colour (“4”) are to be guided by the four regional government agencies within the COA system (HDARES, HFDOFB, HBSWC, and EBAFA) with each agency being primarily responsible for one of the themes. These priority areas include protection and sustainable use of aquatic and biotic resources of the Jialang River system (HFDOFB), the entire Perspective B—promotion of eco-agriculture and reintroduction of native agricultural varieties (HDARES), building up marketing channels and skills (EBAFA), and disaster risk prevention and safe and eco-friendly infrastructure (HBSWC).

Two themes in blue colour (“2”) are the topics outside of the area of expertise of the COA and its subordinate agencies. They, therefore, require efforts from other relevant government agencies, NGOs, and/or private enterprises. One of the topics is related to protection and sustainable use of marine resources, where assistance from

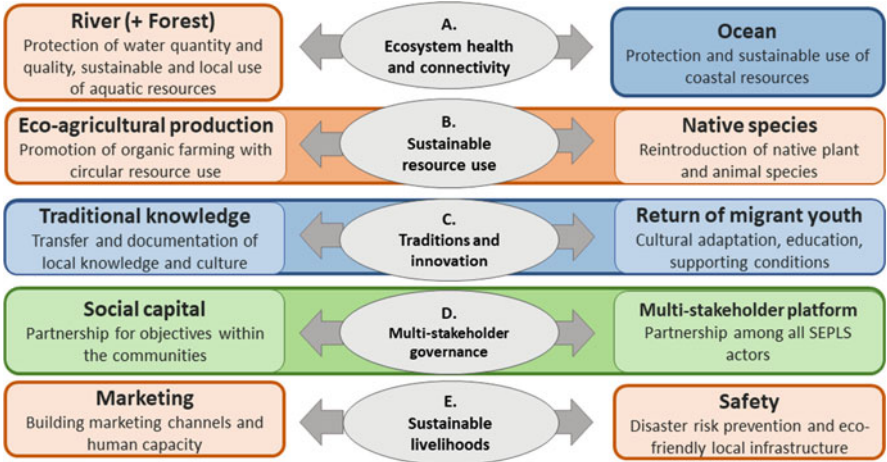


Fig. 4.7 The “4 + 2 + 1 Model” and ten thematic priority areas for midterm adaptive co-management in the Xinshe SEPLS (source: prepared by authors)

Hualien County Government, Taiwan Fisheries Research Institute, and ecological NGOs would be particularly valuable. The other is focused fully on Perspective C: the documentation and transfer of TEK and the return of migrant youth to the Xinshe SEPLS. Potentially, a number of government projects (by HFDOFB, HBSWC, and Taiwan Council of Indigenous People) could support the Fuxing and Xinshe communities and the Xinshe Primary School in addressing this theme.

The green box (“1”) is comprised of the “inner” and “outer” layers of Xinshe multi-stakeholder governance. It is a cooperation and partnership mechanism of the midterm phase that can enable realisation of the “4 + 2” themes by the means of enhanced social capital within the communities and cooperation across the multi-stakeholder platform for the Xinshe Initiative.

Importantly, the interconnectedness of risks and resources within and between the Five Perspectives of the Xinshe SEPLS (see Sect. 3.1) is evident in the nexus patterns between the ten thematic priority areas of the “4 + 2 + 1 Model” as well. For instance, promotion of eco-agriculture and reintroduction of native agricultural varieties (B) will largely depend on the inclusion of TEK (C). In turn, eco-agricultural benefits are likely to have a far-reaching effect not only on ecosystem health (the Jialang River water quality upstream and downstream, restored coral reef ecosystem of the Pacific coast (A)) but also on human physical and mental health (E). Good environment and availability of income-generating opportunities (E) created by eco-agricultural production (B) can act as a strong incentive for the migrant youth to return to the Xinshe SEPLS (C). Diversity of skills, knowledge, and backgrounds of local and newly returned community members can enhance social capital (D) and provide new solutions to some urgent issues (e.g. open up a variety of marketing channels (E)).

Adaptive by design and in pursuit of Xinshe SEPLS well-being, the midterm action plan for the Xinshe Initiative (Appendix D) recommends the “4 + 2 + 1 Model” and ten thematic priority areas to remain at focus throughout the entire midterm phase (up to 2026). The action plan also provides a checklist of 44 specific action tasks—the bottom-up concerns and suggestions of the 2020 RAWs’ participants. The checklist is meant to serve as a helpful action guidance to all multiple stakeholders during the 3-year (2021–2023) period and is to be adjusted at the end of each year. A comprehensive reassessment of the action tasks is scheduled to be performed in “evaluation-adjustment” follow-up RAWs in 2023.

4 Lessons Learned and Conclusions

Stretching from ridge to reef, both a landscape and a seascape, blessed with natural beauty and the wisdom of its indigenous inhabitants, the Xinshe SEPLS is truly a gem of Chinese Taipei’s east coast. Well known across the island as an attractive tourist destination, in recent years, Xinshe has been gaining increasing attention for its revitalisation efforts inspired by the Satoyama Initiative. The Xinshe Initiative and its multi-stakeholder platform have already become a knowledge-sharing base for *Satoyama* practitioners across Chinese Taipei. The findings presented in this study add to this experience exchange from the perspective of SEPLS well-being.

Since 2016, promotion of eco-agriculture has played a major role in *enhancing various aspects of human health*: physical (green and nutritious produce from clean soil and water, reduced proneness to seasonal diseases, enhanced self-sufficiency at times of COVID-19), psychological and mental health (sense of place, sense of unity with natural surroundings), cultural and spiritual health (revival of TEK such as shaman rituals, harvest, and ocean festivals), and community health (cohesion, sense of comradeship, and return of migrant youth).

A number of *synergies and trade-offs* have also been observed. For example, 4 years (2016–2020) of eco-agricultural practices on land have already led to the improved health of the coral reef ecosystem (more fish, more coral diversity, and less coral bleaching)—a type of landscape-seascape “ridge-to-reef” synergy. On the other hand, the midterm management should be particularly mindful of the socio-economic trade-offs in Xinshe SEPLS dynamics. For instance, the much-anticipated return of the migrant youth (an actively ongoing process during COVID-19) can have a positive effect on the diversity of community organisations and projects but can also result in adaptation difficulties, conflicting objectives, and profit-sharing disputes between old and new community members.

We found the 20 Localised Indicators of Resilience to be a useful tool in *measuring the effectiveness of Xinshe SEPLS management*. By being comprehensive, they addressed a wide spectrum of socio-economic and environmental risks and resources in the SEPLS. Likewise, they were *relevant* and thereby enabled alignment of short-term and midterm action plans through concrete on-the-ground examples relevant to the Xinshe SEPLS. Finally, being comprehensible, they employed the

“health check” and “SEPLS well-being” concepts as helpful terms to communicate the monitoring and evaluation processes to all multiple stakeholders.

The *challenges* that the Xinshe Initiative would need to address in the upcoming years include keeping up the momentum and ensuring the long-term engagement of all multiple stakeholders, staying flexible in the face of uncertainties (such as COVID-19), and communicating the values of the Xinshe Initiative to newly returned migrant youth and outsiders (e.g. avoiding the use of pesticides and herbicides, adopting eco-friendly waste management habits, learning to work with the government agencies).

The *opportunities* largely stem from the solution-oriented, positive-thinking approach of the local people and other stakeholders. Ways forward include conducting follow-up RAWs (in 2023) to observe the emergence of new synergy patterns and to readjust the action tasks; engagement of new stakeholders from outside of the COA system (e.g. Taiwan Fisheries Research Institute, Hualien County Government, Hualien Tourism Department, Fengbin Township Office) to address the newly emerged risks and resources; and building upon the social capital within and the partnership between the Fuxing and Xinshe communities (e.g. fostering the Jialang River dialogue).

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Appendix A

A set of 20 localised indicators of resilience in Xinshe SEPLS (*translated from the Chinese language*)

Five perspectives of the Satoyama Initiative	Localised indicators of resilience in Xinshe SEPLS ^a
A. Ecosystem health and connectivity	A1. Diversity and multifunctionality of Xinshe SEPLS elements
	A2. Connectivity between Xinshe SEPLS elements
	A3. Xinshe SEPLS recovery and regeneration from natural hazards
	A4. Xinshe SEPLS protection and restoration from socio-economic threats
B. Sustainable resource use	B1. Diversity and consumption of locally grown food
	B2. Conservation and breeding of local crops and native species
	B3. Environmentally friendly farming practices with a circular resource use
	B4. Sustainable use of common resources (forest, river, and ocean)

(continued)

Five perspectives of the Satoyama Initiative	Localised indicators of resilience in Xinshe SEPLS ^a
C. Traditions and innovation	C1. Transfer of traditional ecological knowledge (TEK)
	C2. Documentation of traditional ecological knowledge (TEK)
	C3. Innovations and appropriate technology for agriculture and conservation
	C4. Recognition and respect for traditional ecological knowledge (TEK) of men and women
D. Multi-stakeholder governance	D1. Rights in relation to the management of Xinshe SEPLS natural resources
	D2. Multi-stakeholder governance mechanism in Xinshe SEPLS
	D3. Social capital of Fuxing/Xinshe communities
	D4. Community participation and benefit sharing in Fuxing/Xinshe communities
E. Sustainable livelihoods	E1. Local infrastructure
	E2. Human health and environmental conditions
	E3. Xinshe SEPLS ecosystem-based income diversity and marketing ability
	E4. Community spatial and temporal resource-use adaptive capacity

^a*Comprehensive*: the “explanation-evaluation-discussion” model of conducting RAWs encouraged the participants to think of both risks and resources within each of the five perspectives; *Relevant*: local examples from the short-term action plan and the locals’ insights from semi-structured interviews were added under each Localised Indicator; *Comprehensible*: pictorial explanation and clarifying question(s) were added under each indicator (see Appendix C for more details)

Appendix B

Three stages of the 2020 Resilience Assessment Workshops (RAWs) process

RAWs stage	Time	Description of activities
Pre-RAWs	April–June 2020	<ul style="list-style-type: none"> Analysis of short-term action plan (2016–2019) of Xinshe Eco-Agriculture Initiative against the original set of 20 Indicators of Resilience in SEPLS (Bergamini et al., 2014) and development of first draft of 20 Localised Indicators of Resilience (the Localised Indicators) in Xinshe SEPLS (Sun et al., 2020) Preparatory workshop with regional government agency members of multi-stakeholder platform (HDARES, HFDOFB, HBSWC, and EBAFA): matching action tasks of short-term action plan against first draft, collective development of second draft of localised indicators 14 one-on-one semi-structured interviews with local residents from Fuxing and Xinshe tribes: test running and editing of second draft on “comprehensive-relevant-comprehensible” basis





(continued)

RAWs stage	Time	Description of activities
		<ul style="list-style-type: none"> Completion of third (final) draft of localised indicators based on the analysis of previous steps
Result: A finalised set of 20 localised indicators of resilience in the Xinshe SEPLS		
Core RAWs	June–September 2020	<ul style="list-style-type: none"> 5 + 1 community-based consecutive RAWs in Fuxing and Xinshe communities (12 RAWs in total): five (5) workshops in each community were RAWs based on the five perspectives (one for each perspective), one (1) was a summary workshop in each community for discussion of assessment results Set of 20 localised indicators and perspective-related evaluation sheets (five in total) used during all five RAWs (see Appendix C) Same group of participants from each tribe completed RAWs: 12 community members from Fuxing tribe and 8 from Xinshe tribe Procedure of each RAW based on “explanation-scoring-discussion” model (Lee et al., 2020) with a particular emphasis on risks and resources within each perspective Follow-up analysis carried out upon completion of each RAW and reported at the beginning of the following RAW in order to collect additional suggestions and opinions from community members
Result: A community-based perception of risks and resources in the Xinshe SEPLS		
Post-RAWs	September–December 2020	<ul style="list-style-type: none"> Drafting of first version of midterm action plan (2021–2026) for the Xinshe initiative based on RAWs’ results Preparatory workshop with regional government agency members of multi-stakeholder platform (HDARES, HFDOFB, HBSWC, and EBAFA): communication of results of RAWs, division of responsibilities for action tasks in first draft of midterm action plan Joint workshop open to all community members from Fuxing and Xinshe tribes with invited heads of the regional government agency members of the multi-stakeholder platform (HDARES, HFDOFB, HBSWC, and EBAFA), Xinshe Primary School (local school), and Fengbin Township Office (local government): communicating results of RAWs with a special emphasis on risks and resources of Xinshe SEPLS, collective development of second draft of midterm action plan via a Q&A session between local community members and government officials Two task force meetings and a semi-annual multi-stakeholder platform meeting: adding final edits to the division of responsibilities for action tasks and adoption of third (final) version of midterm action plan
Result: A bottom-up midterm action plan (2021–2026) for the Xinshe “Forest-River-Village-Ocean” Eco-Agriculture Initiative		

Appendix C

Sample of the Resilience Assessment Workshops (RAWs) Evaluation Sheet, Perspective A (*Translated from the Chinese Language*) (Source: Prepared by Authors)

Participant's name: _____

<i>Localised Indicators</i>	A1. Diversity and multifunctionality of the Xinshe SEPLS elements	A2. Connectivity between the Xinshe SEPLS elements	A3. The Xinshe SEPLS recovery and regeneration from natural hazards	A4. The Xinshe SEPLS protection and restoration from man-made (socio-economic) threats
<i>Explanatory pictures</i>				
<i>Evaluation questions</i>	Does the Xinshe SEPLS contain diverse natural and man-made ecosystem elements? Are these elements healthy and well functioning?	Are the forest, river, farmlands, and ocean well connected? Are there any constraints to the Xinshe SEPLS connectivity?	Does the Xinshe SEPLS recover and regenerate quickly from natural hazards?	Does the Xinshe SEPLS possess effective protection and restoration measures from man-made (socio-economic) threats?
<i>Scores</i>	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆	☆☆☆☆☆☆
<i>Relevant action tasks of the Xinshe initiative</i>	A1. Investigate and enhance diversity and multifunctionality of the Xinshe SEPLS elements	A2. Investigate and enhance connectivity between the Xinshe SEPLS elements	A3. Assess the susceptibility of the Xinshe SEPLS to natural hazards and enhance its recovery and regeneration capacity	A4. Protect and restore the Xinshe SEPLS from man-made (socio-economic) threats
<i>Indicator-relevant local examples of specific action tasks (please score in order of priority)</i>	<input type="checkbox"/> Conduct regular biodiversity checks and share results with the local people <input type="checkbox"/> Improve protection of water quality and quantity of the Jialang River <input type="checkbox"/> Enhance man-made landscape diversity	<input type="checkbox"/> Investigate and communicate the role of eco-agriculture for the SEPLS health and forest-river-village-ocean connectivity (e.g. via coral reef checks and wetland buffer zone construction)	<input type="checkbox"/> Improve monitoring and disaster response to coastal erosion (including eco-friendly engineering projects) <input type="checkbox"/> Strengthen forest and stream (the Jialang River) patrol to monitor the risks	<input type="checkbox"/> Develop community-based river protection mechanism to prevent non-locals from fishing in the Jialang River <input type="checkbox"/> Prevent “construction invasions” that negatively impact local

(continued)

<i>Localised Indicators</i>	A1. Diversity and multifunctionality of the Xinshe SEPLS elements	A2. Connectivity between the Xinshe SEPLS elements	A3. The Xinshe SEPLS recovery and regeneration from natural hazards	A4. The Xinshe SEPLS protection and restoration from man-made (socio-economic) threats
	(e.g. home gardens, rice paddies, green buffers, hedgerow plants) <input type="checkbox"/> Learn about the Xinshe SEPLS values from tribal history and culture (e.g. farming, fishing, hunting, gathering, arts and crafts) and apply them to everyday life	<input type="checkbox"/> Improve protection of water quality and quantity of the Jialang River <input type="checkbox"/> Carry out eco-friendly restoration projects (e.g. terraced irrigation, drainage systems and ponds, repairing terraces, dams, and agricultural roads) <input type="checkbox"/> Conduct reforestation and restoration of degraded forest land <input type="checkbox"/> Develop measures to recover the spawning migration of fish and shrimp	of erosion, landslides, and floods <input type="checkbox"/> Set up a “crisis team” in response to typhoons <input type="checkbox"/> Remove weeds that obstruct the water flow of the Jialang River (flood prevention) <input type="checkbox"/> Develop affordable and maintainable methods to deal with crop-raiding species (e.g. Formosan macaques, wild boar, wild hare, and barking deer) <input type="checkbox"/> Prevent and control invasive animal and plant species (e.g. <i>Mikania micrantha</i>)	ecology/scenery (e.g. utility poles, high-voltage street-lights, and solar panels) <input type="checkbox"/> Educate the local farmers to abstain from the use of pesticides and herbicides <input type="checkbox"/> Strengthen tourist environmental education to prevent destructive behaviour (e.g. littering, trampling, use of DEET mosquito sprays, and SPF lotions) <input type="checkbox"/> Strengthen environmental protection awareness of the local residents (e.g. household waste sorting, prohibiting burning of garbage, reducing single-use plastic) <input type="checkbox"/> Prevent destructive fishing methods (e.g. trawling, drift nets) <input type="checkbox"/> Strengthen forest patrol to prevent illegal logging

Appendix D

The midterm action plan for the Xinshe “Forest-River-Village-Ocean” Eco-Agriculture Initiative (*translated from the Chinese language*) (source: prepared by authors)

Five Action Perspectives	10 Thematic priority areas (2021-2026)	Checklist of 44 specific action tasks (2021-2023) (to be adjusted at the end of each year, to be re-assessed by the follow-up RAWs in 2023)	Division of responsibilities between the multiple stakeholders (★ leading role; ✓ supporting role)													
			Amis Tribe	Fuxing	Kavalan Tribe	Xinshe Primary School	Fengbin Township Office	Hualien County Government	HDARES	HFDOFB	HBSWC	EBAFA	Irrigation Agency	NDHU	Hualien Tourism Department	Other
A: Protect health and connectivity of the Xinshe SEPLS	“River”: Protect the Jialang River resources and set up a community-based river protection mechanism	➢ Maintain drinking and irrigation water quality (including sewage discharge management) and quantity (adequate supply of drinking water for each household), protect the Jialang River's water source	★		★				✓							
		➢ Improve the spawning migration passage for fish and shrimp ("river-sea" connectivity)	✓		✓						★					
		➢ Sustainably use local fish and shrimp resources, set up a community-based river protection mechanism and erect notice boards	★		★		✓									
		➢ Organise de-weeding of the riverbed when needed based on consensus between the local residents (preferably no dredging)	★		★	✓					★					
		➢ Strengthen local residents' knowledge about river protection laws, regulations and competent authorities	★		★	★				✓				✓		
		➢ Monitor coastal erosion, consider eco-friendly coastal engineering projects	✓		✓											
		➢ Prevent destructive fishing or collection methods	★		★						★					
		➢ Strengthen community-based sustainable use of marine resources in traditional territories	★		★											
		➢ Monitor the health of marine ecosystem (including coral reef and fish checks)	★		★											
		➢ Strengthen local residents' knowledge about ocean protection laws, regulations and competent authorities	★		★	★									✓	
B: Sustainably use natural resources of the	“Eco-agricultural production”: promote organic, environmental techniques	➢ Promote expansion of organically-farmed zones, assist farmers with installation of small processing units (upon request)	★		★				✓					★		
		➢ Provide extension and training services on organic, environmentally-friendly and circular farming techniques	★		★					★					✓	

[illegible]

HDARES Hualien District Agricultural Research and Extension Station, *HFDOFB* Hualien Forest District Office, *HBSWC* Hualien Branch of Soil and Water Conservation Bureau, *EBAFA* Eastern Region Branch of Agriculture and Food Agency, *NDHU* National Dong Hwa University, *RAWs* resilience assessment workshops, *SEPLS* socio-ecological production landscape and seascape, *TEK* traditional ecological knowledge

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