



The indigenous uses of plants from Siberut, Mentawai, Indonesia

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Research

Abstract

Background: Indigenous knowledge systems, like those traditionally practiced by the Mentawai people from the Mentawai Islands, West Sumatra, Indonesia, are a deep-time laboratory that examines how people manage or failed to find adaptive solutions to changes in their surroundings, including biodiversity loss and changing climate. However, many of these practices, including Mentawai's traditional knowledge system, **arat sabulungan**, are eroding. Given that Indigenous knowledge systems are believed to make up at least half of humanity's intellectual heritage, adequate documentation of traditional ecological knowledge is needed, as too are appropriate systems that support the perpetuation of such knowledge. This paper identifies the indigenous uses of Siberut's flora and explores how this knowledge may underlie the conservation of Siberut's unique biodiversity. Mentawai values and attitudes toward their traditional ecological knowledge and reasons why their traditional knowledge is eroding are also examined.

Methods: Primary data was derived from various sources, including: observation of peoples' day-to-day activities; community surveys (number of participants = 494) and key informant interviews (number of informants = 21); and plant collection and identification. Research participants in the community survey were chosen based on their interest and willingness to partake in the survey. Key informants were chosen based on their reputation within the community on the extent of their plant knowledge.

Results: Ethnobotanical data suggests that the Mentawai have ethnobotanical uses for at least half of all plant species on record. Though 98 percent of respondents felt their traditional knowledge is important for the future of Mentawai, a majority felt there were substantial threats to the continuation of their traditions.

Conclusion: Data gathered during the research period suggests that Mentawai indigenous practices and traditions play a critical role in conserving Siberut's unique biodiversity.

Key words: Biodiversity; Indigenous peoples; traditional ecological knowledge; Mentawai Islands; Indonesia; tropical conservation; Mentawai people

Background

Indigenous knowledge systems

Indigenous peoples inhabit some of the most biologically diverse regions globally and add substantially to the world's cultural, linguistic and intellectual heritage (Davis 2009, Gray 1991, Posey 1999, UNDESA 2009). Accumulated over millennia, traditional ecological knowledge (TEK) spans multiple dimensions and scales, and is verified through repetition, empirical observations and recognition of patterns (Mazzocchi 2006, Nicholas 2018). Moreover, these knowledge systems are often: collectively owned; have co-evolved with ecosystems; integrate benefits across many dimensions, and usually pre-date Western science (Mazzocchi 2006, Tiwari *et al.* 2017, UNDESA 2009, Wilder *et al.* 2016). Yet concerns remain in relation to the conservation of Indigenous peoples' knowledge systems as they continue to be marginalised, expropriated and disparaged; forced to adhere to foreign education, religion and politics (UNDESA 2009). Moreover, those processes that threaten biological diversity and ecosystem health also impact indigenous populations (Sheil *et al.* 2005), causing detrimental effects to their physical and mental health and wellbeing, and their traditional lands and biomes (Maffi 2002, Minority Rights Groups International 2017, Persoon 2008). Yet, Indigenous peoples, whose values, systems and stewardship regularly interact with, sustain, and often perpetuate or enrich traditional lands and ecosystems, offer significant contributions to global biodiversity conservation efforts (Berkes *et al.* 2000, Corrigan *et al.* 2018, Corrigan & Hay-Edie 2013, Posey 1999, Sheil & Lawrence 2004, Sobrevila 2008, Standley & Hill 2011, Sujarwo & Caneva 2016, Wilder *et al.* 2016). Given the current global crisis – namely, ecological degeneration, the possibility of climate collapse and unprecedented biodiversity loss, adequate documentation of TEK is needed, as too are appropriate systems that support the perpetuation of such knowledge.

Mentawai, West Sumatra, Indonesia, is home to a rich, biologically diverse rainforest and unique hunter-gatherer culture. Purportedly, the Mentawai people have occupied these islands for thousands of years, maintaining a strong cultural and spiritual connection with the forest they inhabit (Schefold 1989). In varying degrees, the Mentawai people still practice **arat sabulungan**, a complex, animistic belief system based on the sacred relationships between themselves and the spirits that reside in all animate and inanimate objects. These practices are based on the overarching priority to live in harmonious balance with nature, and offer the Mentawai people a subsistence lifestyle that can provide all food, resources and medicines from the forests surrounding the **uma** (traditional clan houses usually built on river tributaries throughout the forest). Tribal elders, or **sikerei/ sikebbu'kat**, are the primary keepers of this knowledge and work to maintain the health of their community, acting as shaman, educator and healer.

Since 1954, foreign practice and ideology were introduced and enforced throughout Mentawai as part of a "modernisation program" for isolated communities (Colfer & Resosudarmo 2002). Labelled as 'backward' and 'primitive', the Mentawai people were removed from their ancestral lands and relocated into 'modern' resettlement villages, where traditional agriculture, religion, education and artefacts were forbidden. As foreign developments and a cash-based economy have become established within the villages; as more children are being sent to government-run schools; as more villagers become reliant on imported foods rather than forest foods and traditional agricultural provisions; and, as fewer youth are undertaking apprenticeships to become **sikerei**, the transmission of Mentawai TEK is hindered, and more quickly becoming diluted (Bakker 1999, Kusakabe *et al.* 2015, van Klooster *et al.* 2019, Wilder *et al.* 2016). Despite national policies softening to accommodate traditional beliefs and practices (Boedhihartono 2017), 99 percent of the Mentawai population live within the resettlement villages, with very limited or no access to their traditional knowledge and practices (Persoon 1998, Persoon 2008). The gap between the younger generation and the TEK held and taught by the **sikerei** and **sikebbu'kat** (respected elders) is substantial, and growing rapidly.

Aims of this study

The continued richness of biodiversity, intact ecosystems and perpetuation of Mentawai TEK is assumed to be intrinsic to Mentawai wellbeing, and ultimately fundamental to their communities' survival. Additionally, it is believed that **arat sabulungan** – Mentawai TEK – governs and, in many ways, may perpetuate Mentawai's biodiversity (Berkes *et al.* 2000, Colfer & Resosudarmo 2002, Reyes-García *et al.* 2014). Considering the Mentawai community's values, agenda, and long-term goals, this study examines Mentawai uses of plants and the associated traditions. This study is the first to rank these plants according to their perceived importance by the community, and thus offers a fuller understanding of Mentawai TEK practices, customs and taboos, and local conservation priorities. Collaboration with an Indigenous-led non-profit organisation and their research team was foundational to the research approach as it helped us gain greater depth, accuracy, and relevance of results and ramifications.

Materials and methods

Study area

Maileppet ($1^{\circ} 33' 14''$ S, $99^{\circ} 10' 58''$ E) is a coastal village approximately 5 kilometres north of the main port, Muarasiberut, in Southern Siberut, West Sumatra, Indonesia (Figure 1). Nearby Muntei village ($1^{\circ} 34' 56''$ S, $99^{\circ} 11' 25''$ E) is situated west of Maileppet on the Muntei River (see Figure 1). Both village districts predominately speak the Sabirut dialect of the Mentawai language. Surrounding the villages are disturbed secondary forests predominately covered by *Metroxylon sagu* Rottb. (Arecaceae), *Musa* L. (Musaceae), *Durio* Adans. (Malvaceae), *Cocos nucifera* L. (Arecaceae), and other useful or commercial crops (e.g., *Areca catechu* L. (Arecaceae) and *Hevea brasiliensis* (Willd. ex A.Juss.) Müll.Arg (Euphorbiaceae)), with mangrove forests lining the coast, and *Colocasia esculenta* (L.) Schott (Araceae). In addition, **pugette'an** (traditional taro garden fields) and **mone** (clan-owned growing fields) are scattered throughout the landscape. Maileppet and Muntei village regions are located within Siberut's development zone, where forestry, agricultural and urban developments may occur, and are not within the Siberut National Park conservation zone (WWF 1980).

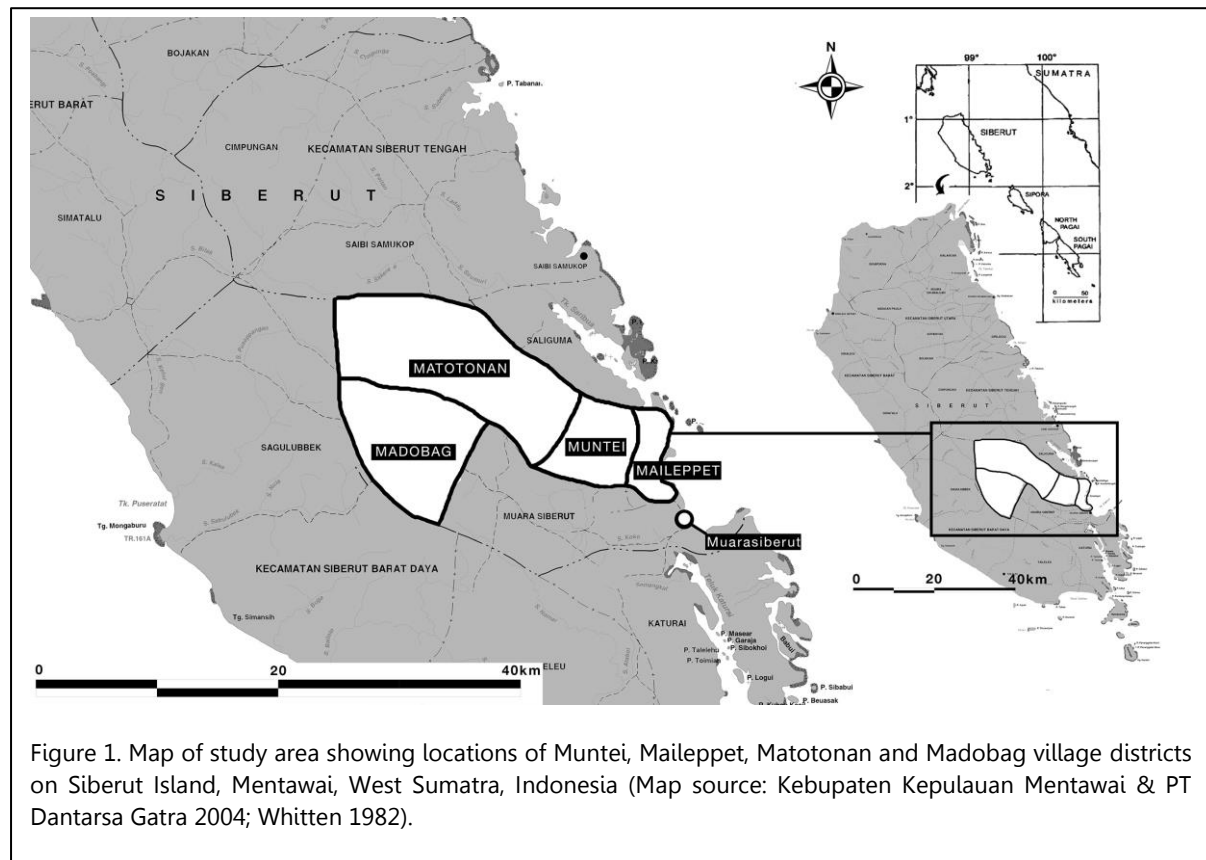


Figure 1. Map of study area showing locations of Muntei, Maileppet, Matotonan and Madobag village districts on Siberut Island, Mentawai, West Sumatra, Indonesia (Map source: Kabupaten Kepulauan Mentawai & PT Dantarsa Gatra 2004; Whitten 1982).

The Madobag and Matotonan regions, $1^{\circ} 35' 43''$ S, $99^{\circ} 5' 2''$ E and $1^{\circ} 32' 19''$ S, $99^{\circ} 0' 58''$ E respectively, are situated along the Sarereiket River, a Muntei River tributary, approximately 20-25 kilometres upriver northwest from Muarasiberut (see Figure 1). Both districts share the Rereiket dialect of the Mentawai language. The region is remote and usually only accessible by **pompong** (small dugout canoe with a 2 HP engine) or foot. The surrounding vegetation mixes closed-canopy forests, **pumonean** (food forests), **pugette'an**, and **sagu** (*Metroxylon sagu*) swamps. The Madobag and Matotonan village regions fall within the Siberut National Park traditional use buffer zone, where all traditional use and activities may take place, and commercial logging is not permitted (WWF 1980).

Data Collection

This project was carried out in collaboration with researchers from Yayasan Pendidikan Budaya Mentawai (YPBM), a grassroots non-profit organisation providing cultural and ecological knowledge learning opportunities for students living in resettlement villages in Mentawai. Through a participatory approach, the study sought to empower YPBM collaborators by facilitating research training activities that might enhance team members' existing skills so that plant identification and ethnobotanical documentation, and monitoring and evaluation activities may be continued following the completion of this study.

The lead researcher lived with the Mentawai community from January to December 2019, and was mostly based in Muntei village to facilitate daily collaboration with YPBM at their office base. Several field trips to the Madobag and Matotonan districts were undertaken during this time. In addition, the lead researcher frequently accompanied **sikerei** and **sikebbu'kat** whilst they were collecting or preparing medicines. Researcher involvement in day-to-day household and wider community activities allowed more accurate detection of community needs, wants and attitudes, and enabled the lead researcher to become familiar with Mentawai plant traditions and practices in context (similar to experiences of Nolan & Turner 2011). This involvement also supported the detection of emerging socio-cultural trends (Alexiades 1996). Documentation activities (including photography and videography) focused on capturing the value and relevance of TEK to the Mentawai people, whilst also recording individual plant specimens and uses. Voucher specimens for the plants identified as the most useful to the Mentawai people were collected according to standards outlined in Cunningham (2001) and Martin (1995). Specimens were identified using existing literature and deposited in the herbarium at Universitas Andalas (ANDA) for identification and storage [See Appendix 1 for collection details]. These specimens were still awaiting cataloguing at ANDA at the time of publication.

Semi-structured interviews were carried out on a one-on-one basis by Mentawai collaborators from February to March 2019. A total of 494 participants were surveyed. Research participants were chosen based on their interest and willingness to partake in the survey. Recognising that most Mentawai community members hold some level of botanical knowledge (Nolan & Turner, 2011), and to elucidate differences in opinion and knowledge levels between population groups, no bias was given for age, ethnicity, level of education or occupation for those participating in the community survey. Nearly half of all respondents were 18-40 years of age, nearly one-third were over 41 years of age and 12 percent were aged between 12-17 years of age. Fifty-seven percent of participants were male; 43 percent were female. One-quarter of all respondents had not completed any formal schooling, one third had only completed primary school, 38 percent had completed middle and/or high school, and 5 percent of participants had attended university. Sixty-eight percent of respondents identified their religion as Catholic, 26 percent Islam, and 6 percent Protestant.

As suggested by Mentawai collaborators, the lead researcher did not interview participants in the community survey to prevent participants from becoming shy or distracted due to language barriers. The community survey had two sections: i) a mostly closed-ended questionnaire about individual perceptions of Mentawai TEK, and ii) a 'freelisting' activity, where respondents were asked to cite useful 'ethnospecies' (plant specimens identified as individual species according to Mentawai informants) within previously defined categories, namely: food, medicine, construction, ceremonial, firewood, tools/handicrafts) (Quinlan 2005). No limit was given to how many plants each respondent could list for each category. From these lists, a freelisting matrix was created to document the relative frequency of citation (RFC), and the average order in which each plant was listed, thus attempting to determine the overall cultural saliency of each ethnospecies, where:

$$RFC = (\text{number of times an ethnospecies was cited})/(\text{total number of informants}).$$

The freelisting matrix also sought to reveal variations between age, gender and regional demographics (Caruso 2015, Quinlan 2005, Vogl *et al.* 2004). Language variations were identified when possible for each ethnospecies cited. Respondent answers that cited plant parts (e.g. **loina'**, **kayu** (Bahasa Indonesia), timber), names of ceremonies (e.g. **puliaijat pangurei**), or objects (e.g., **opa**, **jaraik**), and not plant species were excluded from the analysis.

To clarify results gathered from the community survey, 21 key informant interviews with **sikerei** and **sikebbu'kat** were conducted. Key informants were selected based on community consensus of these participants being perceived as being highly knowledgeable and experienced in Mentawai plant knowledge. Interviews were carried out by YPBM team members who were fluent in the Sabirut and Rereiket dialects. Using results from the freelisting activity described above, key informant interview questions focused on refining the uses and descriptions of plant data extracted from the community surveys, and confirming that data gathered from these surveys adequately reflected the perceived usefulness and value of species within Mentawai plant traditions. Open questions focused on elucidating how participants gained their knowledge, whether they had taught or were teaching anyone else, and whether they believed the ways that knowledge is being shared and practiced may be changing, under threat, or eroding.

Data analysis

The cultural significance of each ethnospecies was calculated as specified by Silva *et al.* (2006) as:

$$CSI = \sum(i \times e \times c) \times CF.$$

Where i = ethnospecies management [wild (1) or cultivated (2)]; e = use preference [not preferred (1) or preferred (2)]; c = use frequency [rarely (1), sometimes (1.5) frequently (2) used]; CF = correction factor [number of citations for a given ethnospecies divided by the number of citations for the most-mentioned species].

To measure the proportion of informants who regard an ethnospecies as most important, the Importance Value (IV) formula, adapted by Byg & Balslev (2001) from Phillips & Gentry (1993), was used:

$$IV_s = n_{is}/n.$$

Where n_{is} = the number of informants who consider ethnospecies s most important; and n = the total number of informants.

Results

Overview

A total of 452 ethnospecies were recorded during the initial 10-month documentation period (January to October 2019): 339 ethnospecies were spontaneously listed during freelisting activities (number of informants = 494) and, 127 ethnospecies cited in key informant interviews ($n = 21$). When asked to clarify whether any species cited may have two or more varieties, informants were able to cite an additional 166 varieties (e.g., **aileleppet** includes **aileleppet simaingo**, **aileleppet simabulau**, **aileleppet kaeru**), including 17 varieties of **mago** (*Musa spp.*), 14 varieties of **gette** (*Colocasia esculenta*), and 13 rattan types. A total of 225 ethnospecies could be identified to genus or family level, from which 83 botanical families were represented. Zingiberaceae (20 ethnospecies), Poaceae (12 ethnospecies) and Araceae (11 ethnospecies) were the most highly represented families (Figure 2). Most plant species are believed to be native to the Mentawai Islands.

Frequently cited plants in the community freelisting activity

The average number of ethnospecies listed by respondents during the community freelisting activities was 21.8 (± 12.76 SD, ± 0.57 SE) (Figure 3). Gender did not play a significant role in determining the number of plants cited by respondents (t-test, $p > 0.05$). However, there was a correlation between age and the average number of plants cited by respondents (ANOVA single factor test, $p < 0.05$), with men over 60 years of age able to cite significantly more species ($M = 28.1$, ± 13.3 SD, ± 0.73 SE) than younger respondents (Figure 4). Of the total number of useful ethnospecies cited, 39 percent could be used medicinally, 30 percent used for construction, 25 percent were used for firewood, 24 percent had ceremonial purposes, 19 percent were edible, and 14 percent used for tool-making. One-third of all ethnospecies were listed in more than one category. Of the 339 ethnospecies cited during the community freelisting activities, 95 ethnospecies were mentioned by only one respondent.

A total of 64 ethnospecies were listed as food sources. **Sagu** (*Metroxylon sagu*), **gette** (*Colocasia esculenta*) and **mago** (*Musa spp.*) were most frequently mentioned as the most important food sources (Table 1). Fifty-seven ethnospecies cited as food sources were mentioned by fewer than 20 percent of respondents. A total of 134 ethnospecies were cited for medicinal purposes. **Aileleppet** (*Graptophyllum pictum* (L.) Griff. (Acanthaceae)), **kakainau** (*Hedychium coronarium* J.Koenig (Zingiberaceae) / *H. flavescens* Carey ex Roscoe (Zingiberaceae)), **talingengeng** (*Piper betle* L. (Piperaceae)), **kopuk** (*Kaempferia galanga* L. (Zingiberaceae)), and **mumumen** (*Mussaenda frondosa* L. (Rubiaceae)) were ranked highly, and were mentioned by more than 20 percent of respondents. Only one respondent mentioned thirty-nine medicinal ethnospecies. Eighty-five ethnospecies were listed as important ceremonial plants, of which only five were listed by more than 20 percent of respondents. Medicinal plants were listed highly for ceremonial purposes, along with important traditional foods such as **sagu**, **gette**, **toitet**, and decorative plants **sura** (*Codiaeum variegatum* (L.) Rumph. ex A.Juss. (Euphorbiaceae)), **bekeu** (*Hibiscus rosa-sinensis* L. (Malvaceae)), **katsaila** (*Arenga pinnata* (Wurmb.) Merr. (Arecaceae)). A total of 103 ethnospecies were considered as important building materials. Only one respondent cited twenty-four ethnospecies. **Katuka** (*Shorea pauciflora* King (Dipterocarpaceae)), **sagu**, **kakatdut** (*Alstonia spatulata* Blume (Apocynaceae)), **mancemi** (*Hopea dryobalanoides* Miq. (Dipterocarpaceae)) and **manggeak** (bamboo types) were

most frequently cited as important building materials. Respondents from the Sarereiket region also ranked **kaboi** (*Pentace triptera* Mast. (Malvaceae)) highly for building purposes.



Figure 2. Six examples of important Zingiberales plant species found in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia. From left to right: **pelekak** (*Etlingera coccinea* (Blume) S.Sakai & Nagam. (Zingiberaceae)), **bagli-bagli** (*Hellenia speciosa* (J.Koenig) S.R.Dutta (Costaceae) **kiniu** (*Curcuma longa* L. (Zingiberaceae)), **Tottot mamai** (Sabirut dialect) / Gojo (Rereiket dialect) (*Etlingera elatior* (Jack) R.M.Sm (Zingiberaceae)), **kukuet** (*Hornstedtia conica* Ridl. (Zingiberaceae)), and **kojo koddiai** (Siberut dialect) / **kasingin** (Sabirut dialect) / **pasingin** (Rereiket dialect) (*Alpinia malaccensis* C.Presl (Zingiberaceae)).

A total of 86 ethnospecies were listed as firewood, with three ethnospecies cited by 20 percent of respondents. Some respondents commented that all wood might be used as firewood provided they were dry. The most frequently cited ethnospecies for firewood were **manggeak**, **sagu**, and **sibetu** (Sabirut dialect) / **eru'teinung** (Rereiket dialect) (*Melastoma sylvaticum* Blume (Melastomataceae)). For handicraft and tool-making, a total of 46 ethnospecies were cited. Rattan kinds, including **pelege** (*Calamus sp.* L (Arecaceae)), **mandorou** (*Calamus caesi*

Blume (Arecaceae)), and **sasa** (*Calamus sp.*), were ranked most highly, along with **osap** (Gleicheniaceae C.Presl), **toitet**, **manggeak** and **sagu**.

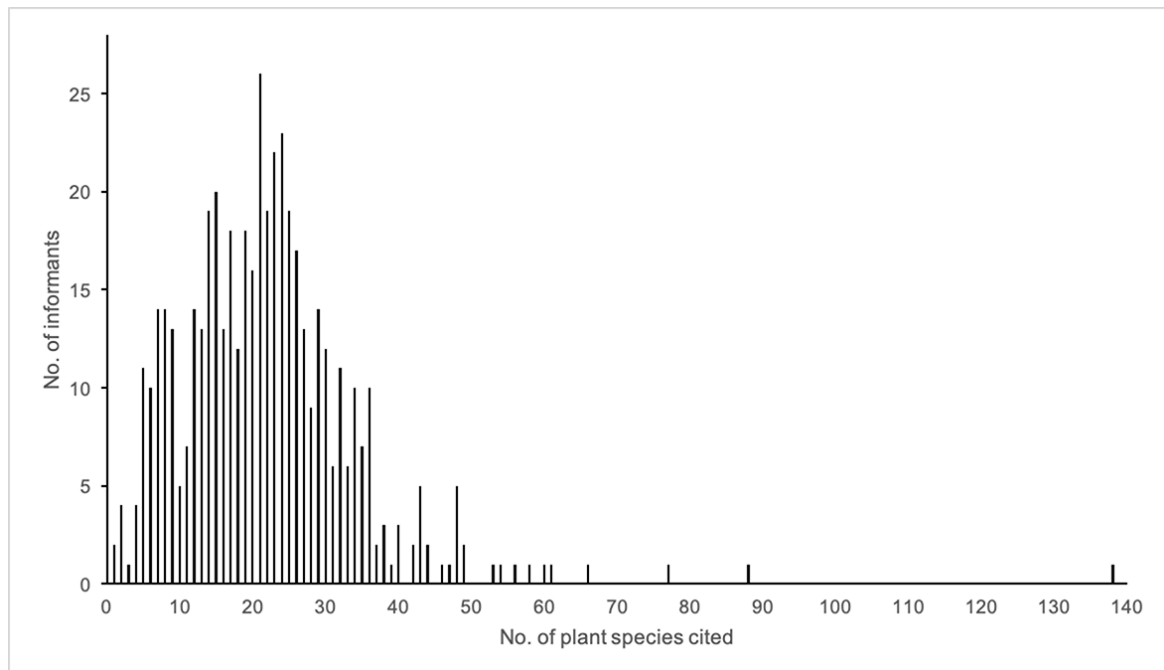


Figure 3. Distribution of plant knowledge among the Mentawai people living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, as indicated by the list length of informants ($n = 494$) who cited certain plants across all surveyed categories. Total number of plant species mentioned as being useful was 339. Average list length was $21.8 (\pm 12.76 \text{ SD}, \pm 0.57 \text{ SE})$.

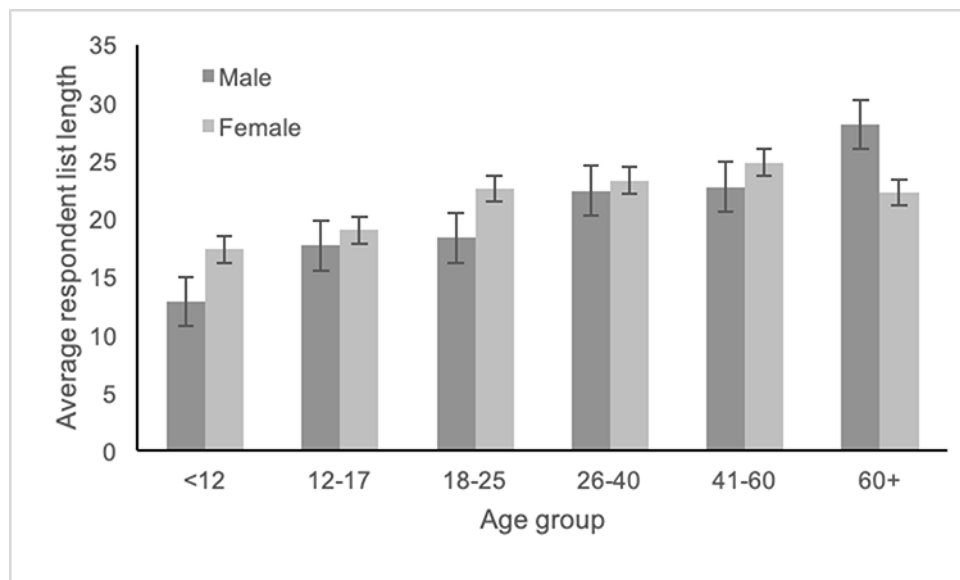


Figure 4. Average number of plants cited during freelist surveying per age category and gender by the Mentawai people living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands ($n=494$). Men over 60 years of age cited more plants than other age and gender categories (mean $28.1, \pm 16.14 \text{ SD}, \pm 0.72 \text{ SE}$). Overall, there was no significance difference among list length between genders (ANOVA single factor test, $p < 0.05$).

Table 1. The top five most frequently cited ethnospecies within each category (food / nutritional, medicinal, ceremonial, building, firewood, and tool-making / handicraft) by the Mentawai people living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia. Relative frequency of citation (RFC) shows the proportion of the population who cited that ethnospecies within that category, and average rank (Av. rank) is the average list order in which respondents cited that ethnospecies for that category. **Sagai** (Sab) / **Sagu** (Sar) (*Metroxylon sagu* Rottb. (Arecaceae)) was frequency cited as important for all six categories. (Ment –Mentawai language, Sib –Siberut dialect, Sab – Sabirut dialect, Sar –Rereiket dialect, BI – Bahasa Indonesia).

Family	Scientific name	Vernacular name/s	RFC	Av. rank
Food / nutritional				
Arecaceae	<i>Metroxylon sagu</i> Rottb.	Sagai (Sab) / Sagu (Sar)	0.96	1.4
Araceae	<i>Colocasia esculenta</i> (L.) Schott	Gette' (Ment) / Keladi (BI)	0.78	2.6
Musaceae	<i>Musa spp.</i> L.	Bago' (Sab) / Mago' (Sar) / Pisang (BI)	0.76	2.7
Arecaceae	<i>Cocos nucifera</i> L.	Toitet (Ment) / Kelapa (BI)	0.47	3.9
Malvaceae	<i>Durio spp.</i> Adans.	Doriat (Ment) / Durian (BI)	0.21	5.2
Medicinal				
Acanthaceae	<i>Graptophyllum pictum</i> (L.) Griff.	Aileleppet (Ment)	0.44	2.7
Zingiberaceae	<i>Hedychium coronarium</i> J.Koenig / <i>Hedychium flavescens</i> Carey ex Roscoe	Kakainau' (Sab) / Simakainau' (Sar)	0.43	2.7
Piperaceae	<i>Piper betle</i> L.	Talingengeng (Ment) / Sirih (BI)	0.33	2.6
Zingiberaceae	<i>Kaempferia galanga</i> L.	Kopuk (Sab) / Sikopuk (Sar) / Kencur (BI)	0.32	3.4
Rubiaceae	<i>Mussaenda frondosa</i> L.	Mumunen (Sib)	0.22	2.6
Ceremonial				
Euphorbiaceae	<i>Codiaeum variegatum</i> (L.) Rumph. ex A.Juss.	Sura' (Ment)	0.36	1.9
Arecaceae	<i>Metroxylon sagu</i> Rottb.	Sagai (Sab) / Sagu (Sar)	0.24	2.2
Acanthaceae	<i>Graptophyllum pictum</i> (L.) Griff.	Aileleppet (Ment)	0.24	3.2
Araceae	<i>Colocasia esculenta</i> (L.) Schott	Gette' (Ment) / Keladi (BI)	0.22	2.5
Zingiberaceae	<i>Hedychium coronarium</i> J.Koenig / <i>Hedychium flavescens</i> Carey ex Roscoe	Kakainau' (Sab) / Simakainau' (Sar)	0.21	3.2
Building				
Dipterocarpaceae	<i>Shorea pauciflora</i> King	Katuka (Ment)	0.50	1.7
Arecaceae	<i>Metroxylon sagu</i> Rottb.	Sagai (Sab) / Sagu (Sar)	0.34	2.7
Apocynaceae	<i>Alstonia spatulata</i> Blume	Kakatdut (Sab) / Gite (Sar) / Pulai (BI)	0.29	2.8
Dipterocarpaceae	<i>Hopea dryobalanoides</i> Miq.	Mancemi (Ment)	0.28	2.8
Poaceae	Bamboo types	Manggeak (Ment) / Obbuk (Ment) / Bambu (BI)	0.27	3.0
Firewood				
Poaceae	Bamboo types	Manggeak (Ment) / Obbuk (Ment) / Bambu (BI)	0.45	2.3
Arecaceae	<i>Metroxylon sagu</i> Rottb.	Sagai (Sab) / Sagu (Sar)	0.31	2.5
Melastomataceae	<i>Melastoma sylvaticum</i> Schltdl.	Sibetu (Sab) / Eru'teinung (Sar)	0.20	2.9
Euphorbiaceae	<i>Macaranga sp.</i> Thouars	Katunganggei (Ment)	0.18	2.6
Rhizophoraceae	<i>Rhizophora apiculata</i> Blume	Bakat (Ment) / Bakau (BI)	0.18	2.0
Tool-making / handicrafts				
Arecaceae	<i>Calamus sp.</i> L.	Pelege (Ment)	0.57	2.0
Arecaceae	<i>Calamus caesioides</i> Blume	Mandorou' (Ment)	0.40	2.7
Arecaceae	<i>Calamus sp.</i> L.	Sasa (Ment)	0.36	2.6
Gleicheniaceae	Gleicheniaceae C.Presl	Osap (Ment)	0.32	2.3
Arecaceae	<i>Cocos nucifera</i> L.	Toitet (Ment) / Kelapa (BI)	0.19	3.3

Key informant perspectives of Mentawai medicinal and useful plants

A total of 147 ethnospecies were cited during key informant interviews: 77 medicinal plants, and 70 plants for food, building, tool-making, firewood and ceremonial purposes. Of these, 20 plants had not been previously cited in the community survey. When shown the community freelisting activity results, all key informants agreed that the results and ranking adequately reflected the salient plants used for medicines and other purposes. Key informants made additional comments suggesting that although the plants cited during the community freelisting activity were important, factors such as ease of harvest, relative abundance, and presence in **bebet uma** (plants growing next to the **uma**) may contribute to higher rankings of some plants. Other observations suggest that some plants may have received lower rankings since survey activities took place outside flowering, fruiting and/or harvesting seasons.

Significance and importance of medicinal plants and their uses

Using the top-ranking results from the community freelisting activity, coupled with recommendations suggested in key informant interviews, 31 ethnospecies were identified as important medicinal plants for healing both physical and spiritual diseases and illnesses (Figure 5; Table 2). Of these, 35 percent were herbaceous, 19 percent trees, 16 percent shrubs, 16 percent grasses, 6 percent climbers, 3 percent palms, and 3 percent ferns. Zingiberaceae was the most represented plant family (10 species). There were minor differences between the rankings of plants cited during the community freelisting activity and those cited during the key informant interviews. **Aileleppet** (*Graptophyllum pictum*) was ranked most highly in RFC, CSI, and IV (Table 3).



Figure 5: Three of the most frequently cited plants used for medicinal purposes by the Mentawai people living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia. From left to right: **Aileleppet** (*Graptophyllum pictum* (L.) Griff. (Acanthaceae)), **kakainau'** (Sabirut dialect) / **simakainau'** (Rereiket dialect) (*Hedychium coronarium* J.Koenig (Zingiberaceae)), and **talingengeng** (*Piper betle* L. (Piperaceae)). All three plants are readily found in **bebet uma** (plants in the gardens surrounding the **uma**). **Aileleppet** and **kakainau'** are also considered important for Mentawai ceremonies and rituals.

Table 2. Thirty-one important medicinal plant species and examples of their uses for the Mentawai people living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia (M – medicine, C – ceremonial, F – food, W – firewood, B – building, T – tool making / handicrafts; Ment –Mentawai language, Sib –Siberut dialect, Sab –Sabirut dialect, Sar –Rereiket dialect, BI – Bahasa Indonesia; Ba – bark, Fl – flower, Fr – fruit, L – leaf, P – pith, Rh – rhizome, R – roots, S – shoots, St – stem, Ti – timber, Tu – tuber / corm).

Community freelist ranking	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
1	M C	Acanthaceae	<i>Graptophyllum pictum</i> (L.) Griff.	Aileleppet (Ment)	Shrub	L	Medicine used for fevers, swelling, headaches and sore back. Can be grated and used topically, or drunk as a tea. Also has significant ceremonial importance, and usually features in all ceremonies. Often planted at the front of a new uma . Maileppet means ‘cooled’, indicating its use for treating heat conditions.
2	M C	Zingiberaceae	<i>Hedychium coronarium</i> J.Koenig / <i>Hedychium flavescens</i> Carey ex Roscoe	Kakainau’ (Sab) / Simakainau’ (Sar)	Herbaceous	Fl, Fr, L, R, S	Used in many sikerei medicines, particularly in kisei preparations (a type of spiritual illness or disease manifested in the physical body in varying ways). Roots used in laggek pakop sagu . Young shoots used to treat ulcers. Rotting fruits can be used to treat vomiting. The flower is often worn by sikerei when walking in the forest in case medicine is needed whilst away from the plant source. The leaves are worn as a skirt by sikerei during ceremonial rituals.
3	M	Piperaceae	<i>Piper betle</i> L.	Talingengeng (Ment) / Sirih (BI)	Climber	L, R	Used in many medicines, particularly for kisei medicines, Used in laggek sasaggoi and laggek lango’ preparations. Used topically to treat machete wounds, or other open skin abrasions.
4	M C	Zingiberaceae	<i>Kaempferia galangal</i> L.	Kopuk (Sab) / Sikopuk (Sar) / Kencur (BI)	Herbaceous	L, Rh	Used in laggek lango’ and laggek leitik preparations. When delirious or possessed, the smell of the leaf is used to “surprise” patients back to consciousness. Rhizome can be used to treat stomach ache and fevers.
5	M C	Rubiaceae	<i>Mussaenda frondosa</i> L.	Mumunen (Sib)	Shrub / tree	Ba, Fl, L, R	Used in laggek siripusou and laggek leitik remedies. A very important plant used for nearly all ceremonies. The leaves are worn to signify a woman is pregnant. Mumunen means buluk raumun purimanua (“leaf that brings blessings for a full and happy life”).
6	M F C	Zingiberaceae	<i>Curcuma longa</i> L.	Kiniu (Ment) / Kunyit (BI)	Herbaceous	L, Rh	Used as a base for many medicines. Used in food preparations. Grated and used topically for treating skin infections, e.g. boils. The root is grated and painted over the body and face by sikerei during ceremonies.
7	M C	Asparagaceae	<i>Cordyline fruticosa</i> (L.) A.Chev.	Boblo (Ment)	Shrub	St	Used in medicinal preparations to treat stomach ache, mixed with a variety of plant stems. Also planted at gravesites. Leaves are important for ceremonies.
8	M	Poaceae	<i>Eleusine indica</i> (L.) Gaertn.	Ngiti-ngitit (Sib) / Komensakkoko’ (Sab)	Grass	L	Used in laggek pakop sagu preparations.
9	M F	Zingiberaceae	<i>Hornstedtia conica</i> Ridl.	Kukueta (Ment)	Herbaceous	Fl, Fr, L, Rh, St	Often used in masisingin (sweet smelling) medicines. Used in some snakebite remedies. Leaves are crushed and used whilst bathing to clean the skin. Flowers are used in laggek lango’ preparations. Flowers seeped in hot water and drunk as a tonic. Fruits are eaten for food.

Community freelisting rank	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
10	M F C	Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Laiga' (Ment) / Jahe (BI)	Herbaceous	Rh	Used to treat stomach complaints. Also valued in cooking.
11	M	Poaceae	<i>Rottboellia sp.</i> Naezén	Boku-boku' (Ment)	Grass	L	Used in laggek pakop sagu preparations. Often mixed with several other leaves and roots.
12	M C	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Bekeu (Ment) / Kembang sepatu (BI)	Shrub	L, Fl	Leaves are used in medicine to treat "inside body heat" (a type of fever). Rotting flowers are also used for some medicines. Important ceremonial flower worn in hair, alongside simakainau' (<i>Hedychium coronarium</i> / <i>H. flavescens</i>).
13	M B C T	Euphorbiaceae	<i>Codiaeum variegatum</i> (L.) Rumph. ex A.Juss.	Sura' (Ment)	Shrub / tree	L, St	Used in laggek siritettet . Used to treat fungal infections and skin ulcers. Placed inside the roof of the uma during ceremony. Worn on the upper arms of sikerei during ceremony. Planted at the base of toittet, doriat (<i>Durio sp.</i>) or sagu (<i>Metroxylon sagu</i>) tree to signify the death of a clan member. The phrase masura' bagatta is inspired by this plant, and translates as "there are colourful leaves growing inside us" – or, thank you.
14	M C	Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd.	Oroket (Sab) / Palakkokoai (Sar)	Herbaceous	Fl, Fr, L, S	Used in many kisei medicines. Used in laggek siripusou sikatait, laggek pakop sagu and laggek lango' preparations. Can be used for treating headache and stomach ache. Leaves are sometimes held whilst performing ceremonial dances.
15	M C	Marattiaceae	<i>Angiopteris evecta</i> (G.Forst.) Hoffm.	Bakkat laggai (Ment)	Fern	R, Tu	Used in laggek pakop sagu and laggek siripusou preparations. Roots are grated and covered over a sacrificial animal to protect its spirit. In this ritual, sikerei ask for the animal's blessing and ask that its spirit would bring more of its kind to the clan group. If the animal is hunted from the forest, sikerei seek blessing from the spirit of the forest.
16	M	Zingiberaceae	<i>Etlingera coccinea</i> (Blume) S.Sakai & Nagam.	Pelekak (Sib)	Herbaceous	Fl, L, S, St	If after being sick for a long time and the body is still weak, the flower is mixed with several other leaves and flowers to help restore the body's energy. Kinoso (young newly blossomed flower) pelelak used in laggek lango' preparations. Was also observed being used in treating more complicated illnesses.
17	M	INDENT	INDENT	Obboi (Sib)	Grass	L, R	Used to treat a sweaty, hot fever. Used in laggek dugui preparations. Can be used for treating stomach aches and coughs.
18	M C F	Zingiberaceae	<i>Etlingera elatior</i> (Jack) R.M. Sm.	Tottot mamai (Sab) / Gojo (Sar)	Herbaceous	Fl, Fr, L, S	Tairatti (young flowers) are used in many medicine preparations. Gojo (stems / shoots) are used to treat stomach ache. If a child hasn't taken its mother's milk for several days and still refuses the breast, the leaves are mixed and drunk to encourage her to return (laggek sika to'to'). Used in laggek lango' preparations. Totonan (fruits) eaten and tairatti often cooked with vegetables or meat.
19	M F W	Myrtaceae	<i>Psidium guajava</i> L.	Jabbui (Ment) / Sabbui (Sar) Jambu biji (BI)	Tree	Fr, L	Leaf mixed with other leaves and drunk as a tea to treat diarrhoea. Fruit eaten.
20	M C	Piperaceae	<i>Piper sarmentosum</i> Roxb.	Baba (Sib)	Climber	L	Used in laggek lango' and laggek siripusou preparations. Can be used to treat sprained or injured joints.

Community freelisting rank	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
21	M	Acoraceae	<i>Acorus calamus</i> L.	Butek-butek (Sab) / Sumamra (Sar)	Grass	L	Used in laggek lango' sikebukat preparations. Often mixed with a variety of Zingiberaceae species and covered over the forehead and back of neck.
22	M B C W	Fabaceae	<i>Erythrina subumbrans</i> (Hassk.) Merr.	Mancuat (Sab) / Matcuat (Sar)	Tree	Ba	Used in many laggek lango' preparations, especially for women after giving birth. Flower worn by newly initiated sikerei .
23	M C F	Zingiberaceae	<i>Alpinia malaccensis</i> C.Presl	Kojo koddiai (Sib) / Kasingin (Sab) / Pasingin (Sar)	Herbaceous	Fl, Fr, L, Rh, St	Used in many medicines including laggek siripusou preparations. Leaf used to close obbuk (bamboo) whilst cooking. Fruit is eaten.
24	M C	Zingiberaceae	<i>Curcuma zanthorrhiza</i> Roxb.	Kiniu sailu' (Ment) / Temulawak (BI)	Herbaceous	Fl, Rh	Used in laggek pakop sagu and laggek siripusou preparations. Used to heal the spirit of a person. When a sick, the plant is grated and mixed with parts of the gojo (<i>Etingera elatior</i>) plant and taken to the forest to entice the spirit of that person to take on the colour of its flower.
25	M W	Annonaceae	<i>Cananga odoratum</i> (Lam.) Hook.f. & Thomson	Poak (Sib)	Tree	Ba, L, R, Ti	Used in laggek lango' , laggek sibebelak and laggek sisaksana preparations. Can be used as firewood. Used in medicines when giving birth. Can be used to treat sprained or injured joints.
29	M C	Acanthaceae	<i>Justicia gendarussa</i> Burm.f.	Pakasele (Sab) / Pangasele (Sar)	Shrub	L, R, St	Used in many kisei medicines. Used in laggek leitiki preparations. Can be used to treat intestinal complaints.
32	M C T	Arecaceae	<i>Daemonorops angustifolia</i> (Griff.) Mart.	Rui (Sab) / Labi (Sar)	Palm	L, St	Used in laggek pakop sagu preparations. Leaves are used to seal the top of the roof of the uma . Part of the palm is used to make gigiok (a tool used to crush and grate medicinal plants). New growth at the top of the palm can be eaten.
38	M	Commelinaceae	<i>Amischotolype mollissima</i> (Blume) Hassk.	Lemu-lemu' (Ment)	Shrub	Ba, L, St	Used in laggek appu and laggek lango' preparations.
45	M C	Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Siat-siat (Sab) / Jiat-jiat (Sar) / Serai (BI)	Grass	L, St	Used in many medicinal preparations. Stem used to add flavour to foods.
53	M	Onagraceae	<i>Ludwigia linifolia</i> Poir.	Lotte-lotte' (Sab) / Mumru tuktuk (Sar)	Herbaceous	L, R	Used in laggek simatiet , laggek sasaggioi , laggek бага siripusou and laggek pakop sagu preparations. Called mumru tuktuk as its flower form resembles tuktuk mumru (prawn whiskers).
61	M	Annonaceae	<i>Goniothalamus</i> sp. (Blume) Hook.f & Thomson	Simuinek (Sar)	Tree	L, St	Used in laggek pakop sagu , laggek lango' , laggek besit ute' and laggek sasaggioi preparations.

Table 3. Comparison between three ethnobotanical quantitative measures (RFC – Relative frequency of citation, CSI – Cultural significance index, IV – Importance value) ranking the top 31 plant species considered important medicinal resources for Mentawai communities in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia. Plants have been ordered according to RFC during key informant interviews. (Ment –Mentawai language, Sib –Siberut dialect, Sab – Sabirut dialect, Sar –Rereiket dialect, BI – Bahasa Indonesia).

Family	Scientific name	Vernacular name(s)	Comm- unity	Key informant		
			RFC	RFC	CSI	IV
Acanthaceae	<i>Graptophyllum pictum</i> (L.) Griff.	Aileleppet (Ment)	0.44	0.67	4.00	0.48
Zingiberaceae	<i>Hedychium coronarium</i> J.Koenig / <i>Hedychium flavescens</i> Carey ex Roscoe	Kakainau' (Sab) / Simakainau' (Sar)	0.43	0.57	3.14	0.10
Rubiaceae	<i>Mussaenda frondosa</i> L.	Mumunen (Sib)	0.22	0.52	1.71	0.05
Zingiberaceae	<i>Kaempferia galanga</i> L.	Kopuk (Sab) / Sikopuk (Sar) / Kencur (BI)	0.32	0.43	1.93	0.05
Poaceae	<i>Eleusine indica</i> (L.) Gaertn.	Ngiti-ngitit (Sib) / Komensakkoko' (Sab)	0.14	0.43	1.93	-
Zingiberaceae	<i>Etlingera coccinea</i> (Blume) S.Sakai & Nagam.	Pelekak (Sib)	0.07	0.33	0.75	0.05
Piperaceae	<i>Piper betle</i> L.	Talingengeng (Ment) / Sirih (BI)	0.33	0.29	0.64	0.05
Asparagaceae	<i>Cordyline fruticosa</i> (L.) A.Chev.	Boblo (Ment)	0.15	0.29	1.71	-
Poaceae	<i>Rottboellia</i> sp. Naezén	Boku-boku' (Ment)	0.10	0.29	0.64	0.05
Marattiaceae	<i>Angiopteris evecta</i> (G.Forst.) Hoffm	Bakkat laggai (Ment)	0.07	0.24	1.07	-
Fabaceae	<i>Erythrina subumbrans</i> (Hassk.) Merr.	Mancuat (Sab) / Matcuat (Sar)	0.03	0.24	1.07	-
Commelinaceae	<i>Amischotolype mollissima</i> (Blume) Hassk.	Lemu-lemu' (Ment)	0.02	0.24	1.07	-
Zingiberaceae	<i>Curcuma longa</i> L.	Kiniu (Ment) / Kunyit (BI)	0.15	0.19	1.14	-
Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd.	Oroket (Sab) / Palakkokoai (Sar)	0.07	0.19	0.86	0.05
Arecaceae	<i>Daemonorops angustifolia</i> (Griff.) Mart.	Rui (Sab) / Labi (Sar)	0.03	0.19	0.43	-
Acanthaceae	<i>Justicia gendarussa</i> Burm.f.	Pakasele (Sab) / Pangasele (Sar)	0.03	0.19	0.86	-
Zingiberaceae	<i>Hornstedtia conica</i> Ridl.	Kukuet (Ment)	0.12	0.14	0.64	-
Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Laiga' (Ment) / Jahe (BI)	0.11	0.14	0.64	-
Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Bekeu (Ment) / Kembang sepatu (BI)	0.09	0.14	0.86	-
INDENT	INDENT	Obboi (Sib)	0.06	0.14	0.64	-
Piperaceae	<i>Piper sarmentosum</i> Roxb.	Baba (Sib)	0.05	0.14	0.64	-
Zingiberaceae	<i>Etlingera elatior</i> (Jack) R.M. Sm.	Tottot mamai (Sab) / Gojo (Sar)	0.04	0.14	0.32	-
Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Siat-siat (Sab) / Jiat-jiat (Sar) / Serai (BI)	0.02	0.14	0.64	-
Onagraceae	<i>Ludwigia linifolia</i> Poir.	Lotte-lotte' (Sab) / Mumru tuktuk (Sar)	0.01	0.14	0.32	-
Annonaceae	<i>Goniothalamus</i> sp. (Blume) Hook.f. & Thomson	Simuinek (Sar)	0.01	0.14	0.32	-
Euphorbiaceae	<i>Codiaeum variegatum</i> (L.) Rumph. ex A.Juss.	Sura' (Ment)	0.08	0.10	0.57	-
Myrtaceae	<i>Psidium guajava</i> L.	Jabbui (Ment) / Jambu biji (BI)	0.05	0.10	0.43	-

Family	Scientific name	Vernacular name(s)	Comm- unity	Key informant		
			RFC	RFC	CSI	IV
Zingiberaceae	<i>Alpinia malaccensis</i> (Burm.f.) Roscoe	Kojo koddiai (Sib) / Kasingin (Sab) / Pasingin (Sar)	0.04	0.10	0.21	-
Annonaceae	<i>Cananga odoratum</i> (Lam.) Hook.f. & Thomson	Poak (Sib)	0.03	0.10	0.21	-
Acoraceae	<i>Acorus calamus</i> L.	Butek-butek (Sab) / Sumamra (Sar)	0.05	0.05	0.21	-
Zingiberaceae	<i>Curcuma zanthorrhiza</i> Roxb.	Kiniu sailu' (Ment) / Temulawak (BI)	0.04	0.05	0.21	-

Significance and importance of other useful plants

Using the top-ranking citations from the freelist activity, along with recommendations provided in key informant interviews, 32 ethnospecies were identified as the most useful plants across five categories (nutritional, ceremonial, building, tool-making and firewood) (Figure 6; Table 4). Of these, 63 percent were trees, 9 percent palms, 9 percent rattan kinds, 9 percent herbaceous, 3 percent grasses, 3 percent ferns and 3 percent shrubs. Arecaceae was the most represented botanical family (six species identified). **Sagu** (*Metroxylon sagu*) ranked highest for RFC, CSI and IV (Table 5). Plants that were considered more valuable for medicinal use and previously cited in Table 2 were excluded from Table 4. Despite **sagu** being listed as the most important food source for the Mentawai, it was observed that most families living in resettlement communities were more likely to eat rice, rather than **sagu** at every meal. Further investigation as to the reasons why this is the case have yet to be examined, but it is assumed that convenience and a lack of access to clan lands and resources has influenced this choice.



Figure 6. Three of the most frequently cited plants considered useful for food, building, firewood, ceremony, and/or tool-making purposes by the Mentawai living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands. From left to right: **Sagai** (Sabirut dialect) / **Sagu** (Rereiket dialect) (*Metroxylon sagu* Rottb. (Arecaceae)), **manggeak** and **obbuk** (bamboo types), and **gette'** (*Colocasia esculenta* (L.) Schott (Araceae)).

Table 4. Thirty-two important plant resources and examples of their uses for the Mentawai people living in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia (M – medicine, C – ceremonial, F – food, W – firewood, B – building, T – tool making / handicrafts; Ment – Mentawai language, Sib –Siberut dialect, Sab –Sabirut dialect, Sar –Rereiket dialect, BI – Bahasa Indonesia; Ba – bark, Fl – flower, Fr – fruit, L – leaf, P – pith, Rh – rhizome, R – roots, S – shoots, St – stem, Ti – timber, Tu – tuber / corm).

Community freelistin g rank	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
1	B C F M T W	Arecaceae	<i>Metroxylon sagu</i> Rottb.	Sagai (Sab) / Sagu (Sar)	Palm	Ba, L, P, R, Sh	Pith is a staple food source for humans, and all domesticated animals. Leaves are used for roofing, cooking sagu, cooking utensils (e.g. bibibip), tappiri (basket for storing processed sagu). Spine of leaf is as duck food, and for making babaklu kerei (sacred sikerei box) and bolobop (large carrying basket). The skin is used dried for firewood (salot), and as a long-lasting torch. Skin is also used for making opa and karagjug (carrying baskets). Roots and shoots used in medicines. Skin and leaves used as building materials. Fronds are used to burn off feathers and hair of ceremonial meats. An important plant traded in alat toga negotiations (where possessions of wealth are negotiated as a bride dowry).
2	B C F M T W	Poaceae	Bamboo types	Manggeak (Ment) / Obbuk (Ment) / Bambu (BI)	Grass	Sh	Used for obbuk – used like an oven for cooking meats, vegetables, sagu , and to store and carry food and water. Important firewood source. Young shoots are eaten and used in medicine preparations. Used for many building purposes – e.g. small structures / shelter, animal pens, fencing, flooring, tool-making, roofing (kalasau – long pieces used to hold sagu leaves). Used to build goro jobatoinan (aqueduct). Ceremonial significance – e.g. uma juju simagre (home of the spirits). Used to store medicines (uma laggek). Worn by women whilst fishing to store fish (lagasat). Leaves are used as flooring for roiget gou'-gou' (chicken) basket).
3	C F M T	Araceae	<i>Colocasia esculenta</i> (L.) Schott	Gette' (Ment) / Keladi (BI)	Herbaceou s	L, St, Tu	Staple food source for humans. Tubers, stems and young leaves are eaten. Leaves can be used as a tobacco substitute. Older, yellowing leaves are used in several medicines. Important plant traded in alat toga negotiations. Important ceremonial food.
4	B C F M T W	Arecaceae	<i>Cocos nucifera</i> L.	Toitet (Ment) / Kelapa (BI)	Palm	Fr, L	Staple food source for humans and domesticated animals. Young coconut water is drunk and used in

Community freelistin g rank	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
							medicinal preparations. Husk is burnt to smoke out insects, and braided to make rope. Oil used in cooking and medicines. Bole used for construction purposes. Shell used to make a variety of tools including sisip (ceremonial soup spoon) and baklu (box used to store sacred sikerei paraphernalia). Leaves are used in cooking. Leaves are woven to carry gou'-gou' between owners (tapir). Important palm traded in alat toga negotiations.
5	C F M T	Musaceae	<i>Musa spp.</i> L.	Bago' (Sab) / Mago' (Sar) / Pisang (BI)	Herbaceous	Fl, Fr, L	Staple food source for humans, saina' (pigs) and gou'-gou' . Leaves are traditionally worn as a skirt by women whilst fishing. Flowers used in medicines. Leaves are dried and used as cigarette rolling papers. Leaves used to wrap and protect food.
6	B T	Arecaceae	<i>Calamus sp.</i> L.	Pelege (Ment)	Rotan	L, S, St	Used to make karagjug (large woven basket carried on the back), opa (small woven basket carried on the back), orek (basket to store cooked sagu), letcu (bracelet), roiget (gou'-gou' basket), talatat (storage basket). Leaves used medicinally to treat intestinal worms. Used as rope. Shoots used in laggek pakop sagu .
7	B M T W	Dipterocarpaceae	<i>Shorea pauciflora</i> King	Katuka (Ment)	Tree	Ba, Ti	Important structural timber. Used to carve abak (dug-out canoe). Bark used in medicinal preparations. Large boles can be sold from IDR 2,000,000.
8	B F W	Malvaceae	<i>Durio spp.</i> Adans.	Doriat (Ment)	Tree	Fr, R, Ti	Seasonal food source for humans, and domesticated and wild animals. Large roots are used to carve tegge (machete) handles. Seeds are replanted. Used for construction. Important tree traded in alat toga negotiations.
9	B T	Arecaceae	<i>Calamus caesius</i> Blume	Mandorou' (Ment)	Rotan	St	Used to make karagjug , opa , roiget and other small baskets (e.g. tuku). Used to restring skulls and hung to protect the uma . Used as rope for a variety of purposes.
10	B T	Arecaceae	<i>Daemonorops sp.</i> Blume	Sasa (Ment)	Rotan	St	Used to make bola (floor mats), garangat (small axe). Used to tie bibibilit gajuma (drum skins), tingan jajaj (cultural paraphernalia hung in the uma). If someone steals something, but denies, the two parties agree to cut a piece of sasa . If the accused person was lying, within a week they would become sick, and die. Can be sold as income.

Community freelistin g rank	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
11	C M T	Gleicheniaceae	Gleicheniaceae C.Presl	Osap (Ment)	Fern	L, St	Used to make letcu , letcu baklu (ties for sikerei keepsake box). Leaves used in medicinal preparations, particularly in some laggek kisei variations. Leaves used in healing ceremonies.
12	B C T W	Apocynaceae	<i>Alstonia spatulata</i> Blume	Kakatdut (Sab) / Gite (Sar) / Pulai (BI)	Tree	Ti	Used for carving tools and important cultural artefacts, including jaraik (sacred symbol to prevent harmful influences entering the uma). Cabinetry timber. Used to make floorboards. Previously used to make coffins.
13	B T W	Dipterocarpaceae	<i>Hopea dryobalanoides</i> Miq.	Mancemi (Ment)	Tree	Ti	Important structural timber – used for beams, joists, rafters, floorboards. Used to carve paluga (oar). Used to carve decorative pieces for the uma .
14	B T W	Rhizophoraceae	<i>Rhizophora apiculata</i> Blume	Bakat (Ment) / Bakau (BI)	Tree	Ti	Used for firewood. Important building resource, particularly around the coastal areas where tidal inundation may occur.
15	B C M T	Dipterocarpaceae	<i>Dipterocarpus fusiformis</i> P.S.Ashton	Elagat (Sab) / Kara-kara (Sar) / Kruing (BI)	Tree	Ba, Ti, Resin	Important structural timber – used to create footbridges, floorboards, verandas. Rotting wood is host to an edible worm. Before kerosene became accessible, oil from the wood was used to light lanterns. Large boles can be sold for IDR 2-3,000,000. Used in kisei medicines.
16	C T	Arecaceae	<i>Arenga pinnata</i> (Wurmb) Merr.	Poula (Ment) / Katsaila (Ment) / Anau (BI) / Aren (BI)	Palm	Fl, L, St, Ti	Leaves are arranged in the hair of sikerei during ceremony. At the beginning of a ceremony, a small piece is tied on the ngalou (necklace) of all those present to signify blessing and protection during the ceremony. Leaves are used to carry saina' and monkeys between locations. Leaves also used to make brooms. Trunk used to make gajuma (drum), sasaala (hammer used to make kabit (loincloth)). The flower collects water, which is drunk. Hairs are used as a strainer in processing sagu .
17	B T W	Myristicaceae	<i>Horsfieldia sp.</i> Blume ex DC.	Ribbu (Ment)	Tree	Ti	Highly valued structural timber. Used for dumundai (structural stumps for uma). Source of firewood.
18	B W	Euphorbiaceae	<i>Macaranga sp.</i> Thouars	Katumanggei (Ment)	Tree	Ti	Timber used for beams in the uma . Used to create overhead storage in the uma . Used for firewood.
19	F M W	Melastomataceae	<i>Melastoma sylvaticum</i> Blume	Sibetu (Sab) / Eru'teinung (Sar)	Tree	L, Ti	Used for firewood. Leaves are used as gou'-gou' bedding in roiget . Leaves used to treat stomach ache. Fruit is eaten and used in medicinal preparations. Worms found in bole are used as fishing bait. Worms can also be eaten.
20	F M	Convolvulaceae	<i>Ipomoea sp.</i> L.	Gobi' (Sab) / Siputeteket (Sar) / Ubi jalar (BI)	Herbaceous	Tu	Corm eaten. Leaves can be eaten, although rare.

Community freelistin g rank	Category	Family	Scientific name	Vernacular name(s)	Plant habit	Part used	Reported uses
21	B W	Malvaceae	<i>Pentace triptera</i> Mast.	Kaboi (Sib)	Tree	Ba, Ti	Important structural timber for building uma . Can be used to carve abak . Bark used to make dedebu (bucket used for processing sagu). Large boles can be sold from IDR 1,800,000. Can be used as firewood.
22	B C T W	Dipterocarpaceae	<i>Shorea sp.</i> Roxb. ex C.F.Gaertn.	Karai (Ment)	Tree	Ti	Structural timber used for walls, doors and floorboards. Wood is used to carve jaraik (sacred carving). Used to make karaibo (shield). Used to carve abak and paluga .
23	B F W	Sapindaceae	<i>Nephelium lappaceum</i> L.	Bairabbit (Sib) / Rambutan (BI)	Tree	Fr, Ti	Seasonal food source. Source of firewood.
24	F M	Euphorbiaceae	<i>Manihot sp.</i> Mill.	Bairatti (Sab) / Sipukaju (Sar) / Ubi kayu (BI)	Shrub	Tu	Important food source.
25	F M W	Meliaceae	<i>Lansium parasiticum</i> (Osbeck) K.C.Sahni & Bennet	Selak (Sab) / Tiat (Sar) / Siamung (Sar) / Duku (BI) / Langsat (BI)	Tree	Fr, R	Seasonal food source. Used in laggek leitik preparations.
26	B W	Euphorbiaceae	<i>Macaranga tanarius</i> (L.) Müll.Arg.	Pari-pari (Sab) / Ottot (Sar)	Tree	L, Ti	Timber used to carve tegge and other small knife handles. Used in construction. Leaves are used for wrapping and carrying medicines.
39	B W	Myristicaceae	<i>Horsfieldia irya</i> (Gaertn.) Warb.	Roat (Sab) / Doat (Sar)	Tree	L, Ti	Used as firewood. Leaves can be seeped in water to add a masisingin (sweet) flavour.
40	B W	INDENT	INDENT	Manggugu' (Ment)	Tree	R, Ti	Used as firewood. Used as flooring timber for uma . Roots are used in medicinal preparations.
54	B T W	INDENT	INDENT	Bolasi (Ment)	Tree	Ti	Long burning firewood. Timber is used for building and for handicrafts.
56	F M W	Sapindaceae	<i>Nephelium cuspidatum</i> Blume	Kapa (Sab) / Babaet (Sar)	Tree	Fr, L, Ti	Used as firewood. Used to carve tuddukat . Leaves and bark used in medicines. Fruit is eaten. Fruit can be used to dye clothes. Used in laggek lango' preparations.
58	W	Myristicaceae	<i>Gymnacranthera sp.</i> (A.DC.) Warb.	Ngalou pataddekat (Sar)	Tree	Ti	Source of firewood.
67	B W	Apocynaceae	<i>Kibatalia arborea</i> (Blume) G.Don	Toilat (Ment)	Tree	Ti	Used for firewood. Used for building, particularly for window frames.

Table 5. Comparison between three ethnobotanical quantitative measures (RFC – Relative frequency of citation, CSI – Cultural significance index, IV – Importance value) ranking the top 32 plant species considered important food, building, tool-making, firewood and ceremonial resources for the Mentawai communities in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia. Plants have been ordered according to RFC during key informant interviews. (Ment – Mentawai language, Sib –Siberut dialect, Sab –Sabirut dialect, Sar – Rereiket dialect, BI – Bahasa Indonesia).

Family	Scientific name	Vernacular name(s)	Comm- unity	Key informant		
			RFC	RFC	CSI	IV
Arecaceae	<i>Metroxylon sagu</i> Rottb.	Sagai (Sab) / Sagu (Sar)	0.34	0.90	8.00	0.95
Araceae	<i>Colocasia esculenta</i> (L.) Schott	Gette' (Ment) / Keladi (BI)	0.17	0.71	6.32	0.10
Arecaceae	<i>Calamus sp.</i> L.	Pelege (Ment)	0.10	0.57	1.89	0.33
Dipterocarpaceae	<i>Shorea pauciflora</i> King	Katuka (Ment)	0.09	0.57	1.89	0.52
Myristicaceae	<i>Horsfieldia sp.</i> Blume ex DC.	Ribbu (Ment)	0.04	0.52	1.16	0.29
Poaceae	Various	Manggeak (Ment) / Obbuk (Ment) / Bambu (BI)	0.18	0.43	3.79	0.29
Arecaceae	<i>Arenga pinnata</i> (Wurmb) Merr.	Poula (Ment) / Katsaila (Ment) / Anau (BI) / Aren (BI)	0.04	0.33	1.47	0.19
Arecaceae	<i>Calamus caesius</i> Blume	Mandorou' (Ment)	0.07	0.29	0.95	0.24
Dipterocarpaceae	<i>Hopea dryobalanoides</i> Miq.	Mancemi (Ment)	0.05	0.29	0.63	0.05
Arecaceae	<i>Cocos nucifera</i> L.	Toitet (Ment) / Kelapa (BI)	0.15	0.24	1.68	0.05
INDENT	INDENT	Bolasi (Ment)	0.02	0.24	0.79	0.19
Musaceae	<i>Musa spp.</i> L.	Bago' (Sab) / Mago' (Sar) / Pisang (BI)	0.13	0.19	0.84	
Apocynaceae	<i>Kibatalia arborea</i> (Blume) G.Don	Toilat (Ment)	0.01	0.19	0.63	0.10
Arecaceae	<i>Daemonorops sp.</i> Blume	Sasa (Ment)	0.06	0.14	0.47	0.05
Gleicheniaceae	Gleicheniaceae C.Presl	Osap (Ment)	0.05	0.14	0.47	0.05
Apocynaceae	<i>Alstonia spatulata</i> Blume	Kakatdut (Sab) / Gite (Sar) / Pulai (BI)	0.05	0.14	0.32	0.05
Melastomataceae	<i>Melastoma sylvaticum</i> Blume	Sibetu (Sab) / Eru'teinung (Sar)	0.03	0.14	0.11	
Stemonuraceae	<i>Stemonurus malaccensis</i> (Mast.) Sleumer	Manggugu' (Ment)	0.03	0.14	0.47	0.10
Sapindaceae	<i>Nephelium cuspidatum</i> Blume	Kapa (Sab) / Babaet (Sar)	0.01	0.14	0.95	0.05
Myristicaceae	<i>Gymnacranthera</i> (A.DC.) Warb.	Ngalou pataddekat (Sar)	0.01	0.14	0.47	0.05
Dipterocarpaceae	<i>Dipterocarpus fusiformis</i> P.S.Ashton	Elagat (Sab) / Kara-kara (Sar) / Kruing (BI)	0.04	0.10	0.11	
Malvaceae	<i>Pentace triptera</i> Mast.	Kaboi (Sib)	0.03	0.10	0.21	0.05
Dipterocarpaceae	<i>Shorea sp.</i> Roxb. ex C.F.Gaertn.	Karai (Ment)	0.03	0.10	0.21	0.05
Myristicaceae	<i>Horsfieldia irya</i> (Gaertn.) Warb.	Roat (Sab) / Doat (Sar)	0.03	0.10	0.21	0.05
Malvaceae	<i>Durio spp.</i> Adans.	Doriat (Ment)	0.07	0.05	0.16	
Rhizophoraceae	<i>Rhizophora apiculata</i> Blume	Bakat (Ment) / Bakau (BI)	0.05	0.05	0.11	
Euphorbiaceae	<i>Macaranga sp.</i> Thouars	Katumanggei (Ment)	0.04	0.05	0.11	

Family	Scientific name	Vernacular name(s)	Comm- unity	Key informant		
			RFC	RFC	CSI	IV
Euphorbiaceae	<i>Macaranga tanarius</i> (L.) Müll.Arg.	Pari-pari (Sab) / Ottot (Sar)	0.03	0.05	0.08	
Euphorbiaceae	<i>Manihot</i> sp. Mill.	Bairatti (Sab) / Sipukaju (Sar) / Ubi kayu (BI)	0.03	0.00	0.21	
Convolvulaceae	<i>Ipomoea</i> sp. L.	Gobi' (Sab) / Siputeteket (Sar) / Ubi jalar (BI)	0.03	Not cited	0.21	
Sapindaceae	<i>Nephelium lappaceum</i> L.	Bairabbit (Sib) / Rambutan (BI)	0.03	Not cited	0.21	0.05
Meliaceae	<i>Lansium parasiticum</i> (Osbeck) K.C.Sahni & Bennet	Selak (Sab) / Tiat (Sar) / Siamung (Sar) / Duku (BI) / Langsat (BI)	0.03	Not cited	0.11	

Community perceptions of Mentawai traditional ecological knowledge

Community surveying sought to reveal Mentawai attitudes towards their TEK and whether the community held any concerns about '*why plant knowledge may be eroding or lost*' (Figure 7). Nearly all survey respondents agreed that Mentawai plant knowledge is important for the future of Mentawai, particularly as food and medicine resources (98 percent; 95% confidence interval (CI) 97%-99%). One respondent stated:

Our plant knowledge is very important. Our plants have many benefits, especially in treating sickness. In our traditions, we understand that our plants are the source of our life.

We cannot navigate our way in the world without them.

Mentawai woman, Muntei, February 2019.

When asked what would happen if this knowledge is lost, many believed life would become difficult (38 percent; 95% CI 34%-43%) or become poor (18 percent; 95% CI 15%-21%). Conversely, 19 percent of respondents believed nothing would happen if plant knowledge were lost (95% CI 16%-22%).

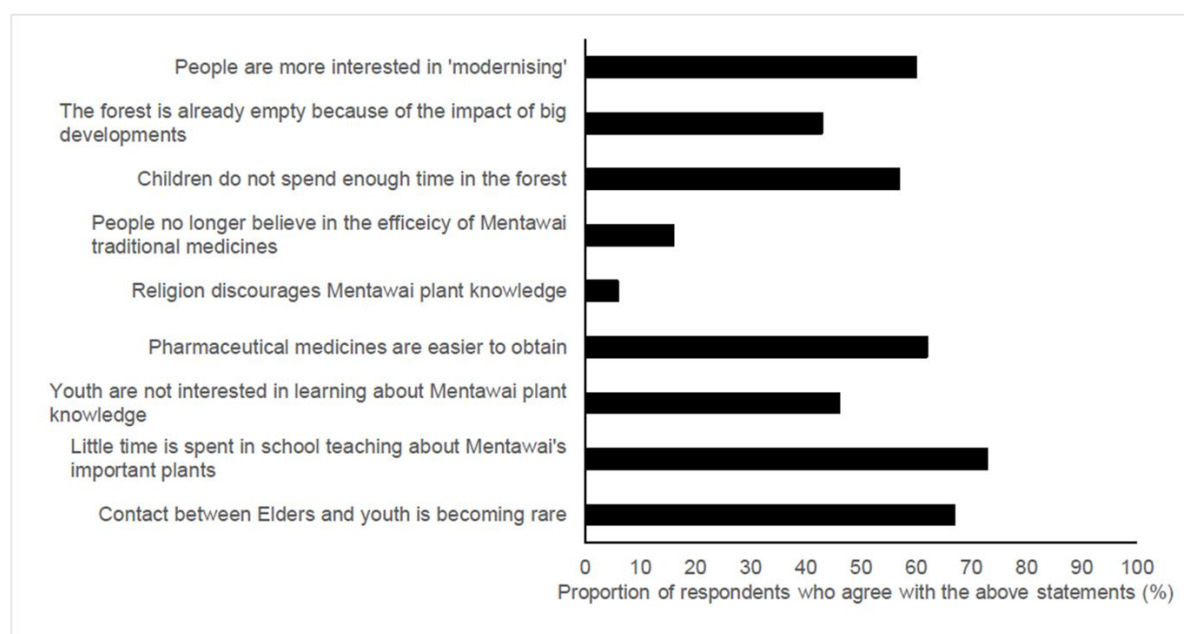


Figure 7. A sample of community perceptions for why Mentawai traditional ecological knowledge might be eroding in the Sabirut and Sarereiket regions of Siberut, Mentawai Islands, Indonesia (n = 494). Most respondents felt the time spent between **sikebbu'kat** (respected elders) and youth is becoming rare due to changes in family social patterns, and because many children now attend formal schools, where little time is spent teaching students about Mentawai's important plants and ecosystem functions.

Half of all respondents felt people were too busy working other jobs to practice Mentawai TEK (95% CI 44%-53%), and over half felt that people were more interested in 'modernising' (95% CI 56%-64%). Two-thirds of respondents

believed TEK is eroding because contact between youth and **sikebbu'kat** is decreasing (95% CI 63%-71%). Half of all respondents felt that children and youth do not seem interested in learning about Mentawai plants (95% CI 41%-50%), nor spend enough time in the forest (95% CI 53%-62%). Additionally, 73 percent of respondents felt too little time was spent in school learning about traditional plant uses (95% CI 70%-77%). Eighty percent of respondents believed the loss of Mentawai TEK may become exasperated due to the immigration of young people from Mentawai to other parts of Indonesia or abroad (95% CI 47%-56%).

Half of all respondents believed Siberut's forests still contain important plants that can be utilised on a day-to-day basis (95% CI 45%-53%). Seventy-four percent of respondents believed the forest would never become 'empty', because Mentawai plant knowledge and the principles and practices of **arat sabulungan** ensure the forest is protected, cared for, and important species are replanted (95% CI 70%-78%). However, a third of respondents identified a correlation between the loss of Mentawai knowledge and the depletion of forest resources (95% CI 32%-41%). The community perceived that the greatest threats to Siberut's forest resources were deforestation caused by large-scale developments, and lack of protective measures or support from the government. A large portion felt that the forest had already been damaged due to extensive development, including unsuitable logging operations or land conversion (43 percent; 95% CI 39%-47%). The majority did not believe that religion discouraged traditional practices (88 percent; 95% CI 86%-91%).

Transmission of Mentawai traditional ecological knowledge

Two-thirds of respondents felt they knew enough about Mentawai plant knowledge (95% CI 62%-70%). This was reflected in the perception that respondents felt they had learnt enough primarily through daily activities from a young age (22 percent; 95% CI 18%-25%), or had been encouraged by other community members to learn about Mentawai plants (16 percent; 95% CI 13%-20%) (Figure 8). However, of those unsure or felt they did not know enough about Mentawai TEK, most felt it was because they had never been taught (30 percent; 95% CI 26%-33%).

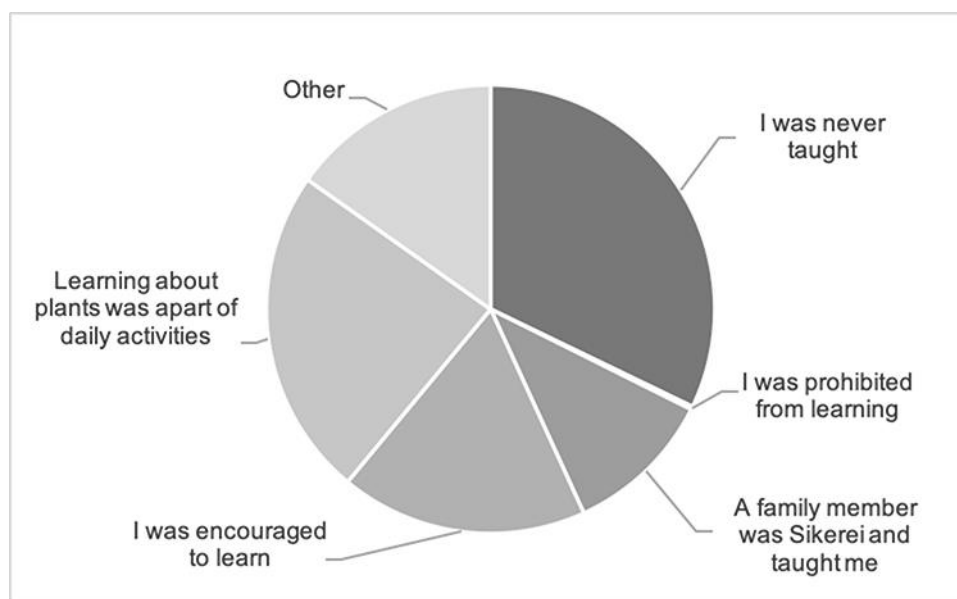


Figure 8. Reasons why the Sabirut and Sarereiket communities of Siberut, Mentawai Islands, Indonesia, feel they have or have not an adequate level of Mentawai plant knowledge. A third of respondents felt they knew very little about Mentawai plant knowledge because they did not have the opportunity to learn. Those who did feel as though they knew enough recognised that most learnings had taken place during daily household activities.

Respondents generally perceived that all community members were responsible for teaching and sharing Mentawai plant knowledge. However, many respondents recognised the responsibility of the **sikerei** in safeguarding traditional plant knowledge (23 percent; 95% CI 20%-27%). Half of all respondents believed that the knowledge had not been forgotten by **sikerei** or **sikebbu'kat** (95% CI 47%-56%). There were mixed responses as to whether

ways of teaching traditional plant use had changed, and whether **sikerei** and **sikebbu'kat** spent enough time in the forest practicing traditional knowledge.

Ninety percent of key informants reported having taught, or passed on, their plant knowledge (95% CI 78%-100%), explaining that Mentawai ecological knowledge is usually taught *'hands-on'* as the opportunity or need is presented. Many respondents added they had only taught others if they had been directly asked by those interested in learning. Nearly all respondents raised concerns about the lack of knowledge or interest by the younger generation, with several lamenting that *'young people are ignorant of the benefits of Mentawai's plants'*. One respondent worried that if they were not asked to teach Mentawai TEK, then

"...our knowledge will become extinct. Our people will no longer remember who we are, or how to survive."

Mentawai man, Puro, April 2019.

Despite concerns raised by **sikebbu'kat** and **sikerei** about threats to the transmission of Mentawai TEK, nearly all respondents from the community survey agreed that Mentawai plant knowledge remains essential for their future, stating:

"The life of the Mentawai cannot be separated from the forest and its plants. Mentawai plants are the breath of everything."

Sikebbu'kat, Muntei, February 2019.

Despite the results suggesting young (12-25 years of age) respondents felt they knew enough about Mentawai plants and TEK (see Figure 8), comments made by key informants, coupled with observations made during the study period, suggest otherwise. For children and youth living in resettlement communities, it was observed that considerably less time is spent in the forest where plant knowledge is shared amongst peers and siblings. While children living in **uma** communities spend most of the day exploring the forest or carrying out home duties utilizing forest resources surrounding the **uma**. In this way, it was observed that children from a young age understand Mentawai's forests' ecological and cultural functions. These interactions were rarely observed in resettlement communities, which may be attributed to new socio-economic conditions driving the loss of traditional knowledge – similar to those drivers discussed in Reyes-Garcia *et al.* (2013).

Other observations made during the study period infer that fewer young people are on the path to becoming **sikerei**. This observation may be cause for concern, given the extensive knowledge held by the **sikerei** and the integral role they play in maintaining the health and wellbeing of the Mentawai people. It was also observed in the study period that there can be significant variation between each **sikerei** and their knowledge and practice of medicinal plants, each having their own unique methods. Though the community collectively knows many plants and their uses, the variation between **sikerei** and knowledge holders was seen to be an important component of Siberut's cultural and biological diversity.

Observations on the use of medicinal plants in the community

Observations during the research period established an emerging trend: that is, that resettled communities are more likely to choose pharmaceutical medicines, only returning to traditional medicines and healing systems as a last resort. This is supported by the suggestion in the community survey that over half of respondents felt that people were more interested in modernizing than practicing TEK (see Figure 7). Discussions with Dr S. Tahmasebian from the Madobag government health centre (Puskesmas) revealed similar concerns: community members no longer utilise traditional plant medicines, and instead choose to visit a Puskesmas expecting a quick fix. She stated:

*"There are so many herbs and leaves in the forest that can keep the Mentawai people healthy, but they aren't using them. They don't ask the **sikerei** to help, but come to [the Puskesmas] expecting pharmaceutical medicines. It's not sustainable, nor is it healthy. When they were younger, they didn't suffer from many of the illnesses and diseases they experience today. Now their children are often sick, when they shouldn't be."*

S. Tahmasebian, Muarasiberut, May 2019.

Changes in healthcare preference may be underlined by changing values and forms of wealth: traditionally, clan groups would have access to pigs, chickens, fruits, and other important tradable items to exchange for **sikerei** medicines, healing ceremonies and other associated traditions. However, it was observed during the study period that those now living within resettlement communities generally have limited access to these traditional forms of wealth, instead now relying on the national currency. Though this has benefits in being able to access pharmaceutical medicines, the cost comparison is vast. For example, during the study period it was found that a course of antibiotics at the local pharmacy, without needing to see the doctor, may cost between IDR 8,000 –

20,000. (approximately USD 0.57 – 1.42) Comparatively, when factoring payment for services, travel costs, purchase of sacrificial animals, and provision of other gifts, foods, etc., for rituals, **sikerei** medicines and the associated ceremonial rituals can cost upwards of IDR 400,000 (approximately USD 28) depending on the severity of illness and required treatments. Though it was observed that community members are becoming less likely to utilise traditional healing systems, many respondents from the community survey still emphasized the importance of Mentawai's plants for treating disease, stating:

"Not all pharmacy drugs are able to heal our people. Disease cannot always be treated by medical treatment or pharmaceuticals."

Mentawai woman, Muntei, February 2019.

"Without Mentawai plant medicines and rituals, disease cannot be cured. Without the Mentawai forest, we wouldn't have our health."

Mentawai man, Maileppet, March 2019.

Contrastingly, those respondents living in **uma** communities were more likely to utilise traditional medicines to treat illness or disease. Many were disinterested in using pharmaceutical medicines, and were unlikely to utilise these services unless compelled as a final option. However, it was perceived that these preferences are partly due to limited access to the national currency, and the relative isolation of **uma** communities from allopathic healthcare options. For example, where there was an option to receive fast-acting medicines to treat headaches, sore joints or diarrhea from visiting tourists, **uma** clan members would often welcome medicines given by foreigners.

Observations of Mentawai ecological practices and interactions

During the observation period, it was perceived that many Mentawai traditional farming practices align with key principles of regenerative agriculture or permaculture (Rodale Institute 2015). For example, **Gou'-gou'** (chickens) and ducks run freely between crops, cattle are grazed as a small herd and rotated regularly, **pugette'an** are established between **sagu** trees, and **mago'**, **toitet**, **bairabbit** and **pinang** are scattered between crops or plantations (Figure 9). Additionally, it was noticed that the Mentawai do not practice slash and burn agriculture – growing fields are cut, and plant matter is left to rot for several years before returning to utilise the land for crops, resulting in aerated soil high in organic matter. However, some fields near Muntei village had been burnt during the observation period before replanting **gette'**. When asked why this might be the case, one Mentawai man explained that when larger trees are cut down in **mone** their stumps are usually burned prior to replanting the field. It was speculated that fields that were burnt may have been owned by immigrants to Mentawai.



Figure 9. **Pugette'an** (traditional taro field) intercropped with a subsidised crop of **pinang** (*Areca catechu* L. (Arecaceae)). In the foreground are coppiced **ngirip / irip** (*Barringtonia racemosa* (L.) Spreng. (Lecythidaceae)) used to fence the field, and behind, a small plantation of rubber trees (*Hevea brasiliensis* (Willd. ex A.Juss.) Müll.Arg. (Euphorbiaceae)). Muntei village, Sabirut region, Siberut, Mentawai Islands, Indonesia, June 2019.

It was also noted during the observation period that fields are often fenced using coppiced **ngirip / irip** (*Barringtonia racemosa* (L.) Spreng. (Lecythidaceae)), a practice that has been shown to enhance biodiversity across agricultural landscapes (León & Harvey 2006). Fertiliser, herbicides and pesticides are usually not used, though, observations of farmers spraying poison to control ferns and grasses along garden paths in resettlement communities were made during the research period. It was also observed where customary land tenure is no longer observed, deforestation, sediment run-off and pollution are more apparent (though this requires further study to validate these initial observations).

Authors notes on collaboration with Indigenous researchers

Collaboration with Mentawai researchers was central to the implementation of the research activities and analysis, and is the first of its kind to emerge from Mentawai. Inclusive and transparent approaches aimed to ensure the study's objectives and methods procured accurate and meaningful outcomes, and were suitable within local contexts. When participants were informed that data gathered during the research period would be returned to the community for their own use, and to develop knowledge-sharing resources for their children, it was observed that participants were more motivated to offer in-depth and accurate responses. Engaging a team of Mentawai researchers also gave a better insight into cultural expectations and procedures, resulting in what was believed to be a more culturally appropriate approach, thus stimulating greater support and interest from **sikerei**, **sikebbu'kat**, local government and community members. Furthermore, as native speakers of the Sabirut and Rereiket dialects, it is believed that the inclusion of Mentawai peoples as researchers, not just informants, greatly reduced the probability of error in listening or spelling words and meanings in the Mentawai language. Additional perceived benefits from the project include: collaborators increased sense of ownership over and empowerment in preserving Mentawai TEK; collaborator and community increased awareness of Siberut's unique biosphere; and, increased awareness of international conservation agenda and protocol. Supporting the study's approach, one collaborating researcher commented:

I knew our forest was important, but I didn't realise just how many important plants – particularly medicines – were in such a small part of the forest. If our people living in the villages knew this, we wouldn't give our land away so freely. We must remember our ancestors' knowledge. We need to keep investigating. We must share our findings with our community.

Y. Mendrofa, YPBM Chairman and collaborating researcher, Matotonan, May 2019

Discussion

The use of medicinal plants and the impact on Siberut's biodiversity

Since tropical climates provide ideal conditions for the spread of diseases (State of the Tropics 2019) and that the Mentawai diet may be considered "calorie deficient" (Conway 1998), traditional plant medicine plays a critical role in supporting the health of the Mentawai. Access to traditional healthcare systems remains vital for both resettled and forest **uma** communities due to their perceived efficacy and cultural significance. If Mentawai traditional medicinal plants are no longer used or perceived as important, less value may be attributed to the forest resource, and less attention will be directed toward preserving Siberut's biome (Hamilton & Hamilton 2006). Furthermore, as the number of youth actively pursuing the path of the **sikerei** declines, the diversity of Mentawai plant knowledge may also diminish. Since culture and biodiversity are "inextricably linked" (Posey 1999), changes in values, social structures, and patterns of use of Mentawai's medicinal plants may impact Siberut's biodiversity.

Mentawai ecological practices and interactions supporting Siberut's biodiversity

Mentawai's indigenous agricultural practices are small-scale, diverse, culturally relevant, flexible and adaptable – characteristics essential for resilient, viable food systems (Lin *et al.* 2011, World Resources Institute 2019). **Pumonean** are highly diverse, and are important genetic resources for conserving Siberut's tree diversity (Indra *et al.* 2017). Moreover, **pumonean** traditional practices have significant cultural importance, providing crops integral to Mentawai's food culture. Gardens surrounding the **uma** are composed of frequently used medicinal, ceremonial, fuel and food plants based on the needs or preferences of the **uma** clan group. These gardens and **pumonean** vary in size, but are generally of high floristic diversity, require very little labour input, and contribute to the supply of important nutritional, cultural and economic plant species (Kumar & Nair 2004). By inter-cropping a range of commercial and subsistent species, Siberut's **pumonean** and **uma** gardens provide vital food, medicine, timber and other resources for the Mentawai community – particularly for resettled communities who have limited access to more remote forest resources (Kumar & Nair 2004, Mutua *et al.* 2014).

Given the considerable impact of industrial agriculture on biodiversity (Laurance *et al.* 2014, Lin *et al.* 2011), practices like those traditionally applied by the Mentawai people contribute substantially to supporting Siberut's biodiversity (Kumar & Nair 2004). Suppose traditional agricultural ecosystems are damaged, or traditional practices discontinued. In that case, there is a possibility that native or endemic plant species may become extinct, thereby causing a decline in the wellbeing of the Mentawai and their biome (WWF 1980). Mentawai traditional practices have the potential to safeguard local food security, maintain long-term sustainability, and regenerate human-degraded ecosystems (Garritty 2004, Kumar & Nair 2004, McNeely & Schroth 2006, Retnowati 2003). Furthermore, by not practicing slash and burn agricultural methods, a lack of fire across Siberut's landscapes ensures the soil is never exposed, thus preventing significant erosion, run-off and stream sedimentation – an important practice given Siberut's fragile soils originate from hardened mud sediments, and that riparian zones are subject to extreme erosion (Suhandi *et al.* 2002; WWF 1980).

The biological and cultural importance of sagu

Previous reforms enforced throughout Siberut and greater Mentawai sought to replace **sagu** swamps with rice cultivation programs (Pradipta 2019), and the Mentawai people were coerced to replace **sagu** with 'modern' products and foods (Persoon 2001). Not only did this replacement ignore the cultural significance of **sagu** and displace a crucial food, building and medicinal resource (Pradipta 2019), but branded a nutritious food source as *primitive* and *only for the poor* – diminishing its status in consumers' eyes. The discouragement of **sagu** also failed to acknowledge the ecological efficiency of the palm for staple food production (WWF 1980; Pradipta 2019). WWF (1980) highlighted several immense ecological benefits of **sagu**: the palm is easily regenerated, requires no pesticide input, and provides food sources and habitat corridors for multiple species (Figure 10). Given observations of changes in rice season and harvest yields due to climate-related effects (Li *et al.* 2017), existing ecosystems already achieving efficient staple food production like Siberut's **sagu** swamps and **pumonean** are vital in ensuring food security for a growing population, and have considerable value toward current biodiversity conservation efforts (World Resources Institute 2019). Considering the interconnectedness of culture and biodiversity (Posey 1999, Pretty *et al.* 2009), those plants most valuable to a community, and the cultural traditions that ensue, are fundamental for biodiversity conservation and ecosystem regeneration.



Figure 10. Examples of the diversity that may be found in **sagai** (Sabirut dialect) / **sagu** (Rereiket dialect) (*Metroxylon sagu* Rottb. (Arecaceae)) ecosystems.

Conclusions

Understanding the relationships between people and their biomes, and the values given to natural resources by communities are foundational to the equitable conservation of biodiversity (Hanazaki *et al.* 2013, Pretty *et al.* 2009, Sheil *et al.* 2005). While Mentawai's indigenous knowledge systems are globally recognised as integral to the conservation of Siberut's unique biodiversity (IPBES 2019), few studies have sought to evaluate the Mentawai community's preferences and priorities (similar to issues discussed in Sheil *et al.* (2005)). Given the correlation between biodiversity loss and the declining health and wellbeing of forest-based peoples (Colfer 2008, Sheil *et al.* 2005), recognizing and responding to local values and priorities for conservation and regeneration may have a two-fold benefit. Though representing a relatively small portion of Siberut's flora, those 63 plants that have been identified as most significant to the Sabirut and Sarereiket communities give a better perception of which plants are vital for Mentawai livelihoods, and provides a baseline from which biodiversity conservation and knowledge sharing can be guided. Perhaps more significantly, all species encountered during the study period had some use

to the Mentawai people, demonstrating a strong relationship between Siberut's biodiversity and Mentawai TEK. Thus, the study indicates that Mentawai TEK is a rich source for understanding Siberut's ecology. Failure to consider Mentawai TEK in conservation and resource management could drive Siberut's unique biodiversity and culture into extinction. The global ecological crisis is too urgent to ignore the contributions of Mentawai TEK and local researcher input in advancing the understanding of Indonesia's ecosystems and species.

Declarations

List of abbreviations:

ANDA	Herbarium of Universitas Andalas
Ba	Bark
BI	Bahasa Indonesia (Indonesian language)
CBD	2014 Conference of the Parties for the Convention on Biological Diversity
CI	Confidence Interval
CSI	Cultural significance index
FAO	Food and Agriculture Organization of the United Nations
Fl	Flower
Fr	Fruit
INDENT	Plant scientific name not yet identified
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IV	Importance value formula
IVI	Importance value index
L	Leaf
M	Mean
Ment	Mentawai language (believed to be shared vernacular in all dialects)
P	Pith
RFC	Relative frequency of citation
R	Roots
Rh	Rhizome
S	Shoots
Sab	Sabirut dialect
Sar	Rereiket dialect
Sib	Siberut dialect
SD	Standard Deviation
SE	Standard Error
St	Stem
TEK	Traditional ecological knowledge
Ti	Timber
Tu	Tuber / corm
UNDESA	United Nations Department of Economic and Social Affairs
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples 2008
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
WWF	World Wildlife Fund
YPBM	Yayasan Pendidikan Budaya Mentawai

Ethics approval and consent to participate: Ethical clearance for research activities associated with this paper were approved by Institut Pertanian Bogor (IPB) Komisi Etik Penelitian yang Melibatkan Subyek Manusia, approval number: 164/IT3.KEPMSM-IPB/SK/2019, and Southern Cross University Human Research Ethics Committee, approval number: ECN-19-055. During 2016-2018, before developing the initial research proposal, informal discussions were held with staff members of YPBM, **sikebbu'kat** and **sikerei** to ask if there was a need for the proposed research, and whether they would be willing to assist in research activities. Together, these discussions highlighted the need for ethnobotanical documentation, provided the first stage of gaining consent, and directed the initial scope of the study. Before commencing the study in January 2019, procedures to inform governments and community members of the research project were followed according to both Indonesian regulation and Mentawai custom. The research outline, outcomes and community survey examples were shared with the Camat (District Leader) of Southern Siberut, requesting authorisation to carry out the proposed activities within the village districts of the Southern Siberut region. Formal written permission to undertake the study was obtained from the

Camat, who then provided a letter of notice for the Kepala Desa (Village Leader) of each village prior to research activities commencing. Before participating in any research activities, participants read (or were read to in their preferred language) and signed an informed consent document, which outlined the research objectives, risks, benefits, and confidentiality agreements. All participants were informed they had the right to decline participation at any time throughout the research activities, and were under no obligation to reveal any knowledge they did not want to share, or felt was secret.

Consent for publication: Before participating in any research activities, participants read (or were read to by a trusted witness) and signed an informed consent document, which outlined the research objectives, risks, benefits, confidentiality agreements and consent for publication. All participants were informed they had the right to decline participation at any time throughout the research activities, and were under no obligation to reveal any knowledge they did not want to share, or considered private knowledge. Consent forms have been stored at the Yayasan Pendidikan Budaya Mentawai office, Jl. Muntei, Desa Muntei, Siberut Selatan.

Availability of data and materials: The data has not been deposited in a public repository, but has been made available to the Mentawai community through Yayasan Pendidikan Budaya Mentawai.

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Authors' contributions: SML conceptualised the initial fieldwork plan and was the primary author of the manuscript, with suggestions for improvements from JDN and DL. SML and SS were involved in methodology design and implementation, and conducted the data analysis. FS was involved in fieldwork and improving the accuracy of Mentawai plant names and variations between dialects. RH offered clarification of observed socioeconomic changes. Nurainas identified plant samples at ANDA. IZS and APPH provided support in-country.

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Appendix 1

Table 6. Supplementary data set – Collection numbers and details of botanical samples taken during the research period.

Scientific name	Vernacular name(s)	Collection location (nearest village)	Collector	Collection number	Collection date	Herbarium location
INDENT	Obboi (BSib)	N/A	N/A	No sample was taken for this plant. During the research period, Southern Siberut experienced an unusual drought spell where it did not rain for 5 months, drying out the habitat where this plant is usually found.	N/A	N/A
<i>Dipterocarpus fusiformis</i> P.S.Ashton	Elagat (BSab) / Kara-kara (BSil, BSar) / Kruing (BI)	Buttui, Sothern Siberut	S Lee	SLBU001	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Angiopteris evecta</i> (G.Forst.) Hoffm.	Bakkat laggai (BM) / Sibakkat laggai (BM)	Buttui, Sothern Siberut	S Lee	SLBU002	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Kibatalia arborea</i> (Blume) G.Don	Toilat (BM)	Buttui, Sothern Siberut	S Lee	SLBU003; SLBU004	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Horsfieldia</i> sp. Blume ex DC.	Ribbu (BM)	Buttui, Sothern Siberut	S Lee	SLBU005	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Justicia gendarussa</i> Burm.f.	Pangasele (BSar, BSil) / Pakasele (BSab)	Buttui, Sothern Siberut	S Lee	SLBU006	5/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Cananga odoratum</i> (Lam.) Hook.f. & Thomson	Poak (BSib)	Buttui, Sothern Siberut	S Lee	SLBU007	6/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Amischotolype mollissima</i> (Blume) Hassk.	Lemu-lemu (BM)	Buttui, Sothern Siberut	S Lee	SLBU008	6/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
Gleicheniaceae C.Presl	Osap (BM)	Buttui, Sothern Siberut	S Lee	SLBU020	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Piper sarmentosum</i> Roxb.	Baba (BSib)	Buttui, Sothern Siberut	S Lee	SLBU021	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Piper betle</i> L.	Talingengeng (BM) / Sirih (BI)	Muntei, Southern Siberut	S Lee	SLBU022	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Daemonorops angustifolia</i> (Griff.) Mart.	Labi (BSar) / Rui (BSab)	Buttui, Sothern Siberut	S Lee	SLBU023	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Etlingera elatior</i> (Jack) R.M. Sm.	Gojo (the whole stem) (BM) Totonan (BM) / Tairatti (BM)	Buttui, Sothern Siberut	S Lee	SLBU026	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Homstedtia conica</i> Ridl.	Kukuwet (BM)	Muntei, Southern Siberut	S Lee	SLBU027	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Alpinia malaccensis</i> C.Presl	Pasingin (BSil, BSar) / Kasingin (BSab) / Kojo koddiai (BSib)	Buttui, Sothern Siberut	S Lee	SLBU029	10/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Alstonia spatulata</i> Blume	Kakatdut (BSib) / Gite (BSil, BSar) / Pulai (BI)	Matotonan, Southern Siberut	S Lee	SLMA002	23/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Horsfieldia irya</i> (Gaertn.) Warb.	Roat (BSab) / Doat (BSar)	Matotonan, Southern Siberut	S Lee	SLMA008	23/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
INDENT	Bolasi (BM)	Muntei, Southern Siberut	S Lee	SLMU001	9/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
INDENT	Mangguguk (BM)	Muntei, Southern Siberut	S Lee	SLMU002	9/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Macaranga</i> sp. Thouars	Katumanggei (BM)	Muntei, Southern Siberut	S Lee	SLMU003	9/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Nephelium cuspidatum</i> Blume	Babaet (BSar) / Kapa (BSab)	Muntei, Southern Siberut	S Lee	SLMU006	10/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Shorea</i> sp. Roxb. ex C.F.Gaertn.	Karai (BM)	Muntei, Southern Siberut	S Lee	SLMU007	10/10/19	UNAND Herbarium (ANDA) Padang, Indonesia

<i>Erythrina subumbrans</i> (Hassk.) Merr.	Mancuat (BM) / Matcuat (BM)	Muntei, Southern Siberut	S Lee	SLMU008	10/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Ludwigia linifolia</i> Poir.	Mumru tuktuk (BSar) / Lottek-lottek (BSab)	Muntei, Southern Siberut	S Lee	SLMU009; SLMU010	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Lansium parasiticum</i> (Osbeck) K.C.Sahni & Bennet	Selak (BSab) / Tiat (BSar, BSil) / Siamung (BSar, BSil)	Muntei, Southern Siberut	S Lee	SLMU011	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Durio spp.</i> Adans.	Doriat (BM) / Dorian (BSil)	Muntei, Southern Siberut	S Lee	SLMU012	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Hibiscus rosa-sinensis</i> L.	Bekeu (BM) / Kembang sepatu (BI)	Muntei, Southern Siberut	S Lee	SLMU013	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Nephelium lappaceum</i> L.	Gairabbik (BSab, BSar) / Rambutan (BI)	Muntei, Southern Siberut	S Lee	SLMU014	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Graptophyllum pictum</i> (L.) Griff.	Aileleppet (BM)	Muntei, Southern Siberut	S Lee	SLMU015	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Cymbopogon citratus</i> (DC.) Stapf	Siat-siat (BSab) / Jiat-jiat (BSar) / Serai (BI)	Muntei, Southern Siberut	S Lee	SLMU016	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Rottboellia sp.</i> Naezén	Boku-bokuk (BM)	Muntei, Southern Siberut	S Lee	SLMU017	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Barringtonia racemosa</i> (L.) Spreng.	Ngirip (BSib) / Irip (BSib)	Muntei, Southern Siberut	S Lee	SLMU018	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
Bamboo types	Manggeak (BM) / Bambu (BI)	Muntei, Southern Siberut	S Lee	SLMU019	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Curcuma longa</i> L.	Kiniu (BM) / Kunyit (BI)	Muntei, Southern Siberut	S Lee	SLMU020	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Acorus calamus</i> L.	Sumamra (BSar, BSil) / Butek-butek (BSab)	Muntei, Southern Siberut	S Lee	SLMU021	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Psidium guajava</i> L.	Jabbui (BM) / Sabbui (BSar) Jambu biji (BU)	Muntei, Southern Siberut	S Lee	SLMU022	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Alpinia galangal</i> (L.) Willd.	Oroket (BSab) / Palakkokoai (BSar)	Muntei, Southern Siberut	S Lee	SLMU023; SLMU024	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Kaempferia galangal</i> L.	Kopuk (BSab) / Sikopuk (BSar) / Kencur (BI)	Muntei, Southern Siberut	S Lee	SLMU026	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Cordyline fruticosa</i> (L.) A.Chev.	Boblo (BM)	Muntei, Southern Siberut	S Lee	SLMU027; SLMU028	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Codiaeum variegatum</i> (L.) Rumph. ex A.Juss.	Surak (BM)	Muntei, Southern Siberut	S Lee	SLMU029; SLMU030; SLMU031; SLMU032	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Mussaenda frondosa</i> L.	Mumunen (BSib)	Muntei, Southern Siberut	S Lee	SLMU033	11/10/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Musa spp.</i> L.	Magok (BSar, BSil) / Bagok (BSab) / Pisang (BI)	Muntei, Southern Siberut	S Lee	SLMU034	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Manihot sp.</i> Mill.	Bairatti (BSab) / Sipukaju (BSil, BSar) / Ubi kayu (BI)	Muntei, Southern Siberut	S Lee	SLMU035	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Ipomoea sp.</i> L.	Siputeteket (BSil, BSar) / Gobik (BSab) / Ubi jalar (BI)	Muntei, Southern Siberut	S Lee	SLMU036	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Hedychium coronarium</i> J.Koenig / <i>Hedychium flavescens</i> Carey ex Roscoe	Kakainauk (BSab) / Simakainauk (BSar, BSil)	Muntei, Southern Siberut	S Lee	SLMU037	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Melastoma sylvaticum</i> Blume	Sibekak (BM) / Sibetu (BSab) / Eruk teinung (BSil, BSar)	Muntei, Southern Siberut	S Lee	SLMU038	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Macaranga tanarius</i> (L.) Müll.Arg.	Ottot (BM) / Pari-pari (BSib)	Muntei, Southern Siberut	S Lee	SLMU039	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Colocasia esculenta</i> (L.) Schott	Gettek (BM) / Talas (BI) / Keladi (BI)	Muntei, Southern Siberut	S Lee	SLMU040	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Curcuma zanthorrhiza</i> Roxb.	Kiniu sailuk (BM) / Temulawak (BI)	Muntei, Southern Siberut	S Lee	SLMU041	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Cocos nucifera</i> L.	Toitet (BM) / Kelapa (BI)	Muntei, Southern Siberut	S Lee	SLMU043	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Arenga pinnata</i> (Wurm.) Merr.	Poula (BM) / Katsaila (BM)	Muntei, Southern Siberut	S Lee	SLMU044	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Rhizophora apiculata</i> Blume	Bakat (BM) / Bakau (BI)	Muntei, Southern Siberut	S Lee	SLMU045; SLMU046	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Eleusine indica</i> (L.) Gaertn.	Ngiti-ngitit (BSib) / Komensakkokok (BSab)	Muntei, Southern Siberut	S Lee	SLMU047	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia

<i>Zingiber officinale</i> Roscoe	Laigak (BM) / Jahe (BI)	Muntei, Southern Siberut	S Lee	SLMU048	22/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Calamus caesius</i> Blume	Mandorau (BM)	Buttui, Sothern Siberut	S Sagari	SSBU001	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Shorea pauciflora</i> King	Katuka (BM)	Buttui, Sothern Siberut	S Sagari	SSBU002	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Pentace triptera</i> Mast.	Kaboi (BSib)	Buttui, Sothern Siberut	S Sagari	SSBU003	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Hopea dryobalanoides</i> Miq.	Mancemi (BM)	Buttui, Sothern Siberut	S Sagari	SSBU004	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Gymnacranthera sp.</i> (A.DC.) Warb.	Ngalou pataddekat (BSar)	Buttui, Sothern Siberut	S Sagari	SSBU005	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Goniothalamus sp.</i> (Blume) Hook.f & Thomson	Simuinek (BSar)	Buttui, Sothern Siberut	S Sagari	SSBU006	4/8/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Calamus sp.</i> L.	Pelege (BM)	Buttui, Sothern Siberut	S Sagari	SSBU020; SSBU022	13/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Daemonorops sp.</i> Blume	Sasa (BM)	Buttui, Sothern Siberut	S Sagari	SSBU021; SSBU023	13/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Etlingera coccinea</i> (Blume) S.Sakai & Nagam.	Pelekak (BSib)	Buttui, Sothern Siberut	S Sagari	SSBU024	13/11/19	UNAND Herbarium (ANDA) Padang, Indonesia
<i>Metroxylon sagu</i> Rottb.	Sagu (BSar, BSil) / Sagai (BSab)	Buttui, Sothern Siberut	S Sagari	SSBU026	13/11/19	UNAND Herbarium (ANDA) Padang, Indonesia