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Resilience Assessment Workshops: A Biocultural Approach to Conservation Management of a Rural Landscape in Taiwan

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Abstract: Local and indigenous communities play a crucial role in stewardship of biodiversity worldwide. Assessment of resilience in socio-ecological production landscapes and seascapes (SEPLS) is an essential prerequisite for sustainable human–nature interactions in the area. This work examines application of resilience assessment workshops (RAWs) as a biocultural approach to conservation management in Xinshe SEPLS, Hualien County, Taiwan. RAWs were conducted in 2017–2018 in two indigenous communities—Amis Fuxing Dipit Tribe and Kavalan Xinshe Paterongan Tribe—as a part of an ongoing multi-stakeholder platform for the "Forest–River–Village–Sea Ecoagriculture Initiative" (the Initiative). Objectives of the study include (1) performing a baseline landscape resilience assessment in two communities and identifying their common and varying concerns and priorities, and (2) eliciting a community-driven vision for enhancement of the landscape resilience based on adjustments to the action plan of the Initiative. Assessment methodology employs 20 indicators of resilience in SEPLS jointly developed by the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) and Biodiversity International; an "Explain–Score–Discuss–Suggest" model is applied. Results show that the communities' primary issues of concern and adjustments to the action plan are related to biodiversity-based livelihoods, transfer of traditional knowledge, and sustainable use of common resources. The study concludes that this approach has a high potential to help facilitate nature-based solutions for human well-being and biodiversity benefits in Xinshe SEPLS.

Keywords: resilience assessment workshops; socio-ecological production landscapes and seascapes (SEPLS); biocultural approach; participatory monitoring and evaluation; nature-based solutions

1. Introduction

Global environmental changes largely caused by past and present socio-economic activities make future development scenarios highly uncertain and unpredictable [1]. As a system's ability to withstand disturbances and changes and maintain its basic functions [2], in recent years, resilience gained significant attention among scholars and practitioners [3]. Non-linear and dynamic social–ecological systems, or coupled, complex, and evolving human and natural systems [4] shape resilience discourse. In any social–ecological system, resilience is defined by retaining the same controls on function and structure of a system, its capability of self-organization, and its capacity for learning and adaptation [5,6]. However, there are smaller systems, including local and indigenous communities, which experience perturbations with the greatest severity and are the most vulnerable in the face of adversity [7].

It is hard to overestimate the importance of local resilience when 70% of global food production takes place on small farms [8], and stewardship of biodiversity in land-based and marine environments

is the most effective "in areas held or managed by indigenous peoples and local communities" [9]. There are many socio-ecological production landscapes and seascapes (SEPLS) around the world that were shaped through sustainable human–nature interactions favorable both to human well-being and to maintenance of biodiversity and ecosystem services [10]. The need for protection and revitalization of SEPLS was proposed by the Satoyama Initiative launched by the Ministry of the Environment, Japan and the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS) in 2010 [11]. The overarching goal of the Satoyama Initiative is in line with that of nature-based solutions under the International Union for Conservation of Nature (IUCN) [12,13], while conservation and restoration of ecosystems and focus on socio-cultural challenges occur at a rural landscape scale. The efforts of the Satoyama Initiative are growing in their significance as traditionally high levels of resilience in SEPLS are being severely undermined by the current land-use pressures, urbanization, globalization, and climate change [14]. Timely and comprehensive assessment of SEPLS resilience is crucial for reversing this downward trend [15].

There is no shortage of resilience measurement frameworks and assessment tools. Lisa et al. [3] distinguished at least 17 such frameworks addressing disaster [16], climate [17], coastal [18], community-based [19], and other types of resilience. As many as 36 community resilience assessment tools were identified and compared by Sharifi [20]. Both quantitative and qualitative, as well as subjective and objective, approaches to measuring resilience are present in the literature [21,22]. Although not within the scope of our study, we mention this existing diversity of resilience frameworks and tools to show how they reflect the variety of contexts, indicators, and beneficiaries from the assessments.

Resilience in SEPLS is referred to as a landscape's ability "to absorb or recover—in terms of both ecosystem processes and socio-economic activity—from various disturbances and pressures without lasting damage" [15]. For such coupled human and natural systems with complex patterns and processes [23] as SEPLS, consideration of both ecological and socio-cultural elements is paramount. Sterling et al. [24] argued that inherent complex resilience challenges may be addressed by biocultural approaches as "those that explicitly start with and build on place-based cultural perspectives (values, knowledge, and needs) and recognize feedbacks between ecological state and human well-being".

Biocultural approaches are often looked at as a way of integrating human well-being in conservation efforts by moving beyond co-management, community-based conservation or integrated conservation and development projects [25,26] and focusing on locally applicable [27], pluralistic, dynamic, and partnership-based [28] indicators. Although principles of biocultural approaches [25] per se are not specifically stipulated in eight principles of nature-based solutions [13], the two clearly share many similarities. Multiplicity of objectives and solutions for maintaining biological and cultural diversity, site-specific and grounded contexts, adaptive and dynamic nature of the systems, fairness and partnership-based approach, role of supportive institutional frameworks, and inclusion of different worldviews and knowledge systems [12,13,24,26,28] characterize both biocultural approaches and nature-based solutions in their vision of conservation management and socio-ecological resilience.

Clearly, assessment of resilience in SEPLS needs to account for their coupled, dynamic, and multifaceted nature by using a variety of bio-ecological, socio-economic, and cultural indicators [24]. Thus, a set of 20 indicators of resilience in SEPLS (the Indicators) was developed by Biodiversity International and UNU-IAS as a multiple-method approach to evaluate resilience in SEPLS around the world [15]. Reflective of the five key perspectives in the three-fold approach to the Satoyama Initiative [11], the Indicators are divided into five categories: landscape/seascape diversity and ecosystem protection, biodiversity (including agricultural biodiversity), knowledge and innovation, governance and social equity, and livelihoods and well-being [8] (Figure 1). Depending on the purpose of their employment, the Indicators are designed to benefit local communities, non-governmental organizations (NGOs), and development agencies, policymakers, project planners, and researchers [8]. Within five years of their introduction in 2014, the Indicators were used in more than 40 countries [29], including their initial application to an indigenous rice paddy cultural landscape in Taiwan in 2015 [30].

This study examines an application of resilience assessment workshops (RAWs) based on the Indicators as a biocultural approach for enhancing conservation management in Xinshe SEPLS, Hualien County, Taiwan. Xinshe Village is home to two indigenous communities of Amis Fuxing Dipit Tribe and Kavalan Xinshe Paterongan Tribe, located alongside one watershed of the Jialang River. In October 2016 a "Forest–River–Village–Sea Ecoagriculture Initiative" (the Initiative) was established in Xinshe SEPLS as a multi-stakeholder platform aimed at assisting the communities with revitalization of their landscape. An action plan in line with the five key perspectives of the Satoyama Initiative was jointly developed and enacted by the stakeholders in March 2017 [31]. Later, the five categories were used as a cross-referencing basis for assessing resilience in Xinshe SEPLS and making adjustments to the action plan.

There are two main objectives of this study as follows:

(1) To conduct a baseline assessment of the landscape resilience in the two communities, and identify their common and varying concerns and priorities;

(2) To elicit a community-driven vision for enhancement of the landscape resilience based on the communities' adjustments to the action plan.

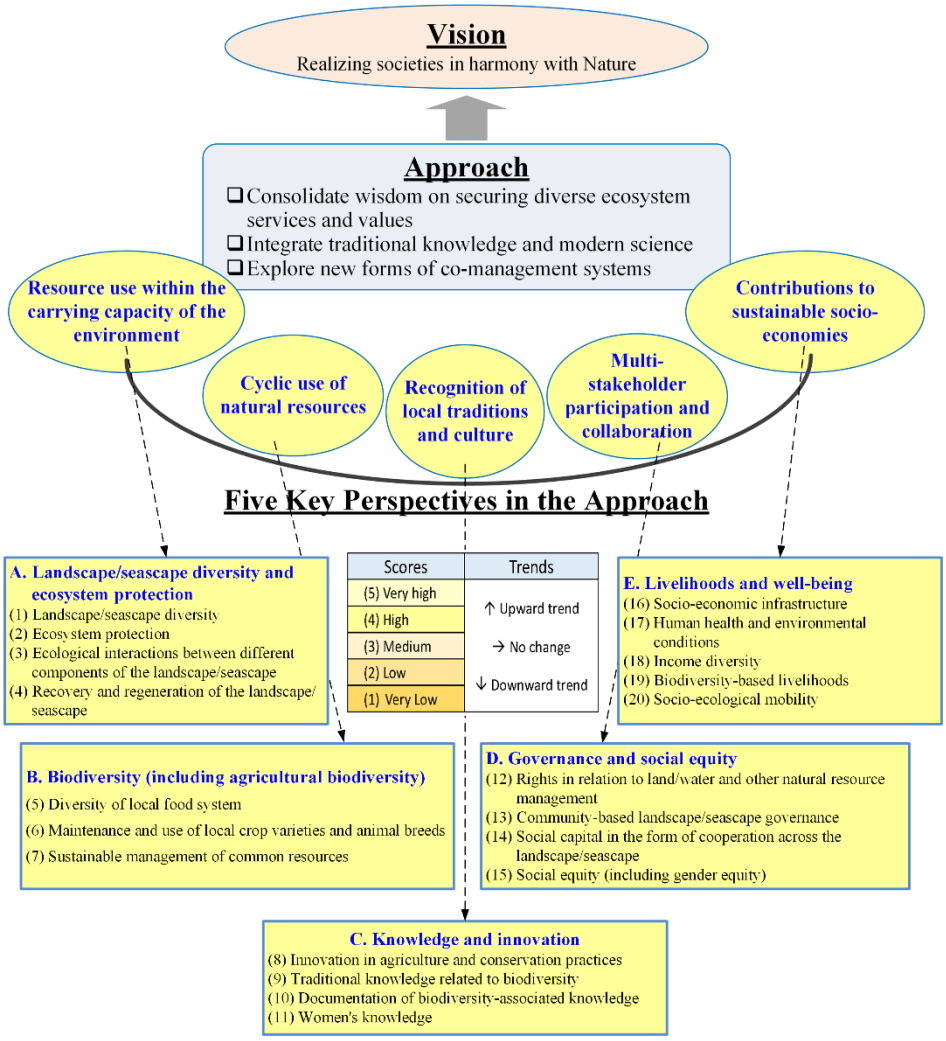

Figure 1. Connections between the three-fold approach to the Satoyama Initiative and the 20 indicators of resilience in socio-ecological production landscapes and seascapes (SEPLS) (based on [8,30,32,33]).

Significance of this work stems from its on-the-ground, participatory, practical contribution to the assessment of resilience in a given landscape, and its original approach to a global experience with the

Indicators. There are two novelty features distinctive of this study. Firstly, RAWs were conducted in two ethnically and culturally different indigenous communities located in one temporal and spatial locality with similar socio-economic and environmental pressures. Secondly, the Indicators were applied to an ongoing multi-stakeholder initiative for improvement of an already existing action plan. In other words, in the case of Xinshe SEPLS, RAWs were tested as a biocultural approach to nature-based solutions for enhancing adaptive governance and stimulating a cross-landscape connectivity in the area.

2. Materials and Methods

2.1. Case Study Area

Xinshe SEPLS is formed by two indigenous settlements situated in the upper (Fuxing tribe) and lower (Xinshe tribe) reaches of one watershed in Xinshe Village, Fengbin Township, Hualien County, Taiwan. It covers an area of about 600 hectares with its western border formed by the national forests of the coastal mountain range and the eastern one formed by the Pacific Ocean (Figure 2). Both Fuxing (77 registered and about 30 permanent residents) and Xinshe (366 registered and about 200 permanent residents) [34] are primarily farming settlements (rice paddies, dry crops, and gardening) with other versatile land-use practices such as hunting, fishing, and gathering of wild edible plants. Despite different ethnic, cultural, and historic backgrounds, the livelihoods of both settlements are closely linked by the Jialang River all the way from its source in the national forests, through farming lands of both settlements, and to its mouth where it debouches into the Pacific Ocean. Naturally, this creates a "Forest–River–Village–Sea" connectivity of Xinshe SEPLS.

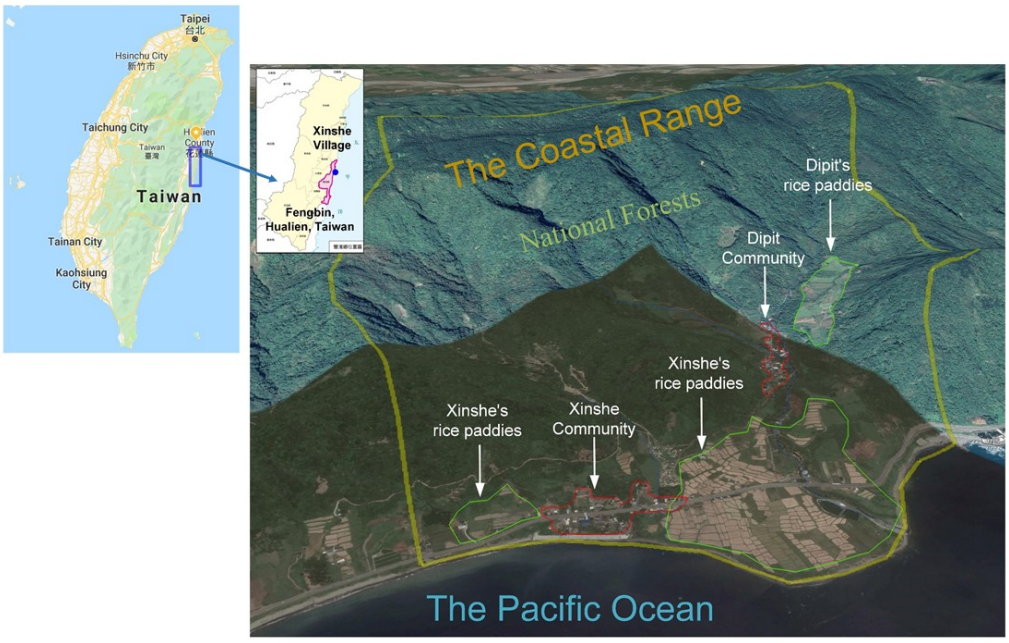

Figure 2. Case study area: Xinshe Village, Fengbin Township, Hualien County, Taiwan.

Over the recent decades, two communities came to face similar socio-economic and environmental problems. Rapid economic growth and industrial development in the 1970s brought the issues of depopulation, aging, decline of local economies, and loss of traditional ethics and culture [35] to both Fuxing and Xinshe tribes. Excessive use of chemical fertilizers, pesticides, and herbicides, reduced collection of firewood, and overfishing resulted in deterioration of production landscape and a significant biodiversity loss in Xinshe SEPLS [31]. Despite the presence of common threats, however, a persistent lack of communication and resource use tensions between the two settlements framed additional obstacles for revitalization of the landscape.

2.2. Rationale of Resilience Assessment Workshops (RAWs)

A multi-stakeholder platform (the Platform) for the "Forest–River–Village–Sea Ecoagriculture Initiative" (the Initiative) launched in October 2016 was aimed at, on the one hand, initiating a dialogue between Fuxing and Xinshe tribes and, on the other hand, promoting coherence in the efforts of four regional government agencies all subordinate to the Council of Agriculture (Eastern Region Branch, Agriculture and Food Agency (EBAFA, which became a regular participant of the Platform meetings in 2019), Hualien Branch, Soil and Water Conservation Bureau (HBSWC), Hualien District Agricultural Research and Extension Station (HDARES), and Hualien Forest District Office, Forestry Bureau (HFDOFB)) but separately engaged in the area. Restoring connectivity of Xinshe landscape and fostering a harmonious relationship between the communities and their surrounding environment were set as the main goals of the Initiative.

Since March 2017, operation of the Platform was based on the jointly drafted action plan (Appendix A, Table A1), which included 38 tasks grouped into five major categories of work, such as landscape/seascape diversity (A), agro-biodiversity (B), traditional knowledge and values (C), multi-stakeholder collaboration (D), and socio-economic benefits (E). Bimonthly task force meetings and biannual Platform meetings, facilitated by National Dong Hwa University (NDHU; the research team), were designed to advance implementation of the action plan (for detailed information on institutionalization of the Platform, see Reference [31]).

By mid-2017, an active multi-stakeholder engagement ensured a stable operation of the Platform. However, this early phase of the Initiative's development also revealed some blind spots. Firstly, stakeholders agreed that there was a limited knowledge of how the current state of resilience in Xinshe SEPLS was perceived by the local people from Fuxing and Xinshe tribes. Secondly, as the meetings were usually attended by only one representative from each of the communities, it was unclear what the overall level of Initiative-related awareness was within the tribes and what the local people's suggestions and opinions toward the action plan were. Lastly, given the need to reestablish the connectivity of Xinshe SEPLS with the two communities at its core, it was imperative to examine similarities and differences in their priorities, inform all of the multiple stakeholders, and determine future focus areas of the Platform's operations.

Conducting RAWs based on the 20 indicators of resilience in SEPLS [8] was viewed as a helpful means to yield answers to the above queries. The choice of this particular tool for a baseline assessment of the landscape resilience in Xinshe SEPLS was justified by its close correlation with the design of the action plan for the Initiative. Specifically, five groups of the indicators were representative of five key perspectives in the action plan. Previous studies on community-based resilience assessments in Turkey, Namibia, Fiji [8], Uganda, and Tanzania [36] were helpful for understanding a methodological approach and procedural steps in application of the Indicators. However, at the time, neither of the reviewed studies applied the Indicators to ongoing on-the-ground initiatives or used the Indicators for adjustments of already existing action plans. This fact partially constituted a methodological challenge for the research team, but at the same time allowed for an innovative approach in combining resilience assessment and enhancement of adaptive governance in SEPLS. Moreover, despite a widely acknowledged challenge of putting the assessment data into further practice [37], this study managed to operationalize the RAWs procedure for the ensuing action planning under the Initiative.

2.3. Methodology and Data Collection

Resilience assessment procedures were consulted with the "Toolkit for the Indicators of Resilience in SEPLS" [8] and included preparation, workshops, and follow-up stages (Figure 3). In the meanwhile, specific contents within each stage were adjusted to the local characteristics of Xinshe SEPLS.

During the preparation stage, all 20 indicators were translated directly from their original English version into the Mandarin Chinese language. Although no context-specific edits were deemed necessary for the written translation of the Indicators, the research team made sure that each of the indicators was clearly understood by the local people with the help of explicit explanations in the beginning of every

workshop session (workshops stage). As a part of the preparation procedures, workshop participants were phoned in advance, and convenient dates, times, and locations were set. Key community representatives to the Platform often assisted the research team with this task by making pre-workshop reminder calls two or three days and sometimes a few hours prior to a workshop session.

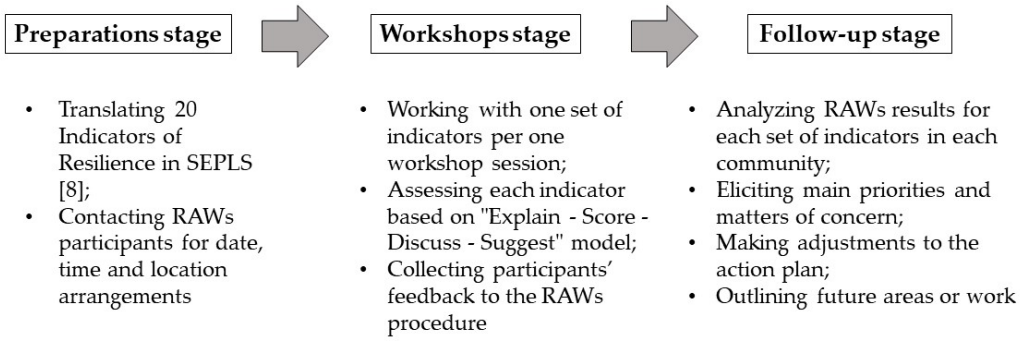

Figure 3. Procedural flowchart for conducting resilience assessment workshops (RAWs) in Xinshe SEPLS (developed from [8]).

A detailed information on the number and representation of the participants, dates, times, and locations of RAWs is provided in Table 1. Due to familiarity with the community and its smaller population size, in October–November 2017, the research team selected Fuxing tribe to be the first one to take part in RAWs. In a much more populous, socially diverse, and geographically spread out Xinshe tribe, the workshops were conducted in the following year—in June, August, and October 2018. Four participants of Fuxing RAWs were representative of four types of social groups living in the community: an elderly resident (the majority of Fuxing population), an indigenous youth returned from the city, an outside wife married to a local from the tribe, and a community helper from the urban area. Originally, 18 participants for Xinshe RAWs, all current or former chiefs of organizations within the tribe, were selected upon a suggestion from the Xinshe community representative to the Platform. As some of them were unable to attend all workshop sessions or missed more than one session, for purposes of consistency and quality in data collection, their attendance was not counted toward the total number of participants.

A few clarifications are required to explain the differing number and composition of participants from each of the tribes. Firstly, the lower number of RAWs participants from Fuxing tribe in contrast to Xinshe tribe reflects the population ratio in the two communities, with the former being much less populous than the latter. Secondly, composition of the participants was based on representation of the main social and decision-making groups in each of the communities, as well as on peculiarities of their community structures. Thirdly, RAWs participants were exclusive and, therefore, most suitable representatives of their respective social and/or decision-making groups based on their community roles and/or previous engagement in operations of the Platform. In other words, at the time when RAWs took place, these were the most appropriate candidates to accurately assess landscape resilience in Xinshe SEPLS and suggest adjustments to the action plan. Lastly, as connectivity plays a key role in enhancement of the landscape resilience in Xinshe SEPLS, RAWs were designed as a biocultural approach to fostering a thorough understanding of priorities and concerns faced by Fuxing and Xinshe communities in the view of local specifics, rather than a pure comparison between the two tribes.

All RAWs were divided into several workshop sessions—four for Fuxing tribe and seven for Xinshe tribe—with dates, time, and duration based on the availability, convenience, and needs of the participants. Hence, while mornings were a more convenient time for Fuxing participants as the elderly people needed to rest early and the younger members had arrangements in the afternoon, Xinshe participants requested evening sessions as they were busy during the day. A longer total period of RAWs for Xinshe community, as well as the choice of months, can also be explained by the participants' availability and occurrence of special events that promised to gather more community members

(e.g., Kavalan Traditional Harvest festival in August). Selection of locations for the workshops in each community was based on considerations of the number of people, overall environment, and available facilities.

Table 1. Participants, date, time, and location data for resilience assessment workshops (RAWs) in Fuxing and Xinshe communities.

Community	Participants (Total Number [1], Representation)	Date (Month, Year)	Workshop Sessions (Total Number, Time)	Location
Amis Fuxing (Dipit) tribe	4 participants: elderly, indigenous youth returned from the city, wife married into the tribe, village helper from the city	October–November, 2017	4 workshop sessions: 09:30 a.m.–12:00 p.m. each	House of the elderly participant
Kavalan Xinshe (Paterongan) tribe	13 participants: former village chief, current village chief, tribal leader, tribal craftsman, women's representative, native language teacher, fishermen's representative, organic rice farmer, native language primary school teacher, chairman and director general of the community development association, doctor, Transitional Justice Commission member	June, August, October, 2018	7 workshop sessions: 7:00 p.m.–9:00 p.m. each	Xinshe Primary School

[1] Number of participants used for the final RAWs analysis.

Every workshop session was dedicated to one or two sets of resilience indicators and followed the "Explain–Score–Discuss–Suggest" model. This means that a set of indicators and all indicators within it were firstly introduced to the participants with a sufficient time provided to elaborate on details and answer questions. Then, the participants were asked to score (Linkert scale) each indicator based on their perception of its current state as "very bad", "bad", "medium", "good", and "very good". After the scoring was done, a discussion followed, allowing the participants an opportunity to share their opinions, build mutual understanding, and learn opposing views. Lastly, the conversation shifted to the Initiative, operations of the Platform, and the action plan. The local people were asked to identify their main areas of concern, provide their suggestions to the action plan, and give feedback to the RAWs procedure. Participant observation, focus group discussions, and interviews were the main research methods employed at this stage. All workshop sessions were recorded and transcribed by the research team, and collected data were used for the next stage analysis.

Finally, the follow-up stage included post-RAWs analysis of the results, making adjustments to the action plan and outlining future directions of work. Importantly, reporting of the RAWs results back to the communities and to the Platform was crucial to, on the one hand, allow the locals to see the overall picture of resilience in each tribe and Xinshe SEPLS as a whole and, on the other hand, to inform other stakeholders—government agencies—about the current situation. A detailed analysis of the follow-up procedures is presented in the next section.

3. Results and Discussion

3.1. Results of Resilience Assessment Workshops (RAWs) in Fuxing and Xinshe Communities

RAWs results for each indicator category (Figure 4) and for all 20 indicators (Figure 5) are presented in the radar diagrams below for Fuxing (a) and Xinshe (b) tribes.

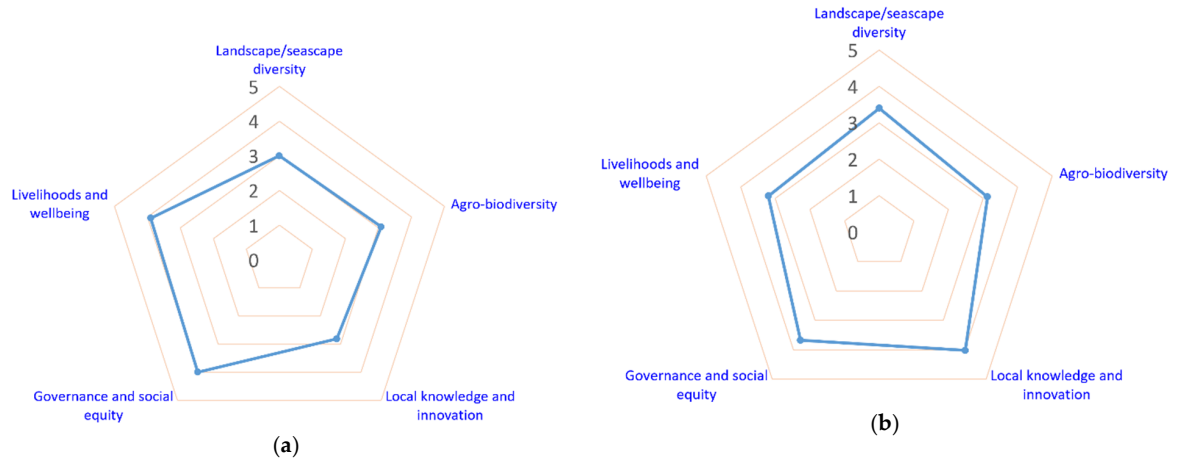

Figure 4. Radar diagrams of RAWs results by indicator categories for (**a**) Amis Fuxing Dipit Tribe, and (**b**) Kavalan Xinshe Paterongan Tribe.

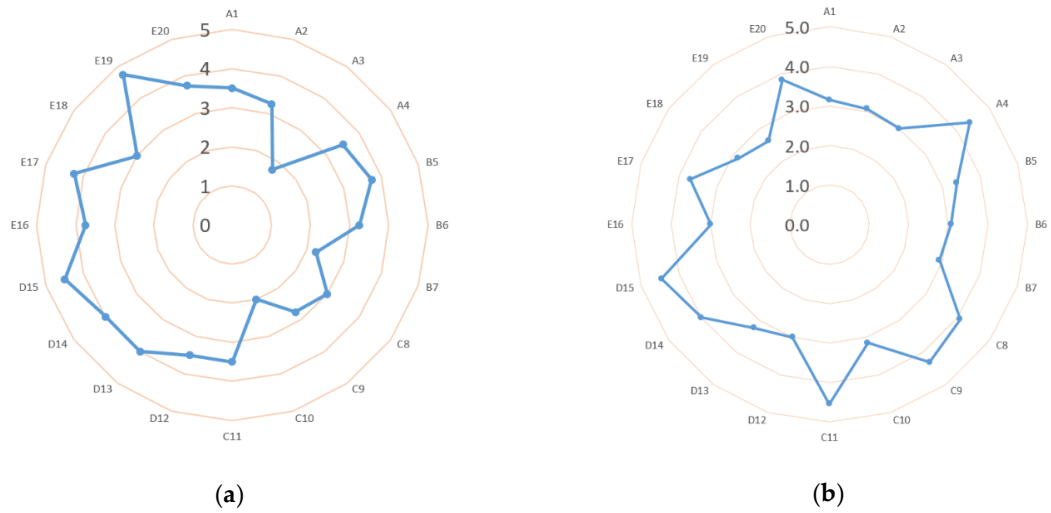

Figure 5. Radar diagrams of RAWs results for all 20 indicators for (**a**) Amis Fuxing Dipit Tribe, and (**b**) Kavalan Xinshe Paterongan Tribe.

An initial glance at the overall scoring given by Fuxing and Xinshe communities to the five categories of resilience indicators allows observing some curious trends. While results from Xinshe community show "medium" to "high" scoring rates for four indicator categories with "local knowledge and innovation" landing at a confident "high", Fuxing community, however, presented a slightly different picture. Specifically, "governance and social equity" and "livelihoods and well-being" were evaluated as "high" by Fuxing workshop participants, "Landscape/seascape diversity" and "agro-biodiversity" were evaluated as "medium", and "local knowledge and innovation" (the highest ranked category in Xinshe community) was evaluated as between "medium" and "low". Such results encourage taking a closer look at the ratings given for each individual indicator and elaborating on the meanings behind them.

RAWs in Fuxing tribe revealed three "low" to "very low" scorings for each individual indicator ("ecological interactions between different components of the landscape/seascape" A3, "sustainable management of common resources" B7, and "documentation of biodiversity-associated knowledge" C10) as compared to the absence of "low" individual scorings in Xinshe tribe and only one "medium to low" scoring for "biodiversity-based livelihoods" (E19). At the same time, around eight individual indicators in both Fuxing and Xinshe tribes were scored as "high" or nearing "very high". Particularly, "social equity (including gender equity)" (D15), "human health and environmental conditions" (E17),

and "biodiversity-based livelihoods" (E19) were marked as close to "very high" by Fuxing participants, while "recovery and regeneration of the landscape/seascape" (A4), "traditional knowledge related to biodiversity" (C9), "women's knowledge" (C11), and "social equity (including gender equity)" (D15) neared "very high" in the estimations of Xinshe residents. The overall assessment picture for each individual indicator rested within a medium range for Xinshe tribe and presented a higher-diversity spectrum for Fuxing tribe.

The above review of the individual indicator scorings allows eliciting the main issues of concern, common and different for each of the communities. It should be noted here though that higher or lower indicator rankings on the radar diagrams are representative of the local people's perceptions of urgency and need for related actions toward the indicator but by no means declare the importance of one indicator over another. Hence, the summary below may be made.

Firstly, for some indicators, despite the numeric differences in scorings given by each of the communities, similar trends may be observed. Results demonstrate that, for both communities, there is a substantial gap to be filled in "documentation of biodiversity-associated local knowledge" (C10), a low level of "income diversity" (E18), a modest level of "landscape and seascape diversity" (A1) and "ecosystem protection" (A2), a somewhat better state of "innovations in agriculture" (C8) and "traditional knowledge related to biodiversity" (C9), and relatively high rankings for "women's knowledge" (C11), "social equity" (D15), and "human health" (E17). Interestingly, high rankings for the role of women's knowledge in both Fuxing and Xinshe tribes may be attributed to a significant role of female community representatives to the Platform, as well as of other charismatic female members in both communities.

Secondly, priority and concern for some issues are different between the communities. RAWs results for Fuxing tribe revealed that "ecological interactions between different components of the landscape" (A3) and "sustainable management of common resources" (B7) are the matters of particular urgency largely related to the common governance of the river, forest, and ocean resources. Also, "traditional knowledge related to biodiversity" (C9) and its documentation (C10) are a serious concern for Fuxing locals who are faced with community aging but lack the resources and manpower to make progress in this area. A higher scoring for the "knowledge and innovation" category of indicators in Xinshe tribe may be explained by an active prior involvement of Xinshe Primary School and of other related stakeholders (including parents) in revival and transfer of Kavalan traditional knowledge.

In the meanwhile, although ranked "medium to low", "biodiversity-based livelihoods" (E19) is the primary concern for Xinshe community to due to a relatively low use of biodiversity in supporting community incomes and reliance on other sources of income (shops, restaurants, rice farming, etc.). Moreover, Xinshe community's dependence on upstream water resources for their farming activities is also a matter of worry evident in a lower scoring for the "rights in relation to natural resource management" (D12). It correlates with Fuxing community's concern toward a sustainable management of common resources (B7) and reiterates the importance of creating a connectivity in the natural resource management of Xinshe SEPLS so as to avoid potential tensions between the tribes, as well as depletion of common resources.

Thirdly, it is essential to mention that the scoring results and related opinions for improvement were also highly diverse even among the participants from the same communities. This is when the discussion phase of the "Explain–Score–Discuss–Suggest" model played an imperative role in initiating a dialogue, encouraging sharing of ideas, and building understanding within the communities. Such differences were apparent in both Fuxing and Xinshe tribes, for instance, when young and middle-aged community members, as well as those who lived in the city, would provide higher scorings than the elderly locals who spent a longer time (if not their entire lives) in their respective tribes. One of the reasons for this is the fascination of the former with the tribal culture, recent local innovations, and comparison with the life and environment in the city. The elderly, on the other hand, were keen to measure the current situation against their life in the past (often when they were young) and, despite acknowledging the ongoing efforts, were still reserved when it came to

declaring any obvious changes and providing higher scores. Another reason may be attributed to the fact that young, middle-aged, and recently returned community members were the most engaged members of the Platform, while the elderly members (especially in Xinshe community) were much less involved. The concept of local participatory governance and community engagement is new to the people of their generation who are more used to entrusting such matters in the hands of community development associations.

In sum, RAWs conducted in Fuxing and Xinshe tribes allowed examining how the current state of Xinshe SEPLS was perceived by the local people from Fuxing and Xinshe tribes, and also helped to elicit the main areas of concern for each of the tribes. These issues primarily included biodiversity-based livelihoods, documentation and transfer of traditional knowledge, and sustainable use of common resources (forest, river, ocean). The next step was to collect the local people's suggestions toward adjustments of the action plan to bring out a community-driven vision for enhancement of the landscape resilience.

3.2. Adjustments to the Action Plan Suggested by Fuxing and Xinshe Communities

In accordance with procedures of the "Explain–Score–Discuss–Suggest" model, after each group of indicators was discussed, the research team stepped in to introduce a corresponding category in the action plan of the Initiative. All short-, mid-, and long-term projects within each category were explained to the participants to improve their understanding of the Initiative and the Platform, as well as to encourage suggestions and revisions to the action plan. It was essential that this would address the three main problem areas that surfaced during the scoring stage of RAWs. As a result, amendments proposed by Fuxing and Xinshe communities were primarily targeted at biodiversity-based livelihoods, traditional and local knowledge, and management of common resources. Also, their focus on site-specific natural and socio-cultural contexts, application at a landscape scale, emphasis on societal benefits via conservation, and maintenance of ecosystem states and processes adhered to the basic principles of nature-based solutions [13].

Thus, on 19 December 2017, after Fuxing tribe completed all assessments and recommendations, an adjusted version of the action plan (second edition) was adopted at the biannual Platform meeting held on 21 December 2017 (Appendix A, Table A1, in bold font). It included increasing crop diversity, preventing unsustainable fishing practices in the Jialang River, facilitating local self-governance and sustainable use of marine resources, implementing ecologically sound coastal engineering, regulating herbicide use in the area, combining modern and traditional composting technologies, building up tribe-to-tribe and tribe-to-government collaborative adaptive governance models, strengthening local medical services, and promoting local food products through community-based ecotourism. In this way, the original 38 tasks of the action plan expanded to 40.

The second revision of the action plan was accomplished by Xinshe community on 29 October 2018, and its third edition was adopted at the biannual Platform meeting on 20 December 2018 (Appendix A, Table A1, in bold font). Xinshe community suggested the following amendments: conducting afforestation and restoration of degraded land, designing subsidies for establishment of local weeding teams, promoting mixed agroforestry with the inclusion of forest economy, local arts and crafts, creating feedback mechanisms for water resource maintenance, setting up a database of local plant and crop varieties (listing its indigenous, Chinese, and scientific names, use, etc.), conducting winter and summer youth training camps on transfer of traditional ecological knowledge and skills, increasing representation of local people to the Platform, co-managing common resources (fisheries, driftwood, and river), enhancing tsunami disaster prevention and response measures, maintaining quality/quantity of natural stream drinking water, advancing local transportation services, and building up local self-marketing ability (including online marketing). Thus, the total number of tasks in the third edition of the action plan became equal to 41.

Notably, one of the revisions suggested by Xinshe tribe included provision of additional seats for Xinshe representatives to the Platform, which reflected the community's concerns about their

limited participation in the past. RAWs made the local people from Xinshe community more aware of the Initiative's efforts over a span of two years. As the action plan and many of its tasks were closely related to their daily lives, more locals were determined to attend the Platform meetings. This decision was supported at the biannual Platform meeting in December 2018 and, since 2019, more local representatives were encouraged to join the Platform.

3.3. Evaluation of the Resilience Assessment Workshops (RAWs) by Fuxing and Xinshe Communities

On 30 October 2017 and 29 October 2018, the research team arranged follow-up discussion sessions with Fuxing and Xinshe communities, respectively. As it was essential to bring the results of RAWs back to the communities and make future methodological improvements, the participants were asked to evaluate their engagement in RAWs and provide detailed feedback to each stage of the workshops. Their responses may be summarized into the points below.

Firstly, while the Platform meetings focused on solving the current and most urgent issues faced by the communities, a set of 20 biocultural Indicators created a unique opportunity to review the past and present difficulties and advancements of each tribe from a fresh perspective. Despite the complexity of many academic terms (e.g., resilience), RAWs participants found the Indicators easy to comprehend with assistance of the research team.

Secondly, aside from sharing their personal opinions, the local people were also exposed to a wider, mutual, and intergenerational learning environment. This encouraged an open knowledge dialogue, exchange of ideas, and a sense of common goal within the communities—between the elders and the young in particular.

Thirdly, by means of the "Explain–Score–Discuss–Suggest" model, developed by the research team, RAWs participants not only assessed resilience in Xinshe SEPLS, but also learned more about the Initiative and the Platform, and used their collective knowledge to guide action via detailed revisions to the action plan.

Worth noting is that RAWs demonstrated some main characteristics of biocultural approach [24] with the questions and solutions being place-based and locally grounded, RAWs participants being representative or their roles in a given socio-ecological context, and RAWs results being used for enhancing management solutions in SEPLS [8].

In sum, experience with conducting baseline RAWs in Xinshe SEPLS was welcomed by the local people and is anticipated to have paved a way for a series of follow-up workshops in the future. There is hope that current limitations may be overcome through an increased participation from the local communities, improved interactions between elderly traditional knowledge holders and newly returned young community members, more in-depth discussions of resilience indicators and their changes on temporal and spatial scales, and inclusion of government officials and experts in the discussion.

4. Conclusions

This study presented resilience assessment workshops (RAWs) as a biocultural approach to conservation management of Xinshe socio-ecological production landscape and seascape (SEPLS) in Hualien County, Taiwan. Understanding of Xinshe SEPLS as a coupled, complex, and dynamic natural and social system required consideration of bio-ecological, socio-economic, and cultural indicators for its resilience assessment. Twenty biocultural indicators of resilience in SEPLS [8] were employed by the research team to conduct RAWs in two indigenous tribes (Fuxing and Xinshe) as a part of an ongoing multi-stakeholder platform for the "Forest–River–Village–Sea Ecoagriculture Initiative" (the Initiative).

RAWs results revealed that biodiversity-based livelihoods, documentation and transfer of traditional knowledge, and sustainable use of common resources (forest, river, ocean) were the primary concerns for both communities. Community-driven adjustments to the action plan of the Initiative specifically targeted these problem areas along with other measures for enhancement of

landscape resilience in Xinshe SEPLS. Lastly, RAWs helped to inform all multiple stakeholders about the current state of resilience in Xinshe SEPLS and to draft future focus areas of work.

The biocultural approach of RAWs in Xinshe SEPLS, Taiwan, may be viewed as a successful case of mainstreaming nature-based solutions in conservation management. Its focus on the feedback between human well-being and biodiversity benefits, and on addressing societal challenges through ecosystem revitalization echoes the overarching goals of nature-based solutions [13]. As a result, RAWs adhere to the principles of both biocultural approaches and nature-based solutions with their dynamic, complex, and partnership-based nature [26,28]. In the meanwhile, limitations revealed throughout baseline RAWs should be carefully examined and addressed in the follow-up RAWs in the future.

Given a particular importance of local and indigenous communities in biodiversity conservation and sustainable resource use in the face of global environmental challenges, the case of Xinshe SEPLS contributes to sustainable local-based solutions and resilience enhancement strategies. Place-based, practical findings presented in this study may benefit local communities, policymakers, practitioners, researchers, and a wider audience.

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Abbreviations

EBAFA	Eastern Region Branch, Agriculture and Food Agency, the Council of Agriculture, Taiwan
HBSWC	Hualien Branch, Soil and Water Conservation Bureau, the Council of Agriculture, Taiwan
HDARES	Hualien District Agricultural Research and Extension Station, the Council of Agriculture, Taiwan
HFDOFB	Hualien Forest District Office, Forestry Bureau, the Council of Agriculture, Taiwan
IPSI	The International Partnership for the Satoyama Initiative
NDHU	National Dong Hwa University
RAWs	Resilience Assessment Workshops
UNU-IAS	United Nations University Institute for the Advanced Study of Sustainability

Appendix A

Table A1. Action Plan for the "Forest–River–Village–Sea Ecoagriculture Initiative" in Xinshe SEPLS

Perspectives	Task Code and Content
A. Landscape diversity	A1 Promoting environmentally friendly farming and **increasing crop diversity** *
	A2 Enhancing landscape diversity in rice paddies by planting grass carpets on ridges, slopes, and surrounding hedges
	A3 Reconnecting natural stream to irrigation ditches and ponds through ecological engineering instruments
	A4 Conducting pest control (boars, monkeys, etc.) for crops
	A5 Removing alien species
	A6 Preventing poaching of precious trees, **conducting afforestation and restoration of degraded land, preventing unsustainable fishing practices in the Jialang River**

Table A1. *Cont.*

Perspectives	Task Code and Content
	A7 Conducting inventory and monitoring of agro-biodiversity in rice paddy fields
	A8 Conducting inventory and monitoring of terrestrial biodiversity
	A9 Conducting inventory and monitoring of marine biodiversity, **facilitating local self-governance and sustainable use of marine resources**
	A10 Monitoring slopes and preventing landslides
	A11 Monitoring coastal erosion and carrying out disaster risk reduction projects, **implementing ecologically sound coastal engineering**
	A12 Evaluating resilience in SEPLS
	A13 **Regulating herbicide use in the area, designing subsidies for establishment of local weeding teams**
B. Agro-biodiversity	B1 Rehabilitating fallow lands, planting traditional and eco-friendly crops
	B2 Encouraging home gardening, indigenous edible plants, use of diversified food sources
	B3 Collecting and using forest products, **promoting mixed agroforestry with the inclusion of forest economy, local arts and crafts**
	B4 Ensuring sustainable use of resources in streams and seas
	B5 **Combining modern and traditional composting technologies**
	B6 **Creating feedback mechanisms for the water resource maintenance**
C. Traditional knowledge and values	C1 **Setting up a database for local plant and crop varieties (indigenous, Chinese, and scientific names, use, etc.)**
	C2 Promoting environmental education activities **(including summer and winter youth training camps) for transfer of traditional ecological knowledge and skills**
	C3 Encouraging indigenous food and agriculture education
	C4 Working with Xinshe Elementary School to promote place-based curriculum
	C5 Promoting indigenous wild edible plants, food art, weaving, and other crafts
	C6 Making community resources maps, leaflets/booklets, books, videos on traditional culture and ecological knowledge
	C7 Creating research inventory on traditional culture and ecological knowledge (agriculture, forestry, and fishery)
D. Multi-stakeholder collaboration	D1 Convening and operating task force and multi-stakeholder Platform meetings, **increasing representation of local people to the Platform**
	D2 Strengthening local social capital (cohesion and leadership) and capacity (planning and action)
	D3 **Building up tribe-to-tribe and tribe-to-government collaborative adaptive governance model, improving co-management of common resources (fisheries, driftwood, and river)**
	D4 Promoting national forest co-management with local people: patrol in mountain forests, sustainable use of forest products, prevention of alien species in the forests
	D5 Building consensus on guarding ancestral properties and sale of land
E. Socio-economic benefits	E1 Applying ecological engineering to disaster risk reduction and climate change adaptation (slope erosion/flood/landslide/typhoon), **enhancing tsunami disaster prevention and response**
	E2 Maintaining quality/quantity of natural stream water **for drinking** and irrigation
	E3 Applying ecological engineering for terraced fields, irrigation ditches, and agricultural roads
	E4 Greening of settlements and enhancing local facilities
	E5 Advancing community elderly care services, **local medical and transportation services**
	E6 Promoting green labeling schemes to add value to environmentally friendly products
	E7 Upgrading agricultural products processing equipment and **enhancing local self-marketing ability (including online marketing)**
	E8 Promoting eco-cultural tourism and native art
	E9 **Promoting local food products through community-based ecotourism** and Xinshe Elementary School's food and agriculture education activities
	E10 Combining landscape art and activities that feature local SEPLS characteristics

* Note: marked in bold are revisions made by the communities.

References

1. Berkes, F. Understanding uncertainty and reducing vulnerability: Lessons from resilience thinking. *Nat. Hazards* **2007**, *41*, 283–295. [CrossRef]
2. Holling, C. Resilience and stability of ecological systems. *Ann. Rev. Ecol. Syst.* **1973**, *4*, 1–23. [CrossRef]
3. Lisa, E.; Schipper, F.; Langston, L. *A Comparative Overview of Resilience Measurement Frameworks*; Overseas Development Institute: London, UK, 2015.
4. Folke, C.; Carpenter, S.; Elmqvist, T.; Gunderson, L.; Holling, C.S.; Walker, B. Resilience and sustainable development: Building adaptive capacity in a world of transformations. *AMBIO* **2002**, *31*, 437–440. [CrossRef] [PubMed]
5. Walker, B.; Holling, C.S.; Carpenter, S.R.; Kinzig, A. Resilience, adaptability and transformability in social–ecological systems. *Ecol. Soc.* **2004**, *9*, 5. [CrossRef]
6. Meadows, D. *Thinking in Systems: A Primer*; Wright, D., Ed.; Chelsea Green Publishing Company: White River Junction, VT, USA, 2008.
7. Bardsley, D.K.; Wiseman, N.D. Climate change vulnerability and social development for remote indigenous communities of South Australia. *Glob. Environ. Chang.* **2012**, *22*, 713–723. [CrossRef]
8. Bergamini, N.; Dunbar, W.; Eyzaguirre, P.; Ichikawa, K.; Matsumoto, I.; Mijatovic, D.; Morimoto, Y.; Remple, N.; Salvemini, D.; Suzuki, W.; et al. *Toolkit for the Indicators of Resilience in Socio-Ecological Production Landscapes and Seascapes*; IGES, UNDP; UNU-IAS, Biodiversity International: Rome, Italy, 2014; Available online: https://www.bioversityinternational.org/fileadmin/user_upload/online_library/publications/pdfs/Toolkit_for_the_indicators_of_riesilience_in_socio-ecological_production_landscapes_and_seascapes_1844.pdf (accessed on 28 May 2019).
9. IPBES. *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*; IPBES: Bonn, Germany, 2019; Available online: https://www.ipbes.net/global-assessment-report-biodiversity-ecosystem-services (accessed on 10 October 2019).
10. Gu, H.; Subramanian, S.M. Drivers of change in socio-ecological production landscapes: Implications for better management. *Ecol. Soc.* **2014**, *19*, 41. [CrossRef]
11. International Partnership for the Satoyama Initiative (IPSI) Official Website. Available online: https://satoyama-initiative.org/ (accessed on 8 July 2019).
12. Nesshöver, C.; Assmuth, T.; Irvine, K.N.; Rusch, G.M.; Waylen, K.A.; Delbaere, B.; Haase, D.; Jones-Walters, L.; Keune, H.; Kovacs, E.; et al. The science, policy and practice of nature-based solutions: An interdisciplinary perspective. *Sci. Total Environ.* **2017**, *579*, 1215–1227. [CrossRef] [PubMed]
13. Cohen-Shacham, E.; Walters, G.; Janzen, C.; Maginnis, S. (Eds.) *Nature-Based Solutions to Address Global Societal Challenges*; IUCN: Gland, Switzerland, 2016.
14. Japan Satoyama Satoumi Assessment. *Satoyama-Satoumi Ecosystems and Human Well-Being: Socio-Ecological Production Landscapes of Japan—Summary for Decision Makers*; United Nations University: Tokyo, Japan, 2010.
15. Bergamini, N.; Blasiak, R.; Eyzaguirre, P.; Ichikawa, K.; Mijatovic, D.; Nakao, F. *Indicators of Resilience in Socio-Ecological Production Landscapes (SEPLs)*; UNU-IAS Policy Report; United Nations University: Tokyo, Japan, 2013.
16. Twigg, J. *Characteristics of a Disaster-Resilient Community: A Guidance Note*; NGO Inter-Agency Group: Brighton, UK, 2009; Available online: http://community.eldis.org/.59e907ee/Characteristics2EDITION.pdf (accessed on 31 October 2019).
17. Elasha, B.O.; Elhassan, N.; Ahmed, H.; Zakieldin, S. *Sustainable Livelihood Approach for Assessing Community Resilience to Climate Change: Case Studies from Sudan*; AIACC: Washington, DC, USA, 2005.
18. USAID. *How Resilient is Your Coastal Community? A Guide for Evaluating Coastal Community Resilience to Tsunamis and Other Hazards*; U.S. Indian Ocean Tsunami Warning System Programme: Bangkok, Thailand, 2007.
19. USAID. *The Resilience Agenda: Measuring Resilience in USAID*; USAID: Washington, DC, USA, 2013. Available online: https://www.usaid.gov/sites/default/fles/documents/1866/Technical%20Note_Measuring%20Resilience%20in%20USAID_June%202013.pdf (accessed on 10 October 2019).
20. Sharifi, A. A critical review of selected tools for assessing community resilience. *Ecol. Indic.* **2016**, *69*, 629–647. [CrossRef]

21. Maxwell, D.; Constas, M.; Frankenberger, T.; Klaus, D.; Mock, M. *Qualitative Data and Subjective Indicators for Resilience Measurement*; Resilience Measurement Technical Working Group, Technical Series No. 4; Food Security Information Network: Rome, Italy, 2015.
22. Frankenberger, T.; Constas, M.; Nelson, S.; Starr, L. *Current Approaches to Resilience Programming Among Nongovernmental Organizations*; Conference Paper; International Food Policy Research Institute: Washington, DC, USA, 2014; Available online: http://www.ifpri.org/sites/default/fles/publications/2020resilienceconfpaper07.pdf (accessed on 10 October 2019).
23. Liu, J.; Dietz, T.; Carpenter, S.R.; Alberti, M.; Folke, C.; Moran, E.; Pell, A.N.; Deadman, P.; Kratz, T.; Lubchenko, J.; et al. Complexity of coupled human and natural systems. *Science* **2007**, *317*, 1513–1516. [CrossRef] [PubMed]
24. Sterling, E.J.; Filardi, C.; Toomey, A.; Sigouin, A.; Betley, E.; Gazit, N.; Newell, J.; Albert, S.; Alvira, D.; Bergamini, N.; et al. Biocultural approaches to well-being and sustainability indicators across scales. *Nat. Ecol. Evol.* **2017**, *1*, 1798–1806. [CrossRef] [PubMed]
25. Berkes, F. Community-based conservation in a globalized world. *Proc. Natl. Acad. Sci. USA* **2007**, *104*, 15188–15193. [CrossRef] [PubMed]
26. Gavin, M.; McCarter, J.; Mead, A.; Berkes, F.; Stepp, J.R.; Peterson, D.; Tang, R. Defining biocultural approaches to conservation. *Trends Ecol. Evol.* **2015**, *30*, 140–145. [CrossRef] [PubMed]
27. McCarter, J.; Sterling, E.; Jupiter, S.; Cullman, G.D.; Albert, S.; Basi, M.; Betley, E.; Boseto, D.; Bulehite, E.S.; Harron, R.; et al. Biocultural approaches to developing well-being indicators in Solomon Islands. *Ecol. Soc.* **2018**, *23*, 32. [CrossRef]
28. Gavin, M.; McCarter, J.; Berkes, F.; Mead, A.; Sterling, E.; Tang, R.; Turner, N. Effective biodiversity conservation requires dynamic, pluralistic, partnership-based approaches. *Sustainability* **2018**, *10*, 1846. [CrossRef]
29. Takeuchi, K. *Satoyama Initiative and its Partnership: Lessons learned for the Post-2020 Framework*; Report at the side event at the CBD Regional Consultation Workshop on the Post-2020 Global Biodiversity Framework for Asia and the Pacific; The Satoyama Initiative: Nagoya, Japan, 2019.
30. Lee, K.C.; Yan, S.Y. Participatory planning and monitoring of protected landscapes: A case study of an indigenous rice paddy cultural landscape in Taiwan. *Paddy Water Environ.* **2019**, *17*, 539–548. [CrossRef]
31. Lee, K.C.; Karimova, P.G.; Yan, S.Y. Towards an integrated multi-stakeholder landscape approach to reconciling values and enhancing synergies: A case study in Taiwan. In *Understanding the Multiple Values Associated with Sustainable Use in Socio-Ecological Production Landscapes and Seascapes (SEPLS) (Satoyama Initiative Thematic Review Vol. 5)*; UNU-IAS, IGES, Eds.; UNU-IAS: Tokyo, Japan, 2019.
32. Lee, K.C. *The Environmental Resilience Indicators for the Cihalaay Cultural Landscape, Fengnan Village, Fuli Township, Hualien County, Taiwan*; Bureau of Cultural Affairs: Hualien County, Taiwan, 2016.
33. UNU-IAS. *Biodiversity and Livelihoods: The Satoyama Initiative Concept in Practice*; Institute of Advanced Studies of the United Nations University and Ministry of Environment of Japan: Tokyo, Japan, 2010.
34. Fengbin Township Household Registration Office. Demographic Statistics Database. 2019. Available online: https://fbhr.hl.gov.tw/files/15-1016-87294,c4242-1.php (accessed on 6 June 2019).
35. Lee, K.C.; Karimova, P.G.; Chiu, Y.H.; Lin, H.C. *Implementing the Satoyama Initiative for the Benefits of Biodiversity and Human Well-Being: Taiwan's Experience*; Food and Fertilizer Technology Center: Taipei, Taiwan, 2019; Available online: http://ap.fftc.org.tw/ap_db.php?id=1030 (accessed on 8 October 2019).
36. Villanueva, A.B.; Morimoto, Y.; Maundu, P.; Jha, Y.; Otieno, G.; Nankya, R.; Ogwal, R.; Leles, B.; Halewood, M. Perceptions of resilience, collective action and natural resources management in socio-ecological production landscapes in East Africa. In *Sustainable Use of Biodiversity in Socio-Ecological Production Landscapes and Seascapes (SEPLS) and its Contribution to Effective Area-Based Conservation (Satoyama Initiative Thematic Review Vol. 4)*; UNU-IAS, IGES, Eds.; UNU-IAS: Tokyo, Japan, 2018.
37. Sterling, E.J.; Ticktin, T.; Morgan, K.; Cullman, G.; Alvira, D.; Andrade, P.; Bergamini, N.; Betley, E.; Burrows, K.; Caillon, S.; et al. Culturally grounded indicators of resilience in social-ecological systems environment and society: Advances in research. *Environ. Soc.* **2017**, *8*, 63–95. [CrossRef]