

Sustainable agricultural farming practices of Mamanwa tribe in Eastern Visayas, Philippines

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ABSTRACT

Agricultural farming is the primary source of food for indigenous people all over the world, including crops, vegetables, and fruits. In terms of planting, growing, harvesting, and storing, indigenous people established diverse agricultural techniques. The study's goal was to explore and explain the Mamanwa tribe's sustainable traditional farming practices and other agricultural activities on Biliran Island, Philippines. Multiple case study design was employed, and Mamanwa participants were identified and determined using purposive sampling. In addition, semi-interviews, direct observation, physical artifacts, field notes, and comments from various sources were gathered, transcribed, and classified. Significant statements from the participants were grouped based on the commonalities and coded. Then, codes were grouped, and themes were formulated. Moreover, the themes were submitted, and reviewed by selected validators for their appropriateness and relevance, with the support of relevant studies as well. The Mamanwa tribe on Biliran Island continues to undertake farming to meet their daily requirements. While the Hanunoos practiced multiple cropping, Manobos, Suludnons, and Atis practiced crop diversity, Mamanwa's practiced soil profiling, multiple cropping, organic farming, astronomical calendar, and cultural ritual activities, to name a few. Furthermore, these agricultural practices are environmentally friendly and long-term, as shown by their forefathers over many years. As a result, environmental education might be used to preserve and integrate these environmentally favorable farming methods.

1. Introduction

Eco-friendly agricultural farming is a farming integration of biological, cultural, and natural inputs, including integrated disease and pest management (Sharma et al., 2009). Indigenous people undertake these sorts of agricultural farming because it reflects their cultural views on forests (Piras & Santoro, 2023), practices (Asante et al., 2017), and traditions and beliefs in environmental preservation and biodiversity (Fongod et al., 2014). Indigenous Peoples (IP) thrived in the Philippines, where they were dispersed over the archipelago. Some of these were the Ikalahan, Magbukun Ayta, Manobo, and Mamanwa whose agriculture is their primary source of food and income. The study will use these to explore and characterize the Mamanwa Indigenous Peoples' eco-friendly agriculture techniques on the island of Biliran Province. The

study will also identify agricultural methods that are affected by their cultural and spiritual history and should be conserved. Additionally, there are limited studies on the traditional agricultural farming practices of the Mamanwa that are being documented in the area. The study provides the documentation and preservation of these farming practices, which later can be integrated into the teaching-learning process.

In the Philippines, indigenous people successfully live and continue to practice their traditional heritage. Some IPs have lately designated their indigenous groups' territories and places to be preserved, namely Ikalahan/Kalanguya of Nueva Vizcaya, Nueva Ecija, and Pangasinan Provinces, Magbukun Ayta IPs of Kanawan, Morong, Bataan, Tongrayan IPs of Tinglayan, Kalinga, Agusan Manobo of Esperanza, Agusan Del Sur, and Kalanguya IPs of Tinoc, Ifugao (Rigor, 2018). Several studies have been undertaken as a result of the IPs' presence and variety in the nation, and one of which is their farming techniques.

Mariano et al. (2012) mentioned that farmers' direct experiences and field observations affected Filipino agriculture techniques more than technology or chemical inputs. The Hanunoos indigenous people in Occidental Mindoro practice multiple cropping systems known as the *lamundaan* and *pagandan* to control soil erosion. At the same time, the Bagobos and the Manobos in Davao, Suludnons and Atis in Iloilo, and Ivatans in Batanes have eco-friendly beneficial agriculture techniques such as significant crop and livestock diversification and little reliance on external inputs. They rely on locally accessible resources, traditional varieties, and traditional storage methods. The Suludnons and Atis of Iloilo and other IPs practice multi-cropping. They have recorded land enhancement techniques, including raised beds that are coated in thick layers of organic materials or mulch. It was their most important method of coping with the climate variability caused by the El Niño/La Niña cycle (Filipe et al., 2013). Similarly, the indigenous peoples of North-Western Cagayan, Philippines, have their own set of conservation beliefs and practices, which represent their traditional knowledge and belief system, as well as forest and wildlife resources, water resources, flora and trees, and land agricultural traditions. Furthermore, these materials serve as a storehouse for their cultural traditions and identity, as well as a reservoir for their extensive ecological knowledge (Magulod, 2018). Finally, the IPs of Sorsogon have passed down eco-friendly indigenous agricultural traditions like seed preservation and storage, seed protection, soil fertilization, and organic farming from generations of farmers (Ocbian & Lasim, 2015). As a result, even without official agricultural instruction, the indigenous inhabitants of the nation have traditional agricultural habits.

This research will add to the body of knowledge on establishing sustainable agriculture in the face of the global environmental catastrophe. Farming is one of the key sources of food for the people of Biliran Island, which is in Eastern Visayas, Philippines. Furthermore, it houses Indigenous Peoples from the municipalities of Almeria and Caibiran (DSWD Database for Indigenous People). These people already had primary schools, barangay systems, electricity, and water systems in place, and the majority of them still relied on farming. Kassam et al. (2009) pointed out that conservation agriculture is a relatively unknown concept and needs to be practiced.

The study aims to investigate and describe the indigenous farming practices and other agricultural activities performed by the farmers in Biliran, Philippines. Specifically, it sought to answer the following:

1. What are the agricultural practices of the Mamanwa farmers in the province?
2. How do these Mamanwa farmers practice agricultural practices?

3. Why do these Mamanwa farmers practice this agricultural farming even during this time of industrial era?

2. Theoretical basis

Indigenous Peoples (IP), on the other hand, have strong social and cultural values, well-ordered social control, and integrated institutions based on their indigenous knowledge of the world and, in particular, their localities. They have normative and well-considered behavior in their interactions with an adaptation to a larger ecological niche that has been formed in their worldview (Melaku, 2016). These IPs are empowered to build upon their cultural and spiritual values of forests (Agnoletti et al., 2022), and their traditions, customs, beliefs, and cultural rights play an essential role in environmental conservation and biodiversity (Fongod et al., 2014), where cultural practices are imperative to overcoming environmental degradation (Cobbinah, 2011). As pointed out in the study of Asante et al. (2017) of Ashantis in Ghana, they believed that ignoring cultural norms in the administration of public forests led to an increase in deforestation, the destruction of water bodies, and divine calamities such as extended drought and soil fertility loss. Moreover, forest managers, decision-makers, and governments must identify diverse cultural practices and traditional beliefs as highly helpful tools and integrate them into existing national and international forestry plans and programs, they said, in order to minimize forest degradation. As a result, IPs have environmentally friendly agricultural techniques anchored in their cultural, spiritual, and customary values.

In the Philippines, indigenous people successfully live and continue to practice their traditional heritage. Some IPs have lately designated their indigenous groups' territories and places to be preserved, namely Ikalahan/Kalanguya of Nueva Vizcaya, Nueva Ecija, and Pangasinan provinces, Magbukun Ayta IPs of Kanawan, Morong, Bataan, Tongrayan IPs of Tinglayan, Kalinga, Agusan Manobo of Esperanza, Agusan Del Sur, and Kalanguya IPs of Tinoc, Ifugao (Rigor, 2018). Several studies have been undertaken as a result of the IPs' presence and variety in the nation, and one of which is their farming techniques.

3. Methodology

The study used a case study approach since it is an in-depth, complex assessment of a particular social phenomena utilizing qualitative research methodologies (Orum & Feagin, 1991). The goal of the study was to obtain insight and meaning of the agricultural farming practices of Mamanwa (Merriam, 1998). Specifically, a multiple holistic case study design was employed (Yin, 2003) because experiences from different participants were collected. The participants were composed of male and female Mamanwa, single or married, aged between 25 - 59 years old. Moreover, questions like - What are the eco-friendly agricultural practices of the Mamanwa farmers in the province? - is explanatory in nature, which supports the use of the case study design. Second, the phenomenon under study in the context of indigenous agricultural practices of Mamanwa farmers cannot be adequately measured (Bonoma, 1985). Thus, employing multiple holistic designs was the most appropriate design in the study.

Purposive sampling was used to identify the participants because they conformed to certain criteria in the study (Smith, 1983). In determining the criteria for selecting the participants of the study, several consultations and relevant studies were considered. Because the study focused on the experiences of the Mamanwa in traditional farming practices, participants must be between 30 years and above. Likewise, the study focused on the Mamanwa's farming practices, so it is ideal that participants belong to the Mamanwa's tribe and reside in the area for

most of their lives. Lastly, participants must have agricultural land where they managed and planted crops.

Semi-interviews, direct observation, tangible artifacts, and the researcher's field notes and comments were used to gather data. Daily, detailed field notes and comments were kept, as well as an audit record of when and how the data was collected and processed. Carefully constructed interview questions about the indigenous agricultural practices of Mamanwa were developed; and all interviews were pre-scheduled, audio-video recorded, and transcribed for accuracy. During the interviews, the purpose and procedure of the study were discussed with the participants. The interview was composed of several questions that underwent an expert-validation. These questions were expected to take 30 - 45 minutes to complete. Moreover, the benefits of the study were also discussed explicitly with the participants. Their participation in the study may or may not benefit them personally. Furthermore, their voluntary participation and withdrawal were also discussed before the start of the interviews. The confidentiality of the records and data was also deliberated. Only the researchers have the access to the information. The information was stored in a password-protected computer. Audio recordings were downloaded and stored in password and firewall-protected computers, and data were destroyed upon completion of the data analysis. Further, the researcher also conducted interviews with the school head of the elementary school, barangay health worker, and construction worker in the area for additional information. Additionally, interview questions were validated by selected evaluators who experts on the theme of the study were.

The researcher went over the information and came up with a list of common data categories relating to the participants' environmentally friendly farming methods. To obtain, data was categorized and evaluated using the frameworks of content, process, structure, and context. Like Merriam's (1998) step-by-step procedure, first, all transcriptions were read and reread, and audiotapes were listened to. This was done to obtain a feel for the whole body of materials, and if thoughts came to mind, they were noted. The interview transcripts were randomly chosen and read aloud many times. The data's underlying significance was sought and noted in the margin. Following the creation of a list of subjects, related topics were grouped. Columns were randomly assigned to big themes, unusual topics, and leftovers. The data were compared using the compiled list, with themes denoted by codes. While tracking whether new categories or codes are developing, the codes are put next to the text segments. At the same time, the theme's most evocative terms are allocated and converted into categories. To condense the list of categories, topics related to one another are grouped. Data were verified and alphabetized in each category. To develop meaning, the data were evaluated and thoroughly explored. Existing data were also documented, participants were asked to confirm the analysis of the data, and recording was done as needed. Examples from the participants' verbatim remarks were used to illustrate the results to formally encourage the reader to ratify the writing.

The themes were assessed by faculty members, LGUs, or agriculturists who were familiar with the idea for input on the examples' comprehensiveness and the literature on the concerns raised in each instance. Furthermore, each participant was given the chance to evaluate the case transcribed and provide comments on the correctness of the data interpretations as well as their understanding of their own practices. During the ongoing analysis, feedback from peer professors and participants was carefully evaluated, and necessary revisions and additions were included in the final analytic process.

Ethical considerations in conducting the study were strictly observed by the researcher. Permits to conduct the study were secured by the researchers. The researchers for approval from the local government officials where the Mamanwa tribes are located. Further, before the collection of the data, a meeting and agreement on the scope and limitations of the study was discussed with the chieftain of the tribe. Then, participants were given informed consent, which includes their voluntary participation and withdrawal from the study. Further, participants' identities were hidden, and pseudonyms were used. Recorded audio-videos were deleted after transcription and validation of the data.

4. Result and discussion

The following section discusses the profile of the Mamanwa individuals who participated in the study. Their responses were collected and analyzed thematically, namely the indigenous agricultural practices of Mamanwa farmers, the types of farming methods, and their reasons of continuing the practice.

4.1. Agricultural farming practices of Mamanwa farmers

Indigenous Peoples (IPs) or Indigenous Cultural Communities (ICC) as defined in the Republic Act No. 8371, otherwise known as the Indigenous People Rights Act (IPRA) of 1987 of the Philippines, based on the Official Gazette of the Philippines (Government of the Republic of the Philippines, 1997), Section 3, paragraph H, pp. 02-03 states that

“a group of people or homogenous societies by self-ascription and ascription by others, who have continuously lived as organized community on communally bounded and defined territory, and who have, under claims of ownership since time immemorial, occupied, possessed and utilized such territories, sharing common bonds of language, customs, traditions and other distinctive cultural traits, or who have, through resistance to political, social and cultural inroads of colonization, non-indigenous, religions and cultures, became historically differentiated from the majority of Filipinos. ICCs/IPs shall likewise include peoples who are regarded as indigenous on account of their descent from the populations which inhabited the country at the time of conquest or colonization, or at the time of inroads of non-indigenous religions and cultures, or the establishment of present state non-boundaries, who retain some or all of their own social, economic, cultural and political institutions, but who may have been displaced from their traditional domains or who may have resettled outside their ancestral domains”.

Mamanwas have, therefore, been defined as an indigenous tribe that has traditionally been nomadic and extremely mobile, known to relocate depending on the availability of farming resources (Kahambing, 2018; Maceda, 1975). The following are the indigenous agricultural practices of the Mamanwas in planting, growing, harvesting, and storing agricultural products.

4.1.1. Soil profiling and selection

As mentioned by Nath et al. (2002), Indigenous Peoples demonstrate that decomposed organic matter is sufficient to maintain soil fertility. As a result, when the Mamanwas begin planting their crops, they choose the soil profile or nature. They study the color, texture, and position of the soil since these characteristics will aid them in producing a successful crop. They regarded these elements because they felt strongly linked to nature and the immediate area in which they reside (Cuaton & Su, 2020). The participants of the study stated, like:

“Kay didto man sa lasang, di man parehas diri sa yuta umahon. Didto sa among uma, maayo gyud tubo sa kamote.” P4

Translation: If it is in the forest, it is not the same here on the farm. On our farm, the growth of sweet potatoes is good.

“Mag-pili mi kanang patag nga yuta nga iyang yuta itom kaayo, humok kaayo, nya walay gamut-gamot.” P4

Translation: We will choose any land with a level surface in which the soil is very black, very soft, and has no roots.

“Kay gipili man ang mayo nga yuta kay tambok kaayo.” P1

Translation: Because we carefully selected soil that was very fertile.

“Naa man mga yuta nga tambok mga maayong yuta nga ang tanom mo abante pa.” P1

Translation: There are also fertile soils that are good soils, and we can still do continuous cropping.

“Mamili gyud mi ug yuta nga itomon bitaw kay organic siya.” P2

Translation: We will choose black soil because it is organic.

To support this, Singh (2003) pointed out that Paddies are an important aspect of the farming system, and they are maintained and developed in traditional methods by indigenous people. As a result, even though the Mamanwa have never had official agricultural schooling, they already possess basic farming skills such as soil selection. They think that nature has a means of generating organic soil without the need for fertilizers or other chemicals.

4.1.2. Multi-cropping practices

Gallaher (2009), an agronomist, developed the phrase “multi-cropping”, which can apply to cultivating crops across several seasons or growing various crops in a single season. He further refined the term by claiming that multi-cropping results in the production of two or more crops every year on the same piece of land. Similarly, when farming in the mountains, the Mamanwa had previously employed multi-cropping. These individuals have planted, raised, and harvested various crops. They also said that they used multi-cropping to have more possibilities and that they planted these crops in plots.

“Among buhaton, mag-tanom ug kuryoso, mag-tanom ug balanghoy, mag-tanom kamote, aron inig ngadto, daghan ang imong mapilian, unsa imo, asa imo ganahan harbesson.” P4

Translation: What we do is we plant “kuryoso”, cassava, and sweet potato, so that when it comes to harvest season, we have a lot to choose from, and we can harvest what we like.

“Koryoso, mga kamote, balanghoy, kubasa, kutob sa mga makaon, tubo.” P1

Translation: Koryoso, sweet potatoes, cassava, squash, as long as edible foods, and sugar cane.

“Mga kamote, mga balanghoy.” P4

Translation: Sweet potatoes, cassava.

“Duha ka plot kamote, ang ila tulo balanghoy, ang ika last kuryoso.” P4

Translation: Two plots of sweet potatoes, the third goes to cassava, the last one is “kuryoso”.

As Perroni and Wigle (2017) pointed out, through agroforestry, crop rotations, polyculture, mixed/intercropping, and water-saving farming methods, indigenous people have been offering a variety of ecological and cultural services in order to maintain food security.

4.1.3. Organic farming

Within the larger sustainable agriculture spectrum, organic farming encompasses a variety of methodologies. Ecologically sustainable agriculture (including organic farming) is both a philosophy and an agricultural system in its most evolved form. It is founded on a set of ideals that reflect an understanding of both ecological and social reality, as well as a sufficient level of empowerment to motivate responsible action (Hill & MacRae, 1992).

“Kay kami di mi kuan sa kanang abono. Wala mi ana.” P3

Translation: Because we don't use any fertilizer. We do not have that there.

“Among mga gulayon, dili man mi mogamit abono sir, kay mayo man iyang tubo.” P3

Translation: Our vegetables, we don't even use fertilizer sir, because it grows well.

Losing organic farmers' indigenous expertise would mean losing a significant portion of their ability to raise their own food and making themselves subject to manipulation by strong forces that stand to profit from the loss (Sumner, 2008).

4.2. Types of agricultural practices of *mamanwa* farmers

Indigenous knowledge is an underutilized resource in the development process that may be used to build problem-solving techniques for local populations, particularly impoverished communities (Enns, 2015). The fact that historical farming practices for sustainable growth originated in direct touch with nature and environmental circumstances is their major strength. Certain ancient procedures have shown to be long-term sustainable (Kazmi et al., 2014).

4.2.1. Physical environment and traditional cultivation method

Traditional farmers are open to using new ways, but they are wary of the approaches that come with changing lifestyles. Farmers are still unsure if they will be able to embrace new practices, let alone reap the rewards that come with them (Kazmi et al., 2014).

“Wala gyud, wala gyud mi gi-punit bisan unsa nga klase, wala gyud kay tambok naman sya daan nga yuta. Gipili man ang yuta nga kilid sa sapa, dili man mo-ingon basta ngalan yuta tanom dayon.” P1

Translation: No, we never pick any kind of, never because the soil is already fertile. The land on the side of the river is also chosen, so we don't just plan anywhere just because there is soil.

“I-suksok sa yuta ang balanghoy. Ukayon man gihapon tabon sa bolo.” P1

Translation: We push the cassava in the ground. We cover it with soil using the bolo.

“Oo, pasagdahan. Naa man mga yuta nga tambok mga maayong yuta nga ang tanom mo abante.” P1

Translation: Yes, we just let it be. There are also fertile soils that are good soils your crop will grow.

“Ibot, unya nya kuhaon ang unod tapos ibalik ra dayon gihapon. Mga unod ra kuhaon.” P1

Translation: We pull, then he would take the flesh and return it immediately. Only its flesh will be removed.

“Ang kamote, kukoton ra ang gamut ra gipangita, ang punuan sa kamote, makita man ang unod kay mogawas man sa yuta, mao ra ang kuhaon. Mo-gawas man sa yuta ang tomoy. Ang kadak-on naglubong pa. Mailhan man kay naa man gamot ang dako-dako gamot mao ang subayon sa ilawom sa yuta.” P1

Translation: For the sweet potato, we just dig the root, that’s what we sought, then the stem of the sweet potato; when the flesh is visible as soon as it comes out of the ground, the flesh will be taken. The rest is still buried. It is also known that if there is a root, there is a much larger root that can be traced underneath.

“Ang among pangutli-on, ug an mga unod, pillion ra sad namo ang mga dagko. Ang gagmay amo ihabilin sa punuan, kay inig balik namo, ang gagmay mo-dagko na pod to, mao dugay mahurot kay samtang gikuha namo ang dagko, ang puno nay gamay ga sige tubo.” P4

Translation: We only take out the big ones. The small ones will be left in the field because when we come back, the small ones will have grown by then, so it will take a long time to run out of crops because while we take the big ones, the small ones will start growing in time.

Their following responses proved that they are more comfortable with their traditional practices and are very efficient in doing so that their practices have become second nature to them. They possess the knowledge and natural instincts to select the environment for farming and are knowledgeable on how to cultivate the available resources.

4.2.2. Astronomical and farming calendar

“Pebrero, Marso, Abril, Mayo, upat ka bulan sa among pagsulod sa trinabaho. Kutob sa ma-akos pa sap ag-trabaho, mo-trabaho mi. Kay kung pananglitan kutob sa Oktobre, kay kinaraan kay Oktobre nag ani mao nay atubangon sa kalasangan sa pamutang sa lungob, kanang pang-dakop sa baboy.” P1

Translation: February, March, April, May, four months into our work as farmers. If you can afford to work, you will work. For example, until October, because in October the harvest is already there, we just need to set up that trap for wild boar.

“Parehas ana, kanang patay nga parehas ang buwan, parehas ana di sa ta ana. Gikan didto padako, naman siya, kung magka-dako na kanang full-moon, nindot na itanom.” P2

Translation: If it is a new moon, we don’t farm. When it changes its phase, that’s when we farm again, until it gets into full moon, perfect time to farm.

“Oo, naa gyud buwan. Sama sa pag-tanom sa mais, kinahanglan gyud na ug adlaw, kanang bungkig ng adlaw. Maayo pod ang buwan, mayo pod ang petsa. Parehas ana 24, dili ta mo-tanom kanang 23, 13, ana.” P2

Translation: Yes, there really is a specific month. Like when planting corn, it really needs a specific date, like an odd number. For example, if it falls on the 24th, we don’t plant our crops; we wait until it is the 23rd or 13th.

“Ang among gibuhay sa pag-panguma hangtod maka-harvest mi ug kamote, di ba pirmiro amo na i-tanom, among ihapan ug unom ka buwan ang kamote, pag-sakto unom ka buwan, mo-harvest mi.” P4

Translation: What we do when farming until we can harvest sweet potatoes is we plant them, then we will count from the time we plant the sweet potatoes for the next six months, and then at exactly six months, we will harvest.

Indigenous people know the farming environment in different seasons and react to it from planting to harvesting (Jeeva et al., 2006). These methods were passed down from their ancestors and have shown to be effective in harvesting healthy harvests; thus, they continue to utilize them since they are key cycles in their agricultural practices.

4.2.3. Harvest adjustment mechanisms

Local farmers meticulously modify the time of seasonal crop planting depending on data gathered from surveillance and monitoring operations. Growing sweet potato and paddy taro crops is an example of a local farmer's adaptive method to guarantee local food supply in response to food shortages caused by disease, typhoons, or high rainfall (Ba et al., 2018).

“Kung nay naka-kontrata, i-diretso. Kung nay adlaw o oras nga kuhaon.” P1

Translation: If we have contracted some buyers, then we have a specific time and date when we turn them over to them.

“Huna-hunaon kung pila kabuok ma-hurot sa usa ka adlaw mao ray kuhaon kung mahurot mo-kuha ra pod.” P1

Translation: We make an estimate of how much we can consume in a day, then we get only what we need.

“Oo, amo pod bana-banaon kining among madala sulod sa usa ka semana. Pag-sakto sa usa ka semana, mahurot na to, mobalik na pod mi.” P4

Translation: Yes, we estimate what we need to bring for one week. After a week and we consumed our food, we went back to harvest again.

“Mopili ra man sa dagko kay kung imo nang laruton, wa naman kay igbalik.” P4

Translation: We only get those that have grown fully. But we don't pull everything because if we do, we have nothing to go back to anymore.

The Mamanwa farmers rely on their crops for their daily provision as well as their means of earning income, they harvest only what is needed for their consumption for the next few days and they do not collect more than what they need. This is a strategy they employ to ensure that nothing goes to waste in terms of their crops and what they can consume day to day.

4.2.4. Crops diversity

Environmental adaptation and resilience may be shown in crop diversity preservation and cultural preferences for particular crops over others (Panday, 2012; Reenberg et al., 2008).

“Koryoso, mga kamote, balanghoy, kubasa, kutob sa mga makaon, tubo.” P1

Translation: Koryoso, sweet potatoes, cassava, kubasa, as long as they're edible, ... sugar cane.

“Di kuan man na, naka-plot man na. Duha ka plot kamote, ang ika-tulo balanghoy, ang ika last koryoso, naa man sya distansya, distansya.” P4

Translation: It's already plotted. Two sweet potato plots, the third balanghoy, and the last koryoso, there is always a distance from one crop to the next.

They also know what specific root crops would thrive in the environment, and they maximize the potential of the soil and the area to grow a variety of crops that would thrive well in their land.

4.2.5. Cultural ritual activities

Indigenous people perform some rituals to satisfy the farming deities (Jeeva et al., 2006). These rituals are strategies for engaging with and influencing the spirits in the land to win the goodwill of the supernatural beings. As indicated by their words, this idea has been passed down from generation to generation, and they follow it religiously every time they farm.

“Oo, ana. Dili pod mi mo-tanom ug parehas ana mo-bungkag ug lasang, amo sa harangan. Mangayo sa mi ug katahuran sa mga tag-iya diha nga dili ingon-nato kay kung di mi mangayo ug katahuran, dili ka magpakaon sa ila, dili ka motuman, ang kulba diha usahay, mosukot man sad sila. Pagkuha pod nimo pananglitan ma-abot to imong gi-tanom, tumanon sad nimo usa ka mokuha, tagaan sa nimo, gasahan sa nimo sila, sila sa una nimo una pakan-on.” P2

Translation: We don't plant nor cultivate the land until we do the spiritual activities. We ask permission from deities, we offer food. We do these activities because they might be angry. Like, if you will do the harvesting season, we also offer goods to them.

“Kanang mga patag, patag para ika-tanom nimo daghan. Didto ka mag-harang, di man pwede mag-harang ka sa layo.” P2

Translation: In a flat land area, we conduct ritual activities.

“Sa amo ng lihi. Oo, mag-lihi mi kay kinahanglan bisan mga gulay ug unsa na imo mga tanom, naa gyud na lihi ana, ug kay mag-depende na sa imong lihi wala kaayo ka ug unod ug daghan.” P4

Translation: We also do ritual activities, even planting vegetables.

“Oo, dapat mag-lihi gyud ka kay aron sakto sa iyang kinabuwanan, daghan unod. Maayo kutob niya way mo-unsang niya.” P4

Translation: You need to do ritual activities.

“Karon maayo mag-tanom mi. Nya mag-lihi kanang ika-tibuok gyud sa buwan, kanang mag-lingin gyud siya. Mao gyud na among... Mga kamote, mga balanghoy.” P4

Translation: We do ritual activities during a full moon.

4.3. Reasons for Mamanwa's agricultural practices

Mountain ecosystem interactions with local indigenous groups are examples of socio-ecological systems in which people rely on ecosystem resources and services, and ecosystem dynamics are impacted, to varied degrees, by human activities (Chapin et al., 2009).

4.3.1. Absence of pests and insects

The reputation of Indigenous Plant Protection Practices (IPPP) for pest control has improved, according to the report. From the ethnic communities of Tripura, India, a total of 39 traditional pest control strategies were documented. People learned a lot about IPPP from their forefathers and mothers. The study's participants created remarkable solutions for the control of a variety of pest problems utilizing locally accessible resources that are both cost-effective and environmentally beneficial (Singh et al., 2021).

“Wala man ulod.” P1

Translation: There are no worms

“Ganahan mi mag-uma didto sa bukid, bukid kay dili mi hasol. Di parehas diri sa dayag duol sa barrio bisan unsa namo i-tanom daghan uod.” P3

Translation: We like to farm there in the mountains, it is more convenient. It’s not the same here obviously near the barrio no matter what we plant there are a lot of worms.

“Among sayote kada semana mo-harvest mi, walay abono, walay spray. Dili mi mag-spray, walay ulod.” P4

Translation: We harvest chayote weekly, no fertilizers, no sprays. We don’t use spray, and there are no worms.

The Mamanwa farmers believe in organically grown food that is grown and processed using no synthetic fertilizers or pesticides. They believe that good crops should not be mixed with chemicals. Due to their natural capacity to find good land to farm, they can scout locations that will not need any pesticides to control pests. They believe that doing so would mean taking additional steps in their farming methods, which they find a complicated process.

4.3.2. *Less agricultural management*

Traditional farming in Wutai village has demonstrated adaptive capacity, manifesting itself in ecologically benign techniques, self-sufficiency, flexibility to environmental and climate change, and connections to local culture and development (Ba et al., 2018).

“Pwede man mga tulo ka adlaw pwede man i-stock sa balay. Dili man ma-unsa. Ma-abtan na sobra usa ka semana.” P3

Translation: It can also be stocked at home for about three days. It won’t go to waste or anything. It will take more than a week before it gets spoiled.

“Oo sir, ganahan mi mag-uma didto sa bukid, bukid kay dili mi hasol.” P3

Translation: Yes sir, we like farming in the mountains because it is more convenient.

“Kay inig balik namo ang gagmay, mo-dagko na pod to, mao dugay mahurot kay samtang gikuha namo ang dagko, ang puno naay gamay ga-sige tubo. Pag-tubo adtong mga gagmay, naa na pod mo-sunod nga gagmay nya ang dagko kuhaon na sad namo.” P4

Translation: Once we go back, those small crops will be fully grown by then. That’s why we can always harvest more; small crops will still have the chance to grow while we harvest the big ones.

Crop pests are a concern in many agricultural systems across the world, but Mamanwa farmers previously had minimal expertise in chemical farming. They only discovered this through local government entities with the interest of extending and improving the indigenous group’s farming techniques. Despite these efforts to give them with effective crop protection knowledge or resources, many admitted to having little awareness of pesticide usage since they have their own farming techniques that do not necessitate the use of pesticides.

4.3.3. *Traditional and cultural knowledge*

The Mamanwa farmers follow their traditional and cultural agricultural farming traditions faithfully, which they learnt via observation, exposure, and absorption in these activities. As a result, these behaviors will be passed down from generation to generation, especially if it is their sole source of revenue for their daily necessities.

“Ang ila pagkinabuhi gikan sa lasang mao pa man amo gamit, hangtod pa gani karon, naa pa.” P2

Translation: The livelihood that they practice in the mountains is the same practice that we do now. It’s still in us.

“Oo, buhaton gihapon namo kay na-andan naman. Di naman pwede di nimo buhaton kay matingad-an na ka kay ngano karon di naka musunod. Hangtod karon, buhaton na gihapon na namo.” P2

Translation: Yes, we still practice it because that’s what we are used to doing. We can’t just simply abandon our tradition because we will be questioned. Until now, we still practice it.

“Kay wa man mi maka-skwela, mao amo gitun-an ang pag-trabaho.” P3

Translation: Because we don’t go to school, we had to learn to work to survive.

“Dili mi sir ganahan nga puyo sa balay. Kinahanglan mangita mi trabaho nga among makaya.” P4

Translation: No, we don’t want to just stay at home and do nothing. We need to work as much as we can.

There is a risk that within one generation, the knowledge could be lost forever (Warren & Rajasekaran, 1993). Traditional farmers are open to using new ways, but they are wary of the approaches that come with changing lifestyles. Farmers are still unsure if they will be able to embrace new practices, let alone reap the rewards that come with them. Most farmers agreed that those who use contemporary ways are not profiting from them either, owing to a lack of understanding and information (Kazmi et al., 2014).

The Mamanwa farmers have continuously practiced eco-friendly agricultural methods in their farming strategies and will pass on the knowledge and skills to the next generation through exposure and lifestyle. They move from one area to another to find sites that can provide them with good crops. They avoid using chemicals in their farm and are only forced to integrate the methods if they are left with no choice but to use them. Farming in the area where they live may require them to integrate pesticides into their methods, but most find it time-consuming. They would rather use the traditional approaches since most of them are comfortable and familiar with the process, namely soil profiling and selection, multi-cropping, and organic practices. They rely on traditional practices taught by their elderly, and these have proven to be effective methods of harvesting good crops despite the available procedures for incorporating technologies that would make the process easier. They can identify good soil easily and they have used astronomical and organic farming using calendar and celestial bodies to harvest crops for their daily needs. Moreover, they know how much they need for the succeeding days; hence, it would lessen the need to harvest more than what they need. They also posited that traditional methods are much simpler and easier to follow compared to the use of latest technology considering their spiritual obligations that they need to observe.

5. Conclusions & recommendations

5.1. Implications of the study

The Mamanwa tribe’s traditional farming practices significantly impact more comprehensive ecological and cultural settings and the people who engage in them. They often base their agricultural activities on well-established, sustainable techniques refined through the

years. With an emphasis on sustaining soil fertility, managing water resources, and protecting biodiversity, these techniques put the long-term health of ecosystems ahead. Furthermore, these practices - including knowledge transmitted orally and via physical practices - reflect the close bond between indigenous peoples and their land. Communities may enhance social cohesiveness and reassert their cultural identity via traditional farming practices, developing a sense of pride and connection to their heritage. Additionally, these indigenous people's agricultural practices emphasize autonomy and self-reliance while prioritizing control over food production and distribution. Indigenous communities like the Mamanwa protect their food sovereignty by minimizing their reliance on outside resources like chemical fertilizers or genetically engineered seeds by upholding diversified and decentralized food systems.

5.2. Limitations of the study

The Mamanwa are an indigenous people from the Philippines with distinctive agricultural practices closely linked to their traditional knowledge and cultural beliefs. The agricultural farming practices of the Mamanwa people, who do not depend on machinery, fertilizers, or higher-quality seeds, were the subject of the study. They raise and harvest their crops organically, without using machines or chemicals. The Mamanwa tribe, concentrated in Sitio Palayan, Barangay Caucab, and Almeria, and located in the hilly region of Biliran Province, is the only group included in the research.

5.3. Future research

To strengthen our comprehension and promote the sustainability of the Mamanwa people's agricultural customs, future studies on their traditional farming practices should focus on several important topics. In order to improve sustainability, resilience, and production, future studies may examine the integration of contemporary agroecological concepts with traditional Mamanwa agricultural techniques. Additionally, studies can investigate how the Mamanwa are modifying their farming methods in response to changes in the climate. Further research will be done using digital archives, community mapping, oral history interviews, participatory research methodologies, and documentation of traditional Mamanwa agricultural knowledge, practices, and innovations. Research of this kind may help create an extensive database of valuable indigenous information for educating future generations, assisting with cultural revitalization initiatives, and supporting international efforts to preserve traditional knowledge and agricultural biodiversity.

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