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Ethnobotany and conservation applications in the *noken* making by the Sougb Tribe of West Papua, Indonesia

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Abstract. Saiba Y, Ungirwalu A, Murdjoko A, Brearley FQ, Peday MH, Yowei RN, Imburi CS, Runtuboi YY, Djitmau DA, Sa'diyah SH. 2023. *Ethnobotany and conservation applications in the noken making by the Sougb Tribe of West Papua, Indonesia. Biodiversitas 24: 4577-4583.* Documenting local ecological knowledge is key for understanding complex ecological-cultural interactions to protect indigenous community entities. Woven baskets known as *noken* have been part of Papuan indigenous culture for centuries, yet ethnobotanical aspects of *noken* making remain poorly understood. Hence, this study describes *noken*-making from an ethnobotanical perspective. We acquired ethnoecological knowledge by interviewing respondents who were actively involved in the production of *noken*. The results revealed that the Sougb tribe (from South Manokwari, West Papua, Indonesia) utilized pineapple as a basic material for weaving and other natural materials as dyes, with this process undertaken mainly by women. We also document the Sougb tribe's adaptation and continuous interaction with their dynamic environment that has evolved during *noken* making. Moreover, the recommendation to conserve *noken* preserves biocultural diversity and habitats for key plant species. Since *noken* have played an essential part in shaping the Sougb tribe's cultural identity, conserving the use of *noken* will aid in preserving the habitats of plants used as materials for *noken*. In the future, the provincial Government should assist habitat biocultural conservation by granting tribes customary forest status to facilitate plant habitat protection in line with the sustainable development agenda of West Papua Province.

Keywords: Anthropology, Arfak, ethnography, igya ser hanjob, pineapple

INTRODUCTION

For centuries, indigenous communities in tropical regions have interacted with and depended upon forests for natural resources (Alamgir et al. 2020; Carson et al. 2018). These interactions have produced and developed local knowledge vertically transferred from one generation to another and/or through various social interaction networks (Berkes et al. 2000; Calvet-Mir and Salpeteur 2016; Díaz-Reviriego et al. 2016). The understanding of nature's contribution to people has recently gained increased stakeholder attention, particularly in considering future initiatives for sustainability (Iyai et al. 2020), as understanding the diversity and utilization of natural resources are considered basic sources of information for biodiversity conservation and ecosystem management (Joa et al. 2018). Indigenous local knowledge, especially concerning natural resource utilization, is an important component of adaptive environmental management as it has been traditionally practiced by local communities integrating people and their environment in sustainable practices over generations (Berkes et al. 2000). Through intensive and long-term interactions in a particular region, communities develop specific knowledge on managing and

changing their environment (Albuquerque et al. 2018) yet these indigenous knowledge systems are dynamic and continually adapting to changing conditions. Collating information based on local ecological knowledge is a valuable approach to understanding complex socio-ecological systems (Joa et al. 2018; Naah and Guuroh 2017). A multidisciplinary framework incorporating ecological interests and historical and cultural contexts leads to a better understanding of interactions between local communities and the environment. This interaction shapes their culture and identity (Ungirwalu et al. 2017).

New Guinea is the largest tropical island in the world, with an incredibly rich diversity of both organisms and cultures (Cámara-Leret et al. 2019, 2020). This biocultural diversity and the long interaction with numerous plant taxa have given rise to a rich indigenous plant knowledge. Yet, major knowledge gaps remain (Cámara-Leret and Dennehy 2019a,b), and this knowledge is declining rapidly (Kik et al. 2021). Most Papuan indigenous groups have used plant materials to produce woven baskets, known locally as *noken*, that form a key part of their traditional culture and identity (Kanem and Norris 2018). *Noken* has been recognized globally by UNESCO through inclusion on its list of Intangible Cultural Heritage. *Noken* has been part of

social activities such as carrying crops, and Papuan women mostly make them. It is unclear how long Papuan people have used *noken* as part of their lifestyle, but many reports where data were obtained from an interview with elderly people and key informants stated that the use of *noken* has been for generations (Kanem and Norris 2018; Wanma et al. 2013). Many reports also stated that each tribe in Papua had developed *noken* in which they modified the plant materials and how they colored the *noken*. Different tribes in Papua show contrasting cultures, such as language, which impact the *noken's* shape and color (Kanem and Norris 2018). Moreover, the woven model also differs between tribes as they exhibit cultural meanings, particularly in the use of color.

The most important narrative is that *noken* has been a key part of Papuan identity, however, ethnobotanical studies of *noken* remain largely unreported. Hence, this study aims to examine the ethnoecology and socio-cultural aspects related to ethnoecology by describing the ecological knowledge of a particular Papuan tribe (Sougb) regarding plant utilization of the major materials of *noken* making and also to consider *noken* making from an ethnobotanical and conservation perspective.

MATERIALS AND METHODS

Study area

One of West Papua's largest ethnic groups is the Arfak, consisting of four major tribes: Hatam, Meyakh, Moile, and Sougb. The study was conducted in four villages (Abreso, Bamaha, Sabri, and Tobou) where the Sougb tribe inhabits the coastal areas in Rasinki Subdistrict, South Manokwari District (1°32' S and 134°10' E) of the West Papua Province, Indonesia (Figure 1). The study combined both ecological and social science approaches. It was focused on elucidating local knowledge's role and social interactions in

noken production and how the migration of the Sougb tribe has influenced these.

Data collection

We gathered ethnoecological knowledge by actively interviewing respondents involved in *noken* production from January to February 2020. The data collection approach included: (i) a preliminary survey to determine where the *noken* makers lived by observing the *noken* sellers and those wearing *noken*. Information from customary leaders was also obtained to find additional key respondents. (ii) Then, the snowball interview technique was applied to select more respondents from the study area as this method needs validation of the next respondents for future information obtained during the previous interview (Loureiro et al. 2015). After asking the interviewees for the next respondents, the information provided was clarified using data from the preliminary survey. The interview began with the village head, who provided recommendations for the names of the next 45 respondents. (iii) During the interviews, data were gained by in-depth interviews using questionnaires to determine the species used as the major materials, dye plant species, parts of plant species that were utilized, how to use them, and where they grew. Socio-cultural data were collected from the respondent's identity, including name, age, gender, education level, and religion. Moreover, the production process was asked about and observed. We grouped their ages as children between 5 and 16, youths between 17 to 29 years old, and adults above 29. (iv) Lastly, a site visit was conducted by observing and recording plants' habitats in swidden fields, fallows, and home gardens. Plants were identified directly in the field, and their local/regional names, usage, and traditional procedures were documented. Unidentified plants were vouchered to be identified and deposited at Herbarium Manokwariense (MAN), Universitas Papua, Indonesia.

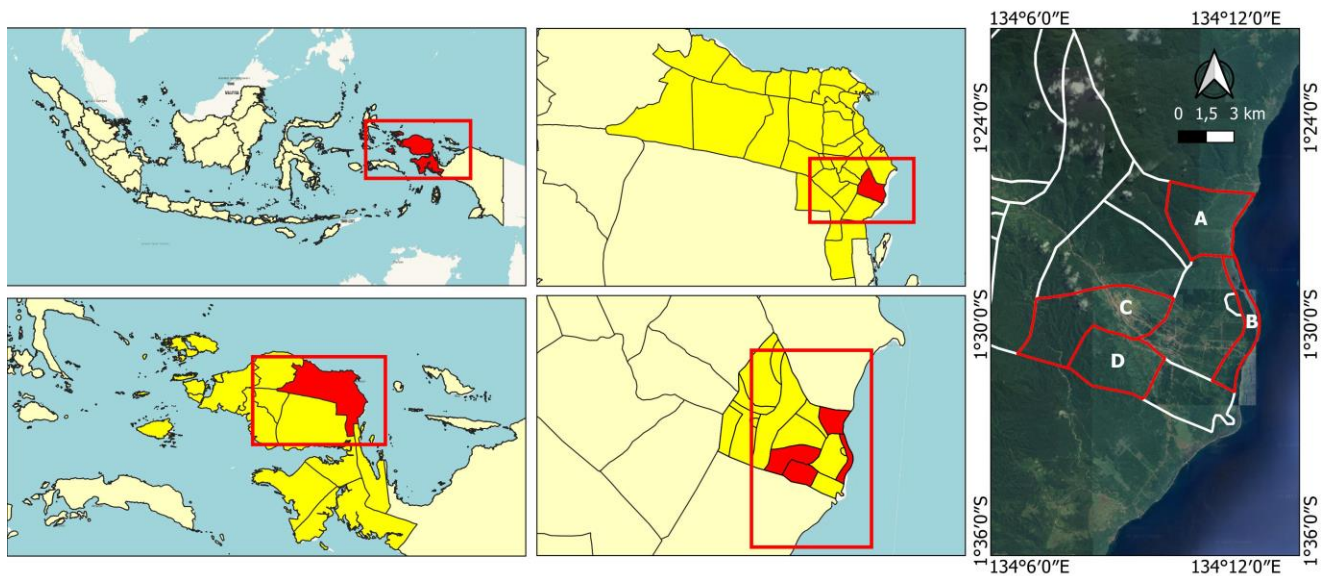


Figure 1. Study site in Ransiki Sub-District, South Manokwari District, West Papua Province, Indonesia. A. Abreso, B. Bamaha, C. Sabri, D. Tobou

Data analysis

Data and observations during the site visits were used to determine the ethnoecology of relevant plants, and the ethno-techno-conservation approach was also assessed (Ungirwalu et al. 2017). The tribe's learning process on plant utilization was investigated using the stimulus (S) on how the local people observed the phenomena and response (R) on the activities arising from the observation (Hills 2002; Rescorla 1988). These were modified by adding encouragement (E) between S and R, in which the E was the observation's development by determining what local people think of natural phenomena. Then, the description was supported through engaged observation, interviews, and literature studies stages.

RESULTS AND DISCUSSION

Ethnography of the Sougb Tribe

Ethnographically, the Arfak people were originally classified as inland communities from the Arfak mountain region. Then, some migrated from the mountains to the lowlands and coast due to several factors, particularly Government, church, and private institutions' investment in the area. In the 1930s, outside Java, the Dutch government was looking for suitable areas for new settlements for agricultural development, including Kalimantan, Sulawesi and West Papua. In West Papua, several areas are found that are quite fertile, especially in the Ransiki plain (south of Manokwari) and are being developed for cocoa farming involving indigenous people. In the post-1950 period, small plantations were found that were established by colonialists and cocoa plantation companies before the second world (De Wilde de Ligny et al. 1963; Ruinard 1964). Meanwhile for the church, a Evangelism school was founded in Ransiki in 1957 for local residents (Rumbekwan & Ramandei 2023). The Sougb tribe's current location in the South Manokwari District was due to the establishment of a private company in the cocoa sector in the early 1980s, PT Cokran Ransiki, as the company provided jobs for the local communities. The Sougb tribal livelihood depends primarily on natural resources such as hunting, gathering, fishing, and farming. The main agriculture comes from shifting cultivation, while home gardens are also cultivated to meet some of their needs (Ungirwalu 2019). Since their migration, the Sougb tribal community has experienced environmental adaptations. Previously the Arfak tribe had utilized the natural resources around them to make traditional tools such as noken which were generally made of bark (Sonbait et al. 2021). This traditional knowledge system has been maintained for generations as part of the customary community knowledge in Papua, and it generally survives in a specific environment. Studies have shown that Arfak residents and several other tribes in Papua have used various plant species as *noken*-making materials (Kanem and Norris 2018; Wanma et al. 2013; Zebua et al. 2020).

Habitat of pineapple plants

In their new location, the Sougb tribe weave *noken* mainly from pineapple leaves in the genus *Ananas* (Bromeliaceae), originally native to tropical South America. Based on interviews, surveys, and ethnographic fieldwork, three pineapple species were identified in the area; those plants were used to create *noken*: (i) Nenas merah (*Ananas bracteatus* (Lindl.) Schult. & Schult. f.) called *Gonggoro gahani* by the Sougb people and found in swidden fields, (ii) Nenas putih (*Ananas* sp.) called *Gonggoro ghof* that grows abundantly in swidden fallows, (iii) and Nenas Bogor (*Ananas comosus* (L.) Merr.) locally named *Gonggoro bey* and found in home gardens. It is considered that the plants were originally introduced through agricultural development in this region. *Nenas putih* was stated as probably native to this area, although this is unlikely due to the origin of the *Ananas* species in South America, as noted above (D'Eeckenbrugge and Govaerts 2015). However, improved taxonomic study is needed to describe and fully identify the species, as the taxonomy of *Ananas* is complex (Coimbra et al. 2020; D'Eeckenbrugge and Govaerts 2015). Pineapple plant habitats are generally located near settlements, and they are harvested mostly from swidden fields and fallows and also, but fewer, from home gardens. Pineapple plants in the abandoned agricultural land were more abundant than those in the other two habitats due to local people using vegetative instead of sexual propagation; the Sougb tribe prefers this method because vegetative techniques produce new plants and fruits more quickly. Homegardens are an important part of the Sougb's agricultural activities, with many vegetations, including cocoa (*Theobroma cacao* L.; Malvaceae) and banana (*Musa* spp.; Musaceae), which are the main commodities in South Manokwari District. Pineapple is not a priority species for plantations; only a few Sougb's do, making them less abundant than other plants in the home gardens.

Ethno-techno-conservation of *noken* making

Noken has been officially categorized as an intangible cultural heritage as a Papuan cultural artifact (Kanem and Norris 2018; Wanma et al. 2013). *Noken* contains many unrevealed histories due to its numerous philosophical, sociological, and anthropological values. The Papuan *noken* tradition has eight symbolic meanings: relationship, family, identity, protection, economy, life, aesthetics, and spontaneity (Zebua et al. 2020). In the Sougb tribe, ethno-techno-conservation has been studied related to local knowledge, technology, and conservation symbols (Assem et al. 2018). In the joint evolutionary stages of the social system, the ethno-techno-conservation process is constructed according to Stimulus (S), Encouragement (E), and Response (R) (Ungirwalu et al. 2017). The South Manokwari coastal biophysical and ecological conditions differ from the Arfak Mountains, where the Sougb tribe originated. While tribes from other areas in Papua utilized *Cypholophus* (Urticaceae), *Ficus* (Moraceae), *Gnetum* (Gnetaceae), *Pandanus* (Pandanaaceae), and other genera as the raw materials (Kanem and Norris 2018; Wanma et al. 2013; Zebua et al. 2020), the Sougb people have developed

pineapple as the main material for weaving *noken*. The chronological adaptation process in South Manokwari remained unclear but most likely began when part of the Sough tribe moved to the low-lying areas from the mountains. The tribe has therefore adapted their *noken* production to a different environment as their community's learning process response (Kanem and Norris 2018), with their adaptive process influenced by human adjustments in using their new natural environment. In South Manokwari, the pineapple plants were selected because they provide more fiber that is more flexible, thus making them easier to manage. Hence, the plants were cultivated close to the settlements in which this process has been part of the initial stimulus (S). People choose by observing the morphological and anatomical characteristics of suitable pineapple leaf fibers'. This stimulus triggered encouragement (E) for local people to meet their needs from the raw fiber, leading them to experiment on the pineapple plant fibers for *noken* production. Furthermore, local people developed the raw materials technique to spin pineapple leaf fibers into yarn, traditionally called *gonggoro mei*. This process was the response (R), as they subsequently acted to create *noken* (Figure 2). This is an example of ethno-techno-conservation, which ideally occurs when humans must repeatedly adapt to natural systems, improving their understanding of the natural environment and inter-relationships (Murdjoko et al. 2021; Ungirwalu et al. 2017).

Noken production processes

The ethnoecological knowledge related to *noken* production is described in three stages, namely (i) pre-weaving, (ii) weaving, and (iii) post-weaving. Adults were the main stakeholders in *noken* production, except for the pre-weaving stage when younger community members were involved; they harvested pineapple leaves to make *gonggoro mei* (Figure 3). Adults have internalized the knowledge of the *noken*-making process, but it is not permanently documented, and therefore this cultural history is only transmitted orally from one generation to another. The children's involvement indirectly supported knowledge transfer, further studied, improved, maintained, and redefined in an interactional.

Women played a central role in all stages of the weaving process, while men were more involved in farming. Hence, *noken* is highly connected to women and symbolizes their existence (e.g., *noken* represents a woman's uterus (Kanem and Norris 2018)). This shows women an important role in maintaining the tribe's cultural heritage and *noken* identity by transforming the symbolization of its utilization.

The pre-weaving stage begins by preparing the tools, machetes, knives, and materials, including pineapple leaves and the dye (natural colorant plants). Old pineapple leaves that are tougher with longer-lasting fibers are those generally selected. The leaves are cut with a knife and brought home for processing by scraping with metal to fiber separation. The leaf fibers are then dried in the sun for at least one day. The leaves are generally 1.0 to 1.7 m long with a width of up to 6 cm. The fibers are divided into two parts at the spinning stage, with fiber lengths between 45 cm and 60 cm. The ancestral weaving technique in *noken* making is braiding the fibers to create the web- or net-like *noken*. Then, the *noken* motifs characteristic of the Sough tribe are created from lines of color differentiation, representing bird feathers, animal teeth, colorful threads, beads, seeds, etc.

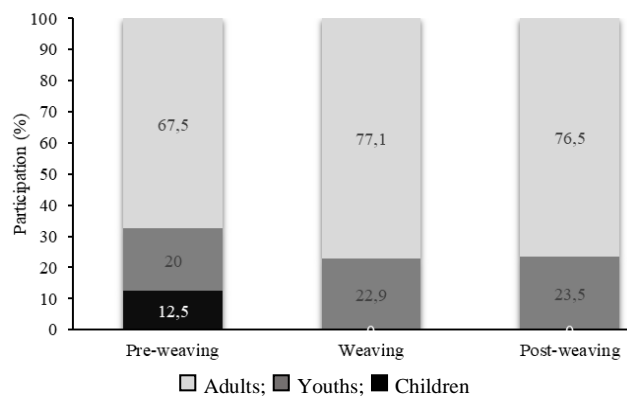


Figure 3. Local participation in *noken* making in West Papua among three age groups



Figure 2. Ethno-techno-conservation construction of *noken* made from pineapple plants in West Papua, Indonesia

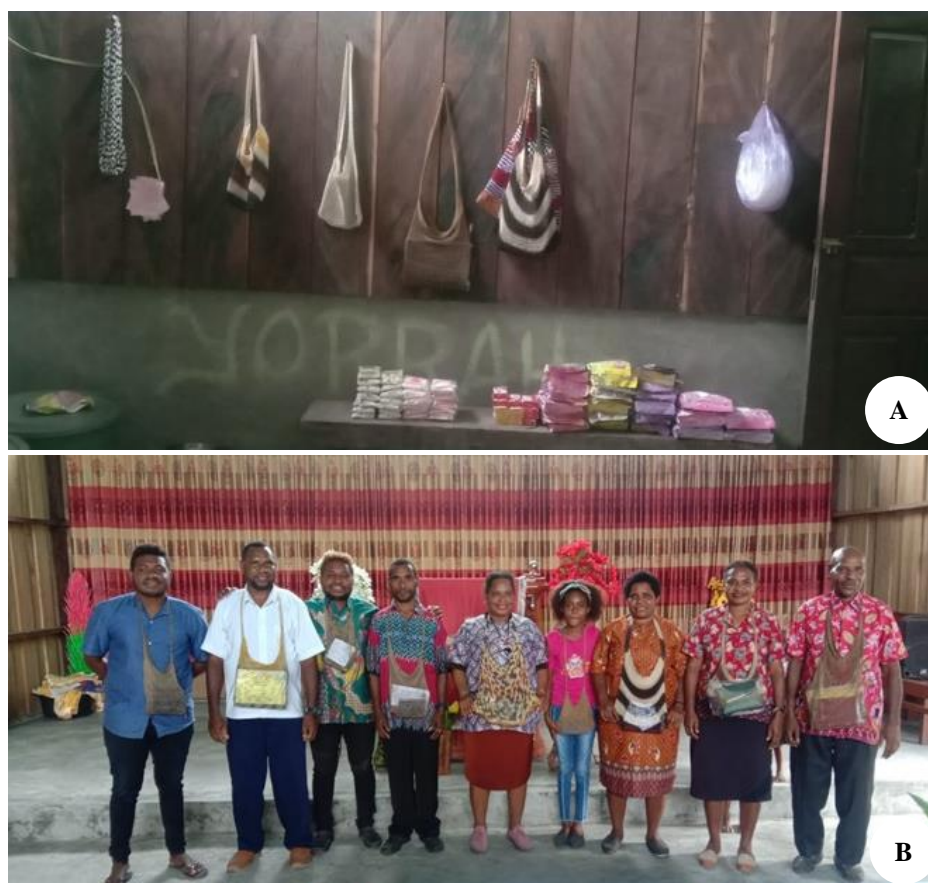


Figure 4. A. Selling of *noken*; B. Pastor and people wearing *noken* during an official inauguration (lower) in West Papua, Indonesia

The natural colorants represent the Sougb tribe's symbols of nature and life, i.e., red, white, yellow, and blue. The red color is produced from teak (*Tectona grandis* L.f.; Lamiaceae) and *kesumba keling* (*Bixa orellana* L.; Bixaceae), which are called *Sirga* and *Kamara*, respectively, by the Sougb tribe. The white color is produced from the pineapple leaves' natural color, while the yellow color is obtained from turmeric (*Curcuma longa* L.; Zingiberaceae). The blue color is produced from *harendon* (*Melastoma malabathricum* L.; Melastomataceae), traditionally called *Manggoi*. Generally, all these natural coloring agents are obtained from natural forests or the habitats where pineapples are found. Dye is applied by pounding and rubbing the relevant dye plant on the pineapple fibers.

The *Noken* of the Sougb tribe is generally produced in three sizes, namely large (*iymedam*), medium (*iytataij*), and small (*iymokrei*), which were developed based on the community's needs. The main function of *noken* in the study villages is to carry items, but more recently, they have been used as souvenirs to influential people who visit. *Noken* is also important in the traditional ceremonies of the Sougb tribe. For example, they are used to bring dowry property during a marriage proposal. Most recently, *noken* has developed a cultural role as a pride symbol of people living in Papua, particularly South Manokwari. Therefore, the *noken* now has commercial value due to its increased

demand. Women sell them by displaying the items in front of their homes or pre-ordering custom designs with specifically selected motifs (Figure 4). The official ceremonies in the South Manokwari Government have proposed *noken* as souvenirs, welcome, and farewell symbols; *noken* is now used by participants such as state officials, leaders, and stakeholders during official inaugurations.

The implication of conserving nature by traditional *noken* conservation

Noken has an important role in the Sougb tribe's cultural identity. However, traditional *noken* materials are now potentially substituted by modern materials such as plastic. Moreover, the South Manokwari government has officially recognized *noken* utilization as this district's traditional identity, such as souvenirs for special guests. The Ministry of Tourism and Creative Economy also asked civil servants to use the Sougb *noken*, supporting its originality and conservation. Conserving the culture of local people could lead to the people (called "key agents") automatically preserving the vegetation in nature (Bussmann 2019; Murdjoko et al. 2021). Consequently, Sougb *noken* and the tribe's culture are being conserved, as well as the habitats of plants used as *noken* weaving materials - a traditional concept of the Arfak tribes called *igya ser hanjob* (Asmuruf et al. 2017). In the future, the

provincial Government needs to support the biocultural conservation of habitats by issuing customary forest status to the tribes to facilitate the conservation of plant habitats. This would lead to multiple positive effects from such a conservation initiative and can serve as an opportunity for the South Manokwari Government to promote this region as part of the sustainable development agenda of West Papua Province (Cámara-Leret, Schuiteman et al. 2019).

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