

THE USE OF VARIOUS PLANT TYPES AS MEDICINES BY LOCAL COMMUNITY IN THE ENCLAVE OF THE LORE-LINDU NATIONAL PARK OF CENTRAL SULAWESI, INDONESIA

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ABSTRACT

The various ethnic communities residing around Lindu Lake in Central Sulawesi Province of Indonesia with their local knowledge on medicinal plants, still use them as the source of traditional medication for healing light and serious ailments. Three females and one male key informant who had good reputation in medicinal plant knowledge and traditional healing along with 34 respondents were questioned using semi structured interview method. Ninety six species belonging to 45 families have been found which can be used to heal 87 kinds of ailments, for facial treatment, for post natal care and as food supplements. The medicinal plants can be found in various habitats including house yard, plantation, forest, rice fields, swamps and any other location (wild).

KEY WORDS: Lindu Lake, Lore Lindu National Park, local knowledge, and medicinal plant uses.

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INTRODUCTION

The traditional use of plants for healing in Indonesia dates back to prehistoric times. The art and knowledge of the uses of plants as medicine have been handed down orally from generation to generation. Some plants still used in traditional medicine can be found depicted in reliefs on the walls of ancient temples in Java. Such as those of Borobudur, Prambanan, Penataran and Sukuh (de Padua *et al.*, 1999)

Indonesia has 1,340 ethnics (BPS, 2010) each holds its own knowledge about traditional medication and as a tropical country Indonesia encompass a vast number of biodiversity, many of them exist in Lore-Lindu National Park (LLNT) of Central Sulawesi, Indonesia, which is one of the highly significant conservation regions in Indonesia. Based on several studies, several botanists (Pitopang *et al.*, 2003 and 2004, Moge, 2002 and 2005, Kessler *et al.*, 2005) have shown that this region is rich in plant types that have their own charm as some of them represent the flora of mountain forest of Sulawesi exhibiting high biodiversity in characteristic and many of them are endemic. However, studies conducted in this region have been limited particularly to those related to the use of medicinal plants by local community.

Lindu Lake located in the enclave of LLNT is the eight largest lakes in Sulawesi and the second largest in Central Sulawesi. Community settling around the lake belongs to various ethnics and sub ethnics who still hold the knowledge of traditional medication and use various plants for various illness treatments as well as for health care and cosmetics. The medicinal plants are collected from forest, plantation, house yard, wetland rice fields and swamps existing around their settlement.

In general, this research is aimed to expose the local/traditional knowledge and its use for traditional medicines and to record medicinal plants and traditional medication.

METHODS

a. Study Area

The research area was located around Lindu Lake (Figure 1). This location was selected

based on considerations that it is high in biodiversity and the local community settling in the Lindu lake region comprises of various ethnics. The Lindu enclave recently has become Lindu sub district due to regional expansion of Kulawi sub district by the government of Central Sulawesi Province, Indonesia. Lindu Sub District spread over an area of 58,585.72 ha (BBTNLL, 2012) covering Puroo, Langko, Tomado and Anca villages. Lindu sub district has 78% (45,672.27) ha of its total area under LLNP and is mountainous at 800–100 elevation above sea level. The slope land is very steep ranging from 60–70% even >80% (BPS, 2013). Climatic seasonality is not pronounced, with a monthly average of over 100 mm of rainfall; although in some years monthly values can be far lower (Whitten *et al.*, 1987). Minimum temperatures range between 12°C and 17°C, while maximum values range from 26°C to 35°C. The natural vegetation in the study area is evergreen tropical forest dominated by the families Anacardiaceae, Burseraceae, Lauraceae, and Sapotaceae (Whitmore & Sayer 1986, Kessler *et al.*, 2005).

b. Demographic Social Characteristics of Respondents

The number of respondents was 38 persons, 20 years to more than 60 years old residing in four villages. The male respondents were 42.11% and the females were 57.89%. Most of the respondents (84.21%) were farmers who cultivate wetland rice, coffee and cacao while the remaining 18.42% were fishermen who also work as farmers.

The respondents living in the enclave of Lindu lake were predominantly *Kaili* ethnic i.e *Kaili Tado* sub ethnic. The *Kaili* ethnic who settled in Lindu region are subdivided into 7 different sub ethnics each with its own dialect including *Kaili Ledo*, *Kaili Ija*, *Kaili Ado*, *Kaili Moma*, *Kaili Tohulu*, *Kaili Uma*, and resettled *Kaili Da'a* (BTNLL, 2009). Other ethnic outside *Kaili* ethnic are *Pekuehua*, *Besoa* and *Bada* (BTNLL, 2009). Some ethnics coming from outside Central Sulawesi are *Bugis*, *Jawa*, *Minahasa* and *Toraja* (Figure 2).

Figure 1a. Map of Central Sulawesi



Figure 1b. Map of Lore Lindu National Park, Indonesia

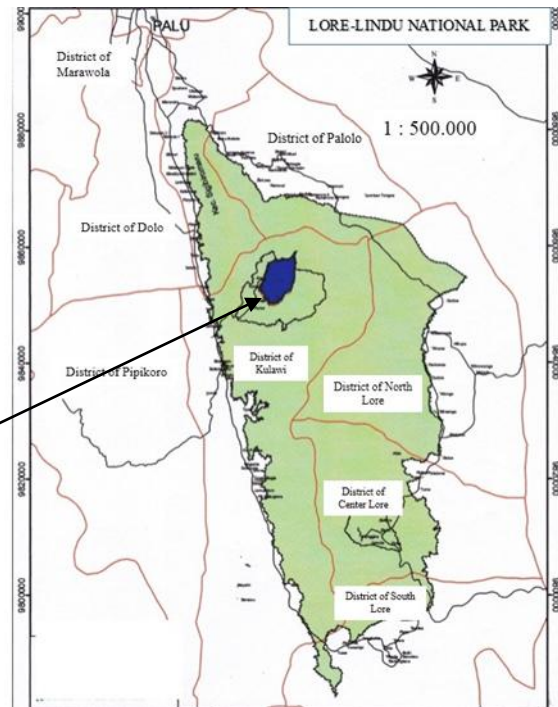
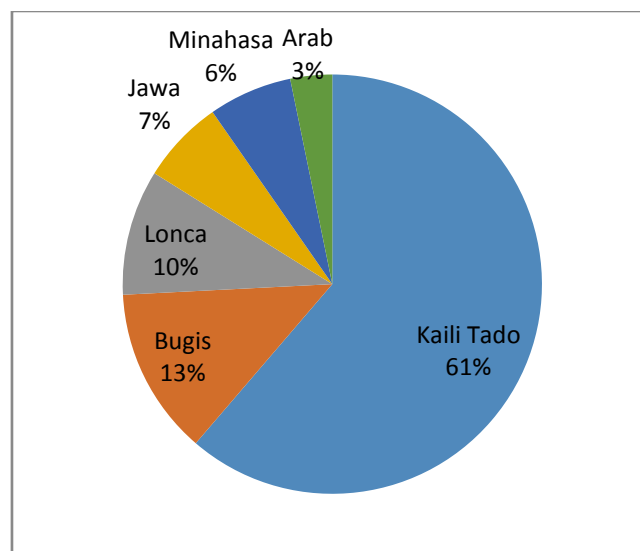


Figure 2. Ethnic Composition residing in Lindu Enclave, Indonesia



c. Data Collection

This research was conducted through interview for ethnopharmacology data collection and through laboratorial analysis for determination of chemical characteristics and

bioactivity of medicinal plants from April 2013–July 2014. Four key informants (three females and one male) from each village were selected based on their good reputation in knowledge of medicinal plants and traditional medication and 34 respondents who sufficiently

have the knowledge were also chosen. Semi structured interview were performed with the key informants and the respondents. The collection of medicinal plants for herbarium and determination of habitat were done directly in field through survey method (Balgooy, 1987). The medicinal plants found were collected and made for herbarium specimens. The identification of the medicinal plants was done in the Celebences Herbarium of Tadulako University and the Biological Research Centre of The Indonesian Institution of Sciences (LIPI) Bogor.

RESULTS

1. Medicinal Plant Types Used by Community

The number of medicinal plants found in the research area was 96 species used by the community around Lindu lake. The knowledge of these medicinal plants and its uses has been passed on from their ancestors to the present generation. The medicinal plants can be grouped into 45 families. Asteraceae is the dominant family comprised of 9 species, followed by Lamiaceae 8 species, Piperaceae

and Fabaceae 5 species each, Araceae and Euphorbiaceae 4 species each and the other families are present only less than 4 species each.

2. Use and Processing of Medicinal Plants as Traditional Medications

Based on the local knowledge, the 98 medicinal plants are useful to treat 87 types of light to serious ailments. The plants also can be used for cosmetics, antiseptic, tonic, post natal treatment, etc.

The most common and simplest way of processing the medicinal plants are by drinking the decoction made by boiling the plants (75%). The plants were also used in such a way that they are applied to body parts (32%). Whilst other modes of administration range between 1–7% (Figure 3).

The part of plant that was mostly used by the community is the leaves (60%) followed by the whole plant (16%), and the other parts (1–5%) (Figure 4).

Figure 3. The various kinds of the medicinal plant preparation

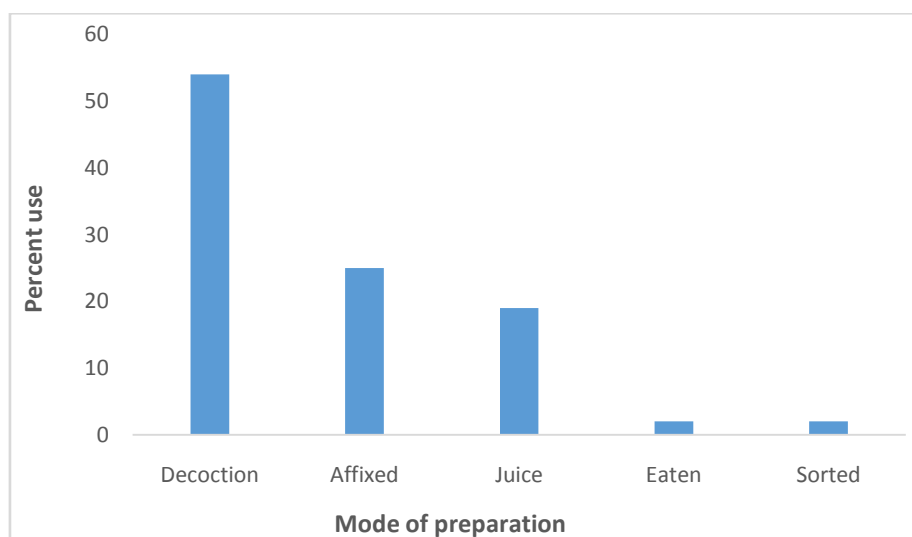


Figure 4. The parts of the medicinal plants used for treating ailments

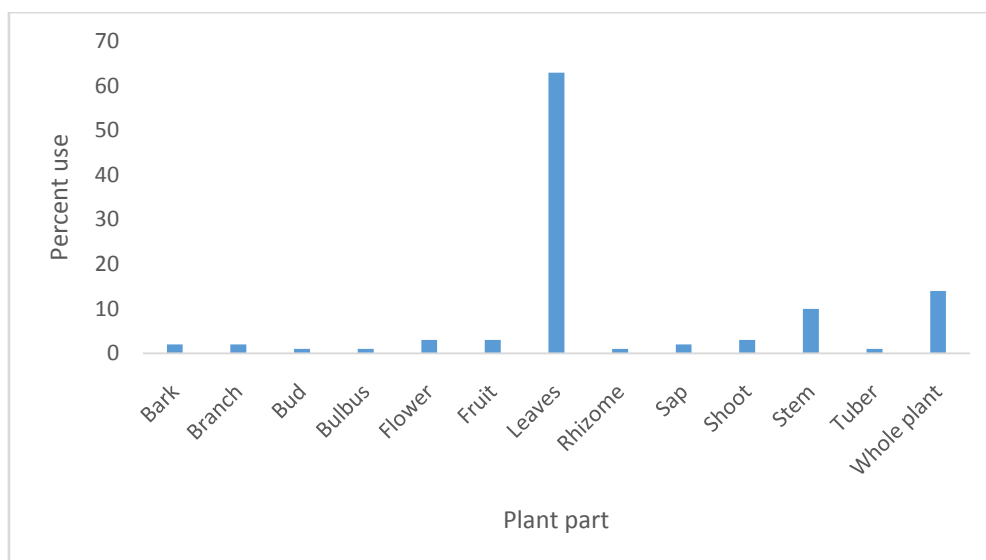


Table 1. Ethnomedicinal uses of medicinal plants of Lindu Lake

Vr. no.	Scientific name (family)	Local name	Part used	Mode of preparation	Medical uses
1	<i>Allamanda cathartica</i> L.(Apocynaceae)	<i>Alamanda</i>	Old leaves	Decoction	Tuberculosis, difficulty urinating
2	<i>Cordia corymbosa</i> Miq. (Boraginaceae)	<i>Ambarogo</i>	Leaves	Decoction	Fever
3	<i>Jatropha curcas</i> L. (Euphorbiaceae)	<i>Balacai</i>	Leaves, stem, sap	Affixed, juice	Lack of appetite, Cough, skin allergies on children, blood vomiting, headache, thrush
4	<i>Bambusa sp.</i> (Poaceae)	<i>Bambu batu</i>	Bud	Eat it in its raw state	Hepatitis, Diabetes
5	<i>Amaranthus spinosus</i> L. (Amaranthaceae)	<i>Bayam duri</i>	Leaves	Decoction	Constipation
6	<i>Scurrulaarto purpurea</i> (Blume) Danser. (Loranthaceae);	<i>Benalu kakao, Benalu kopi, Benalu pohon lemon</i>	Whole plant	Decoction	Tumor, blood vomiting
7	<i>Crecentia cujeta</i> L. (Bignoniaceae)	<i>Bila</i>	Leaves	Decoction	Hernia, Osteoporosis
8	<i>Piper betle</i> L. (Piperaceae)	<i>Bolubua</i>	Leaves	Decoction	Body odor, Bad breath
9	<i>Piper retrofractum</i> Vahl. (Piperaceae)	<i>Bolukaruke</i>	Leaves	Decoction	Epistaxis
10	<i>Piper majusculum</i> Blume. (Piperaceae)	<i>Bolulasu</i>	Leaves	Affixed	Body odor
11	<i>Piper sp.</i> (Piperaceae)	<i>Bolutana</i>	Leaves	Decoction	Body odor

12	<i>Clerodendron japonicum</i> (Thumb.) Swett.(Lamiaceae)	<i>Bunga pagoda</i>	Leaves	Decoction	Ulcer
13	<i>Selaginella sp.</i> (Selaginellaceae)	<i>Cakarayam</i>	Whole plant	Decoction	Rheumatism
14	<i>Amydrium zippelianum</i> (Schott) Nicolson (Araceae)	<i>Daun rusuk</i>	Leaves	Affixed	Sore ribs
15	<i>Plantago major</i> L. (Plantaginaceae)	<i>Daun sendok</i>	Leaves	Affixed	Diseases of the descending colon, appendix
16	<i>Gliricidia sepium</i> (Jacq.) Walp.(Fabaceae)	<i>Gamal</i>	Leaves	Decoction	Headache
17	<i>Abelmoschus manihot</i> (L.) Medik (Malvaceae)	<i>Gedi</i>	Leaves	Decoction	Pain related to Kidney ailments
18	<i>Clerodendrum sp.</i> (Lamiaceae)	<i>Gonato</i>	Leaves	Decoction	Back pain, worms, postpartum
19	<i>Scutellaria sp.</i> (Lamiaceae)	<i>Hipodo Langko</i>	Whole plant	Decoction	Stomach pain, Acute internal disease
20	<i>Curangafel-ferrae</i> (Lour.) Merr. (Linderniaceae)	<i>Hipodo Walo</i>	Whole plant	Decoction	Internal disease
21	<i>Psidium guajava</i> L. (Myrtaceae)	<i>Jambu batu</i>	Leaves	Decoction	Diarrhea, Strengthen teeth
22	<i>Citrus maxima</i> (Burm) Merr. (Rutaceae)	<i>Jeruk bali</i>	Leaves	Decoction	Diabetes
23	<i>Hibiscus tiliaceus</i> L.(Malvaceae)	<i>Kalebou</i>	Shoot	Decoction	Fossilized stomach, hemorrhoid
24	<i>Cordia myxa</i> L (Boraginaceae)	<i>Kanuna</i>	Branch	Juice	Postpartum, Fever
25	<i>Apium graveolens</i> L. (Apiaceae)	<i>Kaporontomate</i>	Whole plant	Decoction	Persistent cough more than 100 days
26	<i>Ocimum basilicum</i> L. (Lamiaceae)	<i>Kapumpu</i>	Leaves, stem	Juice	Fever and cough
27	<i>Senna alata</i> (L.) Roxb. (Fabaceae)	<i>Kayu manuru</i>	Leaves	Juice	Epilepsy, sore skin
28	<i>Syngonium podophyllum</i> (Araceae)	<i>Keladi bunga</i>	Leaves	Decoction	Antidote
29	<i>Moringa oleifera</i> Lam. (Moringaceae)	<i>Kelor</i>	Leaves	Decoction	Lowers body heat
30	<i>Spilanthes oleracea</i> L.(Asteraceae)	<i>Kondo uwe</i>	Flower	Juice	Tooth ache
31	<i>Coffea canephora</i> Pierre ex A.Froehner (Rubiaceae)	<i>Kopi arabika</i>	Leaves	Decoction	Cosmetics
32	<i>Kalanchoe pinnata</i> Pers (Crassulaceae)	<i>Kujadi</i>	Leaves	Juice	Headache, cough, high fever, blain
33	<i>Orthosiphon aristatus</i> (Blume) Miq. (Lamiaceae)	<i>Kumis kucing</i>	Leaves and stem	Decoction	Back pain

34	<i>Zingiber zerumbet</i> (L.) Roscoe ex. Sm. (Zingiberaceae)	<i>Kurondo</i>	Rhizome	Sorted	Elephant foot pain
35	<i>Cucurbita moschata</i> Duchesne ex Poir (Cucurbitaceae)	<i>Labu kuning</i>	Leaves	Affixed	Eye disease
36	<i>Nicotiana tobacum</i> L. (Solanaceae)	<i>Lamba</i>	Leaves	Affixed	Strengthen teeth
37	<i>Elephantopus mollis</i> Kunth.(Asteraceae)	<i>Lambantomate</i>	Whole plant	Eat it in its raw state	Stroke, Tooth ache, postpartum
38	<i>Glinus oppositifolius</i> (L.) Aug.DC. (Molluginaceae)	<i>Langalo</i>	Whole plant	Decoction	Renal stones
39	<i>Drymaria cordata</i> (L.) Willd. ex Schult. (Caryophyllaceae)	<i>Languntule</i>	Whole plant	Juice	Epilepsy, headache, diabetes, high heat in infants
40	<i>Amaranthus blitum</i> subsp. oleraceus (L.) Costea (Amaranthaceae)	<i>Lasuani</i>	Leaves	Decoction, Affixed	Headache
41	<i>Pollia secundiflora</i> (Blume) Bakh.f. (Commelinaceae)	<i>Lekosa</i>	Leaves and stem	Affixed	Leg and stomach swelling
42	<i>Pogostemon auricularius</i> (L.) Hassk. (Lamiaceae)	<i>Lelompeba</i>	Leaves and stem	Decoction	Persistent cough more than 100 days
43	<i>Alstonia scholaris</i> (L.) R. Br. (Apocynaceae)	<i>Lengaru</i>	Bark	Decoction	Wound infection
44	<i>Ficus septica</i> Burm.f. (Moraceae)	<i>Levonu</i>	Shoot	Juice	Eye disease
45	<i>Macaranga hispida</i> (Blume) Müll.Arg. (Euporbiaceae)	<i>Mapo</i>	Fruit	Affixed	Remove warts
46	<i>Cassia</i> sp. (Fabaceae)	<i>Mate sambula</i>	leaves	Decoction	Epilepsy
47	<i>Plectranthus scutellarioides</i> (L.) R.Br. (Lamiaceae)	<i>Mayana</i>	Leaves	Juice	Contusion, internal disease, ulcer, cough
48	<i>Bryophyllum pinnatum</i> (Lam.) Oken (Crassulaceae)	<i>Mpomata</i>	Leaves	Juice	Carbuncles
49	<i>Synedrella nodiflora</i> (L.) Gaertn. (Asteraceae)	<i>Anjing gila</i>	Leaves	Juice/Decoction	Stray dog bites
50	<i>Dichrocephala integrifolia</i> (L. f.) Kuntze (Asteraceae)	<i>Keteguran</i>	Leaves	Juice	Worm infestation
51	<i>Hyptis suaveolens</i> (L.) Poit. (Lamiaceae)	<i>Kutu air</i>	Leaves	Juice	Water fleas
52	<i>Sambucus javanica</i> Reinw. ex Blume (Adoxaceae)	<i>Obat jerawat</i>	Fruit	Affixed	Acne medication
53	<i>Hemigraphis</i> sp. (Acanthaceae)	<i>Bunga merah hijau</i>	Leaves	Decoction	Ulcer, lochia
54	<i>Begonia aptera</i> Blume (Begoniaceae)	<i>Nura</i>	Branch	Juice	Worm infestation

55	<i>Eleusineindica</i> (L.) Gaertn(Poaceae)	<i>Pada</i>	Young leaves	Affixed/Decoction	Injury
56	<i>Luffa cylindrica</i> L.(Cucurbitaceae)	<i>Palolaboe</i>	Dry fruit	Decoction	Abdominal swelling
57	<i>Scindapsus pictus</i> Hassk. (Araceae)	<i>Pancihinana</i>	Leaves	Affixed	Tinea versicolor
58	<i>Sporobolus diandrus</i> (Retz.) P.Beauv.(Poaceae)	<i>Pancisilanalida</i>	Leaves and stem	Affixed	Black spot
59	<i>Merremia umbellata</i> (L.) Hallier f. (Convolvulaceae)	<i>Pancisilana lore</i>	Leaves	Affixed	Black spot
60	<i>Centella asiatica</i> (L.) Urb.(Apiaceae)	<i>Pancongkolangi</i>	Leaves	Decoction	Hacking cough
61	<i>Phyllanthus urinaria</i> L. (Phyllanthaceae)	<i>Panuntu</i>	Whole plant	Decoction	Ulcer, liver & kidney ailments, Smooth bowel movement
62	<i>Cyperus killingia</i> Endl. (Cyperaceae)	<i>Paparisipa</i>	Leaves	Affixed	Fever
63	<i>Ageratum conyzoides</i> L.(Asteraceae)	<i>Paralente</i>	Leaves	Juice	Hard to breathe, ulcer, liver disease
64	<i>Solanum lycopersicum</i> L. (Solanaceae)	<i>Parancina</i>	Leaves	Affixed	Burns, reduce heat
65	<i>Momordica charantia</i> L. (Cucurbitaceae)	<i>Paria</i>	Leaves	Juice	Reduce heat, cough
66	<i>Hippochaete debilis</i> (Roxb. ex Vaucher) Ching.(Equisetaceae)	<i>Pasolonteneru</i>	Stem	Sorted	Fracture, twist
67	<i>Jatropha multifida</i> L. (Euphorbiaceae)	<i>Penesilin</i>	Sap	Affixed	Bleeding, burns
68	<i>Eleutherine bulbosa</i> (Mill.) Urb.(Iridaceae)	<i>Piatopoule</i>	Tuber	Decoction	Heart disease, migraine, hemorrhoid
69	<i>Anredera cordifolia</i> (Ten.) Steenis(Basellaceae)	<i>Pinahong</i>	Leaves	Decoction	Tumor, high blood pressure
70	<i>Etilingera elatior</i> (Jack) R.M.Sm. (Zingiberaceae)	<i>Posuntikala</i>	Flower	Decoction	Hyperuricemia, food
71	<i>Eclipta prostrata</i> (L.) L. (Asteraceae)	<i>Puro</i>	Whole plant	Juice	Umbilical cord injuries, thrush
72	<i>Mimosa pudica</i> L. (Fabaceae)	<i>Putri malu</i>	Whole plant	Decoction	Insomnia, goiter, heat in, appendix
73	<i>Amphineuron</i> sp. (Thelypteridaceae)	<i>Sakimalei</i>	Leaves	Decoction	Hot and red spots on the body
74	<i>Murdannia blumei</i> (Hassk.). (Commelinaceae)	<i>Sampularo</i>	Leaves	Affixed	Black spots on the face
75	<i>Myrmecodia</i> sp. (Rubiaceae)	<i>Sarangsemut</i>	Bulbus	Decoction	Ulcer, headache high blood pressure, hemorrhoids

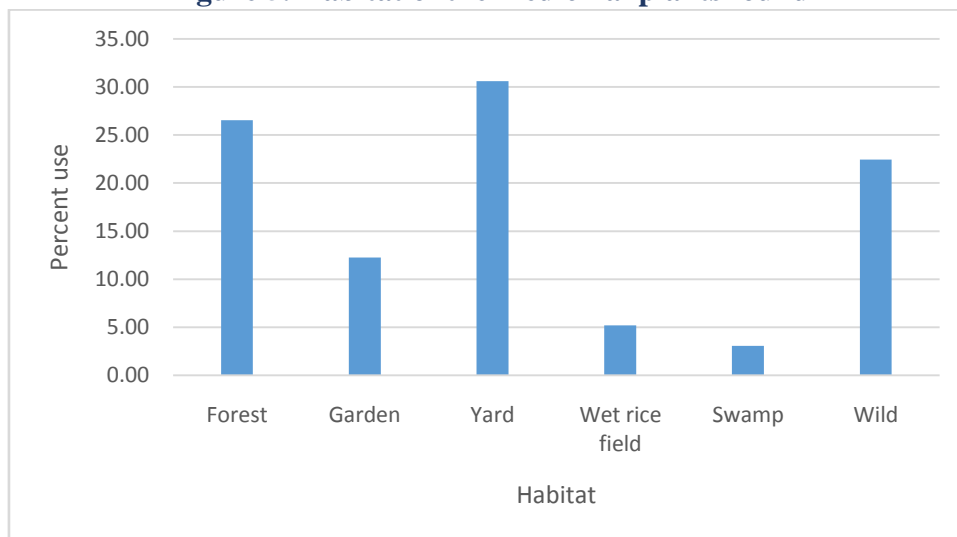
76	<i>Sida rhombifolia</i> L. (Malvaceae)	<i>Silaguri</i>	Leaves	Decoction	Wound infection, strengthen teeth
77	<i>Euphorbia hirta</i> L. (Euphorbiaceae)	<i>Simulasi</i>	Root and leaves	Decoction	Ailments of Appendix
78	<i>Melastoma malabathricum</i> L. (Melastomaceae)	<i>Sinduru</i>	Leaves	Decoction	Boil, epistaxis
79	<i>Annona muricata</i> L. (Annonaceae)	<i>Sirsak</i>	Leaves	Decoction	Renal stone, high blood pressure, wounds
80	<i>Bidens pilosa</i> L.(Asteraceae) ;	<i>Susupi</i>	Leaves	Affixed	Post partum, cough
81	<i>Cordyline fruticosa</i> (L.) A.Chev. (Asparagaceae)	<i>Taba</i>	Leaves	affixed	Sore neck
82	<i>Hyptis capitata</i> Jacq. (Lamiaceae) <i>Tambajara</i>	<i>Taba</i>	Leaves, flower, root	Decoction	Renal stones, liver disease, wounds, cough, shortness of breath, diabetes
83	<i>Sennatoria</i> L.(Roxb.) (Fabaceae)	<i>Tambuangekebe</i>	Root	Decoction	Blood mixed stools
84	<i>Physalis angulata</i> L. (Solanaceae)	<i>Tampeii</i>	Leaves	Decoction	High blood pressure, migraine
85	<i>Scleria purpurascens</i> Steud. (Cyperaceae)	<i>Tatari</i>	Shoot	Decoction	Renal stones
86	<i>Piper umbellatum</i> L. (Piperaceae)	<i>Tavalevo</i>	Leaves	Decoction/Affixed	Ailments of the descending colon, pain in the penis, hemorrhoid.
87	<i>Commelina diffusa</i> Burm.f. (Commelinaceae)	<i>Tavelehoka</i>	Leaves	Affixed	Cramps, gout
88	<i>Rhapidophora</i> sp.(Araceae)	<i>Tavemolu</i>	Leaves	Affixed	Back pain
89	<i>Ipomea batatas</i> (L.) Poir (Convolvulaceae)	<i>Tavovi</i>	Young Leaves	Decoction	arise on the body
90	<i>Cheilocostusspeciosus</i> (Costaceae)	<i>Tintiase</i>	Stem	Juice	Fever
91	<i>Angiopteris evecta</i> (Marattiaceae)	<i>Tombila</i>	Stem	Juice	Stray dog bites
92	<i>Poikilospermum suaveolens</i> (Bl.) Merr (Urticaceae)	<i>Tombu</i>	Leaves, stem	Decoction	Breast cancer, eye pain,
93	<i>Anthocephalus chinensis</i> (Rubiaceae)	<i>Towote</i>	Bark	Decoction	Malaria
94	<i>Eleocharis artopurpurea</i> Retz. Presl.(Cyperaceae)	<i>Voluntile</i>	Whole plant	Affixed	Postpartum
95	<i>Crassocephalum crepidioides</i> (Benth) (Asteraceae)	<i>Wavaro</i>	Leaves	Affixed	Cuts
96	<i>Erigeron sumatrensis</i> Retz. (Asteraceae)	<i>Wingkotu</i>	Leaves	Affixed	Leprosy

3. Habitat of Medicinal Plant Found by Community

Habitat of the medicinal plants found by the community is spread over from the edge of the lake to the forest around Lindu (LLNP).

The types of the habitat depicted in Figure 5 include secondary forest, house yard, wetland rice fields, swamps, and wild (any other location).

Figure 5. Habitat of the medicinal plants found



The house yard is the most common habitat where the medicinal plants exist. Multifunctional community yards around Lindu Lake have diverse vegetation/plants including ornamental plants, vegetable and such plantation crops as *Coffea robusta / arabica*, *Theobroma cacao*, *Psidium guajava*, etc. The medicinal plants cultivated are generally *Jatropha curcas*, *Cheilocostus speciosus*, *Ocimum basilicum* and *Eleutherine bulbosa* while others are allowed to grow wildly such as *Plantago major*, *Crassocephalum crepidioides*, *Hyptis caitatpa*, etc.

Plantation very often exists next to either secondary forest or primary forest where *Coffea arabica/robusta* and *Theobroma cacao* are mainly cultivated. Other vegetation are also found in the plantation like *Amaranthus spinosus*, *Elephantopus mollis*, *Drymaria cordata*, *Amaranthus lividus*, etc.

Some vegetation often found in the forest is *Polia secundifolia*, *Alstonia scholaris*, *Scindapsus pictus*, *Merremiaum bellata*, *Amphineuron* sp, *Myrmecodia* sp., *Scleria*

purpurelens, *Comelina diffusa* and *Rhapidophora* sp.

Several vegetation grow in various habitat frequently in open land, road side, and gutter edge. This vegetation includes *Amaranthus spinosus*, *Elephantopus mollis*, *Drymaria cordata*, *Amaranthus lividus*, etc. *Centella asiatica*, *Sporobulus diandrus*, *Murdannia blumei*, etc, are easily found in wetland rice fields whereas *Zingiber zerumbet* and *Eleocharis artopurpurea* were found in swamp areas.

DISCUSSION

The local community dwelling around Lindu Lake has been keeping their knowledge on different kinds of plants grown around their settlement which can treat various ailments, health care and cosmetic from generation to generation. Although health services provided by government have increasingly improved, the tradition to treat illnesses and health care using medicinal plants are still being frequently practiced. Of 38 respondents, 72.68% were between 20–50 years old and the remaining

26.32% over 60 years old. This indicates that the knowledge of the medicinal plants and their uses is still being maintained and practiced in the daily life of the Lindu lake community.

In this research, the dominant medicinal plant family found is Asteraceae. Previous researches showed that the Asteraceae family is relatively wide spread compared to the other families (Marles and Farnsworth, 1995 and Trojan *et al.*, 2011). Giulietti *et al.* (2005) placed the family of Asteraceae and Myrtaceae as those which exhibit their abundance in high biodiversity and have rapid secondary metabolical development.

The part of the medicinal plant that is mostly used by the community around Lindu lake is leaves (60%). Several researches showed that leaves are plant parts that are mostly used for traditional medication (Kassam, 2011; Packera, 2012; Moushumi, 2013; Deepak and Gopal, 2014; Laid, 2014). From the view of conservation, the use of leaves as source of traditional medicine has no harmful effect on the environment. However, efforts to cultivate the medicinal plants where leaves are frequently used for medicine are necessary to maintain their sustainability and easy access. The Lindu lake community has not yet cultivated medicinal plants used frequently because they can be found easily around their settlement.

The most common way to process the parts of the medicinal plants is by boiling them in water (57%) (Figure 3). The processed medicinal plants are generally classified into complex concoction and single concoction

made up by various type of plants and by only one plant, respectively. The people generally boil the medicinal raw materials with water allowing half of the initial water amount to be left and the water extract is administered for drinking. The leaves used are odd in number such as 3, 5, 7 leaves, etc. Rhizome used usually ranges from one to several segments.

The existence of different kinds of the medicinal plants in their habitat is important to be identified because the ecological aspect of the plants can uncover their actual condition. Such ecological data as biology, habitat and others is significantly important to future development of the medicinal plants.

CONCLUSION

A total of 96 species belong to 45 families were found as medicinal plants used by community residing around Lindu Lake (The enclave of Lore Lindu National Park) to treat different kind of ailments and other uses such as facial health care, post natal care and food supplement. The local knowledge of medicinal plants and traditional healing has been handed down from generation to generation.

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