PLANTS AS ECOTOUR ATTRACTIONS AROUND TRAIL OF MANGROVE INFORMATION CENTRE IN MANGROVE FOREST OF SOUTHERN BALI

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Abstract

A study on plants species sighted around mangrove information centre of Ngurah Rai Mangrove Forest (Tahura Ngurah Rai), Sothern of Bali province (Indonesia), was undertaken in March 2004. The plants sighted on both sides of the mangrove trail were listed. Their potential as ecotour attractions was then identified.

Results of the study showed that there were 42 plant species identified around mangrove trail of this forest. Twelve mangrove species in this ecosystem may act as major attractions to the tourists doing tracking there. Information on protected species, the potential use of plants for humans, such as for animal fodder, medicine, the use in ancient Balinese community, in traditional way of life of Balinese which is last until now, the use for offering in Hindu's ceremony may also be interesting for tourists. Some plant species may cause problems to tourists who doing trekking so need precaution, including on those which cause bleeding and disturbance to human breathing.

Keywords: plants, tourist attraction, mangrove

Abstrak

Sebuah studi tentang jenis-jenis tumbuhan yang ditemukan di sekitar "*mangrove information centre*" dari Taman Hutan Raya (Tahura) Ngurah Rai, di bagian selatan propinsi Bali (Indonesia), dilaksanakan bulan Maret 2004. Tumbuhan ini didaftar dari yang dapat dilihat di kanan-kiri dari jalur pengamatan (*trail*) hutan mangrove tersebut. Potensi tumbuhan tersebut sebagai atraksi wisata kemudian diidentifikasi.

Hasil studi menunjukan bahwa ada 42 species tumbuhan di sepanjang jalur pengamatan mangrove (*trail*) dari Tahura ini. Dua belas jenis mangrove pada ekosistemnya dapat berfungsi sebagai atraksi utama bagi turis yang melakukan trekking di sana. Informasi tentang tumbuhan yang dilindungi, pemanfaatan tumbuhan bagi manusia, misalnya untuk pakan ternak, obat-obatan, pemanfaatan oleh masyarakat Bali dari masa lampau hingga pemanfaatan oleh masyarakat tradisional Bali dewasa ini, penggunaannya sebagai bahan upacara juga berpotensi sebagai daya tari wisata. Berhubung dengan dampak negatif dari beberapa tumbuhan, misalnya adanya tumbuhan yang menyebabkan luka jika disenggol, atau menyebabkan gangguan pernafasan, maka perlu dilakukan pencegahan.

Kata kunci : tumbuhan, atraksi wisata, mangrove.

1. Introduction

Mangrove tour is an alternative type of tourism activities in mangrove forest southern of Bali. This activity has just been initiated recently. This, however, has been quite popular, known as 'ecotourism' (Dalem, 2002a; Dalem, 2002b; Anon., 2003).

The success of this tour package may be impacted by the availability of attraction and the way by which the guides provide interesting information to the tourists. Sources of attractions available in this forest include plants which can be seen around the trails or animals sighted on the site (see Dalem *et al*., 2001). This study was aimed to identify the plants sighted around the trail and identify their potentials as source of attractions for tourists.

2. Materials and Methods

The study was conducted around mangrove trail in mangrove forest of Ngurah Rai Recreational Park (Taman Hutan Raya Ngurah Rai), southern of Bali (Indonesia), on March 3 and 11, 2004. Data were collected by following 1.5 Km trail in the forest while identifying plants which can be seen on the left and right hand sides of the trails to a distance of which the plan can be clearly sighted (based on Kitamura *et al*., 1997; Tjitrosoepomo, 1991; Tomlinson, 1994; van Steenis, 1987; Backer, 1973). Samples of unidentified plants were collected in plastic bags and brought to the laboratory at Biology Department, Udayana University, Bukit Jimbaran Campus (Bali) for identifications; otherwise their photos were utilized for these purposes. All plants were then analyzed for their potential as eco-tour attractions, either because of their unique morphology, status, or their use by local communities (e.g. Suwidja, 1991, Kitamura *et al*., 1997). Some possible negative impacts to the tourists when being touched or when their spores inhaled are also discussed for precautions on the tour programmes.

3. Results

There were 42 plant species that have been identified on this study. There were classified as mangrove (12 species), mangrove associate, and other plant groups. Twelve species of mangrove sighted on this study site can be classified into major components (10 species) and minor components (2 species) (Kitamura *et al*., 1997). List of plants sighted around the trail are as follows (see Table 1).

Table 1. Plants Identified Around Mangrove Trail of Ngurah Rai , Southern of Bali

No.	Local Name	Scientific Name	Familia	Notes
1	Lindur, tanjang-merah, dan lain-lain	*Bruguiera gymnorrhiza*	Rhizophoraceae	Mangrove: major component
2	Sia-sia	*Avicennia marina*	Avicenniaceae	Mangrove: major

	putih			component
3	Banang-banang	*Xylocarpus granatum*	Meliaceae	Mangrove: major component
4	Bakau, bako gandul, dan lain-lain	*Rhizophora mucronata*	Rhizophoraceae	Mangrove: major component, it is utilized as the name of a trail "Mucronata trail".
5	Lamtoro semak	*Sisbania* sp.	Leguminosae	A trail in this mangrove forest has been named after this plant (Sisbania road).
6	Waru	*Hibiscus tiliaceus*	Malvaceae	Mangrove associate; the wood were commonly used for wooden handicrafts.
7	Tengah, mentigi, etc.	*Ceriops tagal*	Rhizophoraceae	Mangrove: major component; Cotyledonary collar yellow in mature 'fruit'.
8	Waru lot	*Thespesia populnea*	Malvaceae	It looks very similar to *Hibiscus tiliaceus* but the leaves are glossier.
9	Prapat, padada, etc.	*Sonneratia alba*	Sonneratiaceae	Mangrove: major component; Green 'fruit'
10	Kedukduk, etc.	*Lumnitzera racemosa*	Combretaceae	Mangrove: major component.
11	Buta-buta	*Excoecaria agallocha*	Euphorbiaceae	Mangrove minor component; cause skin irritation and believed to cause blindness. Protected species.
12	Jangkah	*Rhizophora apiculata*	Rhizophoraceae	Mangrove: major component
13	*Sesepi, gelang laut, gelan-pasir*	*Sesuvium portulacastrum*	Aizoaceae	Mangrove associate
14	Bakau, bako-kurap, etc.	*Rhizophora stylosa*	Rhizophoraceae	Mangrove: major component.
15	Teruntun, kacangan, etc.	*Aegiceras corniculatum*	Myrsinaceae	Mangrove: minor component.
16	Sia-sia, api-api	*Avicennia lanata*	Avicenniaceae	Mangrove: major component.
17	Ambung,	*Derris trifoliate*	Leguminosae	Mangrove associate.

	kambingan			
18	Legundi, Ligundi	*Vitex ovata*	Verbenaceae	Shrub, mosquitoes repellant (burnt).
19	Kayu santen	*Lannaea grandis*	Anacardiaceae	Used to extend shelf live of 'nira', the material for palm /brown sugar**.**
20	Intaran (Neem tree)	*Azadirachta indica*	Meliaceae	Can be utilized for bio-pesticide; In Bali, nice females' eye brows also to be said looks like neem leaves.
21	Kerasi	*Lantana camara*	Verbenaceae	Shrubs; provide food for birds.
22	Ciplukan blungsun, buah permut, rajutan	*Passiflora foetida*	Passifloraceae	Has round fruit; Soil cover.
23		*Stachytarpheta jamaicensis*	Verbenaceae	Mangrove associate
24	Menori, biduri, widuri	*Calotropis gigantean*	Asclepiadaceae	Shrubs, important for cremation ceremony in Bali; as medicine for cough, diarrhea, etc.
25	Lamtoro	*Leucocaena leucocepala*	Leguminosae	Animal fodder, providing shading.
26	Gamal	*Glyricidia sepium*	Leguminosae	Animal fodder, and kills *Imperata cylindrica*
27	Tangi	*Pongamia* pinnata	Leguminosae	Mangrove associate, available at the front of Mangrove Information Centre office.
28	Katang-katang	*Ipomoea pes-caprae*	Convolvulaceae	Mangrove associate; common on the beach.
29	Rumput Babi	*Borreria strieta*	Rubiaceae	Terna / herbs, flower attracts small insects.
30	Babandotan	*Ageratum conyzoides*	Compositae / Asteraceae	Shrub; flowers attracts small insects; Leaves contain ekdison hormones that disturb metamorphosis of insects.
31	Rumput Tampang	*Digitaria sanguinalis*	Gramineae	Grass members; Seed sticky on clothing; Seeds fed by birds.
32	'Orok-orok'	*Indigofera* sp.	Leguminosae	Shrub (terna); flowers attracts small insects.

33	Kembang goyang	*Chloris barbata*	Gramineae	Grass; Light pollen, causing respiratory problems 'bersin', disturbing eyes (vision); Seeds easy to be flown by the wind, sticky to clothing.
34	Teki	*Cyperus compresus*	Cyperaceae	Grass; weeds.
35	Rumput	*Eragrostis* sp.	Gramineae	Grass; Pollen can be easily flown by the wind (causing respiratory problem 'bersin'); Seeds can be sticky on clothing.
36	Meniran	*Phyllanthus niruri*	Euphorbiaceae	Herbs on rainy seasons; Uses as medicine; the leaves are bitter.
37	Sidaguri	*Sida acuta*	Malvaceae	As terna; Yellow flowers, attracts small insects (bee, flies, butterflies).
38	'Bun' (looks like sweet potatoes)	*Ipomoea hederifolia*	Convolvulaceae	'Terna'; Flowers attract insects.
39		*Vernonia patula*	Compositae	Herba / terna; Purple flowers; attracts small insects (wasp, flies, butterflies), help pollination; the fruit with white fur, Very light, can be sticky to clothing.
40	Teki	*Cyperus pilosus*	Cyperaceae	Grass; The edge of the leaves is very sharp which may cause bleeding.
41	Sidaguri	*Sida* sp.	Malvaceae	Terna; Flowers attract small insects.
42	Patikan kerbau	*Euphorbia hirta*	Euphorbiaceae	Herba or terna; Cause sticky mark (noda) on clothing

Based on observation on the site, the potential for tourist attraction on mangrove tour package in mangrove forest southern Bali comes from mangrove as an ecosystem or as the plant individually. As an ecosystem it looks very unique, not so diverse compared to 'generally known' rainforest in tropical countries, and they inhabit a restricted piece of land with a certain characteristic of beaches (intertidal zone)

The morphology of mangrove trees generally is easy to distinguish from other terrestrial plants and they are interesting for tourists because of their unique appearances. This comes such as from the arrangement of roots (stilt, pneumatophore, plank, buttress, etc.), viviparous seeds -- which are commonly known as 'fruits' (like sticks, beans, ball, etc) -- and so on.

In addition, the diversity of mangrove, other flora in the form of herbs or terna, shrubs, or trees are varies in the mangrove forest. They may be useful for humans because they attract birds, and this information also becomes source of attraction on the tracking package. Some plants benefit human as source of food, medicine, or just for their role in ecosystems.

4. Discussion

Flora in mangrove forest is unique. They provide attraction for tourists, even though their diversity is not so high. This is different from mountain rainforest in general, where the diversity of plants is very high, and it covers some stories, at least three stories – under stories (such as consists of grass, terna and herbs), medium level (composed of shrubs) and up in the canopy (consists of trees).

The way of enjoying the appearance of plants through trail (or also known as duck board) may be very interesting. 'Duck board' is very important facility in getting access to plants that are located in a long distance from the beach and/or their location hard to be accessed because of being located in a muddy spots. The availability of the 'duck board' trail has made possible for tourists to get access to the plants which are located at a distance from the beach while this area being inundated by sea water. Enjoying plants in this situation is quite interesting for the tourists.

The appearance of pneumatophores, stilt roots or viviparous mangrove seedling (known as mangrove 'fruits') are very interesting and this important source of attraction for tourists. This is very special part of plants that are generally different from those of mainland. Pneumathophore roots, for example, have put the plant as of over the water surface when high tide comes. Viviparous seedlings which have been grown when the seeds have attached to the host plants, and will stick to muddy soil when fall into the beach, such as in *R. mucronata*, is an example of 'plants behaviour' that might be interesting for tourists.

The present of *E. agallocha* in the site can be a source of attraction because of the status of this plant. *Excoecaria agallocha* is protected in Indonesia, and this potential to be of interest for tourists. In addition, this plant species may be causing eye irritation or blindness, but it can also be utilized as a source of good

smell (in so called 'pedupaan') in Balinese Hindus' ceremony by burning its dry woods.

The tourist guide may be explaining the use of plants in mangrove while doing trekking there. Babandotan (*A. conyzoides*) for example can be utilized as medicine for preventing *Ascaris* worm attack on human stomach. Gamal (*G. sepium*) can be utilized as animal fodder, mangrove trees have been used for fire wood, etc. In addition to the use for the current situation, information of the use of plants in an ancient Balinese community, such as Ligundi (*V. ovata*) as mosquitoes repellant, may also be interesting for tourists. The use has probably been replaced by ointment or electric mosquito repellants now. The use plants in traditional way of Balinese life that is still last until now may also become source of attractions. Up until now some palm sugar farmer in Bali are still using the bark of Kayu Santen (*L. grandis*) for preserving 'nira' before being used in making palm sugar.

Balinese use the plants as part of their ceremony. Widuri or Medori (*C. gigantea*), for example, until now is used by Balinese in their cremation ceremony. This may be part of conservation strategy for Balinese people. Because the plants needed in ceremony, the Balinese should conserve them, and this probably in line with conservation strategy for the plants. This information may also be interesting for the tourists.

Besides of those that bring benefits to humans, there are some plants that cause bad impacts. *Cyperus pilosus* that is locally known as 'teki', for example, may cause bleeding when its blades scratch human bodies. Disturbance to human breathing process may occur because of inhalation of spores of some grass (e.g. *Eragrostis* sp.). All those things need to be explained to tourist for precautions. This is important to be known by the tourists to prevent negative impacts to occur.

4. Conclusion

There were 42 plant species identified around mangrove trail of mangrove forest southern of Bali. Some plants may act as major attraction to the tourists including those classified as mangrove (major and minor components). They are *Bruguiera gymnorrhiza, Avicennia marina, Xylocarpus granatum, Rhizophora mucronata, Ceriops tagal, Sonneratia alba, Lumnitzera racemosa, Rhizophora apiculata, Rhizophora stylosa, Avicennia lanata, Excoecaria agallocha, and Aegiceras corniculatum*. Information on protected species, the use of plants for humans, such as for animal fodder, medicine, the use in ancient Balinese community, the use in traditional way of life of Balinese which is last until now, the use for offering in ceremony may also be interesting for tourists. Some plant species may cause problems, so need precaution, including those which cause bleeding, and disturbance to human breathing.

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Literature Cited

Anon. 2002. *Laporan Pelaksanaan Pelatihan Konservasi Keanekaragaman Hayati dengan Pendekatan Ekoturisme di Propinsi Bali*. Kantor Kementrian Lingkungan Hidup Urusan Bali dan Nusa Tenggara, Denpasar.

Backer, C. A. 1973. *Atlas of 220 Weeds of Sugar-cane Fields in Java*. Vol. 7. Indonesian Sugar Experiment Station, Pasuruan, Indonesia.

Dalem, A. A. G. R., S. K. Sudirga, and S. Burgin. 2001. Birds as an Ecotour Attraction in Nusa Dua Lagoon Complex, Nusa Dua (Bali). Analisis Pariwisata, Denpasar.

Dalem, A. A. G. R. 2002a. "Ecotourism in Indonesia". pp. 85-97 *di dalam Linking Green Productivity to Ecotourism: Experiences in the Asia-Pacific Region*. Ed. by T. Hundloe. Asian Productivity Organization (APO): Japan..

Dalem, A. A. G. R. 2002b. "Ekowisata: Konsep dan Implementasinya di Bali". *Jurnal Dinamika Kebudayaan*. Lemlit UNUD, Denpasar.

Kitamura, S., C. Anwar, A. Chaniago, and S. Baba. 1997. *Handbook of Mangroves in Indonesia: Bali and Lombok*. Ministry of Forestry Indonesia and JICA, Japan.

Suwidja, I K. 1991. *Berbagai cara pengobatan menurut Lontar Usada: pengobatan tradisional Bali*. Toko Buku Indra Jaya: Singaraja-Bali.

Tjitrosoepomo, G. 1991. *Taksonomi tumbuhan: Spermatophyta*. Gadjah mada University Press: Jogjakarta.

Tomlinson, P. B. 1994. *The Botany of Mangroves*. Cambridge University Press, USA.

Van Steenis, C. G. G. J. 1987. *Flora Untuk Sekolah di Indonesia*. P.T. Pradnya Paramita: Jakarta.