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An Ethnobotanical Survey for Tropical Sand Dune Support Greenbelt International Airport Yogyakarta (NYIA) Glagah Village, District Temon, Kulon Progo, Yogyakarta Indonesia

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Abstract

Aim of survey research on the type of Gumuk Pasir Tropik (Tropical Sand Dunes) is intended to reveal species diversity, a system of knowledge that includes the use, knowledge and fulfilment of its various needs. The survey was conducted to document plant diversity, supporting the greenbelt construction of the NYIA airport to take its documentation and sustainable development. The location of the research was conducted at NYIA Airport in Glagah village, Temon district, Kulon Progo regency, Yogyakarta Province Indonesia. The research was conducted using structural and open ended interview, direct observation and survey. Local people have a good knowledge of the diversity of plant species. However, lack of wisdom in the management resulted in natural forest sand dune ecological damage. The survey of local people in Glagah village resulted in identification of 84 plants that are presented in the paper.

Keywords: Ethnobotanical survey; Sand dune; Greenbelt; Yogyakarta

Introduction

Glagah village is limited to the south of Indonesia Sea, West of Palihan village, East times Karangwuni village and north of Kalidengen village (Figure 1). The total area of the Glagah village 603.94 hectare covers 16.64% of the total area of Temon district. The village has 8 Dukuh via Glagah, Sangkretan, Bebekan, Macanan, Kretek, Sidorejo, Bapangan and Kepek. Glagah village has a height of 1-6 MASL (Metres above sea level) with a slope level of 0-1%, the air temperature is approximately 25-33°C and the average rainfall every year 2.342 mm per year.

Coastal dune environments are selective ecosystems characterized by a close interaction between abiotic and biotic factors in a dynamic balance [1]. Sand dune conservation is becoming an important plan to be implemented, on the one hand, sand dune has the potential landscape which can still developed further, and sand dune can be a barrier saviour of community behind these dunes. Sustainability and stability of sand dune can reduce tsunami attack caused by earthquake [2]. Sand dune or sand beach in Glagah village is state land which is traditionally a Pakualaman area. The area is sandy due to the combination of sand or by the wind, the sea wave's south coast (Samodra Indonesia). Studies reported the succession rate in a primary series represented a unimodal relation with total species richness. On the other hand species poor vegetation often dominated by one species, such as heathlands [3].

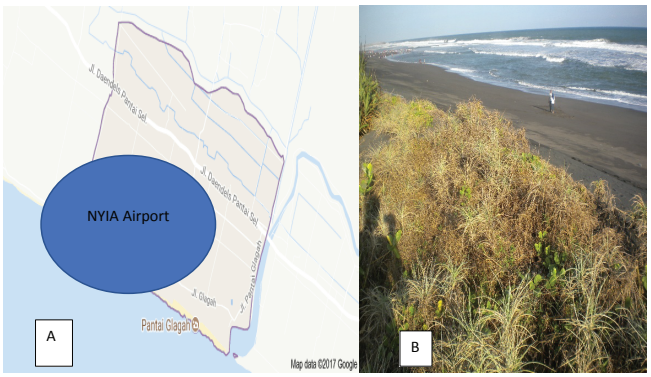

Figure 1: (A) Map of Glagah village, Temon district, Kulon Progo, Yogyakarta and NYIA airport locations of study sites; (B) Gumuk Pasir Tropik (tropical sand dune).

Local types of plants and animals are typical in the tropical sand dune area. Typical plant species include Pandanus (*Pandanus tectorius*), Balaran (*Ipomoea pescaprae*), Krandan (*Canavalia maritima*), Preketekan (*Spinifex littorius*), Widoro (*Ziziphus mauritiana*), *Carex* sp., Cimplukan (*Physalis minima*), Telekan (*Lantana camara*), Nomlang (*Passiflora foetida*), Alang-alang (*Imperata cylindrica*), Sembung (*Eupatorium inulifolium*), Brobos (*Centrosoma pubescent*), Widuri (*Calotropis gigantea*), Sidoguri (*Sida rhombifolia*), Pulutan (*Triumffeta indica*) [2]. Studies reported the plant family in tropical sand dunes covers e.g. Pandanaceae, Gramineae, Cyperaceae, Fabaceae, Solanaceae, Malvaceae, Rhamnaceae, Asteraceae, Apocynaceae, Euphorbiaceae, Labiatae, Pasifloraceae. Among the ten plant species in Sand dune Egypt is *Tamarix aphylla*, *Prosopis juliflora*, *Acacia saligna* and *Atriplex nummularia* show high rates of growth and significant survival rates [4].

Types cultivated of plants that have high economic value are dragon fruit (*Hylocereus undatus*), Lombok kriting, chili (*Capsicum anuum*), Semangka, watermelon (*Citrullus lanatus*) and Kambil, coconut (*Cocos nucifera*). While the types of plants are important to consider in support of green belts NYIA airport such as Pandan (*Pandanus tectorius*), Balaran (*Ipomoea pescaprae*), Krandan (*Canavalia maritima*), Widuri (*Calotropis digantea*), *Carex* sp., Preketekan (*Spinifex littorius*) and introduction species of Cemara laut (*Casuarina equisetifolia*), Tereside,

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Gamal (*Glyrisidia sepium*), Akasia (*Acacia aurifiliformis*), Waru laut (*Hibiscus tiliaceus*) [1,2,5]. The industrialization with agriculture and aquaculture e.g. wetlands (tambaks) with increased use of chemical input poses create to coastal environment [6]. Amphibian diversity and reptiles at sand dune Bantul regency Yogyakarta Province identified 11 species namely *Cryptoblepharus cursor*, *Hemidactylus frenatus*, *Hemidactylus garnotii*, *Hemidactylus platyurus* and *Duttaphrynus melanostictus* [7,8].

Materials and Methods

The study site is located at the tropical sand dune Glagah village, Yogyakarta Province and Laboratory of Plant Taxonomy Brawijaya University. The research was conducted using structural and open ended interview and direct observation or survey [9,10]. Based on the examination of the material survey and specimens herbarium colection Herbarium Biology Brawijaya University (H.Bio Unibraw). Fresh material colection from survey 2016-2017 in area tropical sand dune Glagah village, Temon district, Yogyakarta Indonesia. From the collection studied by the author, details and identification from dried material, except for floral and fruit sizes, which were based on dehydrated (boiled in water) material [11-14]. Terminologies and methods follows [3,4,9,15]. The identification and nomenclature of the listed plants were based on the Flora of Java and Flora Malesiana.

Results and Discussion

During the present research, inventarization flora local and ethno-botany follow data on 34 families, 84 plant species was collected and preserved at Herbarium Brawijaya University (H Bio Unibraw). The study evidenced that agricultural plays an important role in the enhancement of the livelihoods of local peoples. Several of species and subspecies of wild plants and animal are threatened with extinction. For example: Landak (*Hystrix* sp.). Biological diversity conservation is and urgent coastal matter [16]. Sand dune is area an important part of coast as because the lands are first defence against the force of the ocean, protecting the diversity of native flora, fauna and the ecosystem as a whole. The other hand the understanding of tropical hydrology can serve important the realism of tropical greenbelt [17].

The types of conservation plants that need to be considered in favour of green belt are Table 1 via Pandan (*Pandanus tectorius*), Balaran (*Ipomoea pescaprae*), Krandan (*Canavalia maritima*), Preketek (*Spinifex littorius*), Akasia (*Acasia aurifiliformis*), Widuri (*Calotropis gigantea*), Gringging, gamal (*Glyricidia sepium*), Jambu monyet (*Anacardium occidentale*), Cemara laut (*Casuarina equisetifolia*), Jarak (*Jatropha curcas*), Kelor (*Moringa oleifera*), Teki pasir (*Carex* sp., *Cyperus* spp.), Nomlang (*Passiflora foetida*), Widoro (*Ziziphus mauritiana*), Pace (*Morinda citrifolia*), Cimplukan (*Physalis minima*) and Singkil (*Premma* sp.). Sharing animal species on the beach shoreline includes: Undur-undur laut (*Emerita* spp.), jingking sapi, jingking kebo (Crustacea, Ocypodidae), Gemak (*Turnix sylvaticus*), Jangkrik (*Gryllus campestrix*), Kadal laut (*Cryptoblepharus cursor*), biawak (*Varanus* sp.), Landak (*Hystrix* sp.). Jingking sapi (Ocypodidae) widely used local community as a side dish (Jingking pelas). The diversity of fish species in the estuary includes Blanak (*Mugil-mugil*), petek (*Leiognatus equulus*), Bojor, Pari (*Dasyatis* sp.), while crustacean e.g, Shrimp, Kepiting (*Brachyura* sp.), Udang (*Macrura* sp.), Urang ayu (*Cherax* sp.), Siput (Molusca) and green algae.

The diversity of fauna by the local community is utilized include Undur-undur laut (*Emerita* sp.), fishing, duck fodder, food (peyek) while Jingking sapi (Crustaceae, Ocypodidae) is foodstuffs (pelas). Lately tropical sand dune area of glagah village is utilized by shrimp farming. While the diversity of wild plants that are exploited are fruit or food (*Physalis minima*, *Ziziphus mauritiana*, *Passiflora foetida*, *Canavalia maritima*). *Pandanus tectorius* leaves used to make a hat, the root as a rope (sulur). The diversity agricultural of plants that have high economic value viz. Buah naga, dragon fruit (*Hylocereus undatus*), Lombok kriting, Chili (*Capsicum anuum*), Semangka, Watermelon (*Citrullus lanatus*) and Kambil or klopo, coconut (*Cocos nucifera*).

While the types of plants are important to consider in support of green belts NYIA airport is Pandan (*Pandanus tectorius*), Balaran (*Ipomoea pescaprae*), Krandan (*Canavalia maritima*), Widuri (*Calotropis digantea*), *Carex* sp., Preketekan (*Spinifex littorius*), Nyamplung (*Calophyllum inophyllum*), Keben (*Baringtonia asiatica*) and species introduction of Cemara laut (*Casuarina equisetifolia*) [18], Teresidae, gamal (*Glyrisidie sepium*), Akasia (*Acacia auriculiformis*). Tree plants species i.e., Keben (*Barringtonia asiatica*), Nyamplung (*Callophyllum inophyllum*), Pandan duri (*Pandanus tectorius*), Jambu monyet (*Anacardium occidentale*) very good for conserving green belt in tropical sand dune. Coastal sand dunes provide this opportunity, this biological diversity continuity provides an unending source of material research ecological studies [8,18].

Keben (*Barringtonia asiatica*) family Lecythidaceae, Nyamplung (*Calophyllum inophyllum*) in the familia Calophyllaceae is native from East Africa, southern coastal India to Malaysia and Pandan (*Pandanus tectorius*) in the familia Pandanaceae, pakis haji (*Cycas rumphii*) familia Cycadaceae, Dudulan (*Scaeveola taccada*) familia Goodinaceae are tree species of flowering plants. The four species are naturally green belt on the sand beach of Alas Purwo National Park East Java. We are sure Dudulan (*Scaeveola taccada*), *Pandanus tectorius*, *Baringtonia asiatica*, Jambu monyet (*Anacardium occidenrale*) and *Calophyllum inophyllum* is very well grow as green belt NYIA Airport. Sand dune systems are historically mobile physically and also adaptable physiologically, and have survived many environmental changes in the past [19]. Studies reported *Canavalia rosea* (Sw.) D.C.; *Ipomoea pes-caprae* (L.) Sweet. and *Schizachyrium scoparium* Michx. var. lit- toralis (Nash) Hitch are almost always found growing in places with regular sand movement [20,21]. The function of green belt at sand dune can be a barrier savior of community, ecotorism and can reduce tsunami attack caused by earthquake. The introduction of plant species at Green belt, maybe cause aircraft flight problems with the appearance of certain bird species [22].

Information regarding their vernacular name, botanical name, family, part used and their ethno-agricultural uses are listed below starting with local name, scientific name and family name, part used and Ethno-botany uses and locations (Table 1).

Conclusion

Based on the investigation of specimen herbarium and survey were resulted that there are 34 family, 84 species are recognized. The study evidenced that agricultural plays an important role in the enhancement of the livelihoods of local peoples. A Total of 84 plants consist of tropical sand dune Glagah Village, district Temon, Kulon Progo Regency, Yogyakarta Province existing in the region. Local people have a good knowledge of the diversity of plant species. While the types of plants are important to consider in support of green belts NYIA airport is Pandan (*Pandanus tectorius*), Balaran (*Ipomoea pescaprae*), Krandan (*Canavalia maritima*), Widuri (*Calotropis digantea*), *Carex* sp., Preketekan (*Spinifex littorius*), *Carex* sp., Nyamplung (*Calophyllum inophyllum*), Keben (*Baringtonia asiatica*), Dudulan ((*Scaeveola taccada*), Jambu monyet

S.no	Local name	Scientific name	Family	Parts used	Location and Status
1.	Bayam	*Amaranthus hybridus* L.	Amaranthaceae	Young stem, leaf	Sand dune, cultivated
2.	Bayam coklat	*Amaranthus* sp.	Amaranthaceae	Leaf, animal feed	Sand dune, wild
3.	Bayam duri	*Amaranthus spinosus* L.	Amaranthaceae	Whole, toxic	Sand dune, wild plants
4.	Jambu monyet	*Anacardium occidentale* L.	Anacardiaceae	Stem, drinks, seed, sap fruit toxic	Sand dune, cultivated, conservation*
5.	Widuri	*Calotropis gigantea* (Willd) Dryand. Ex W.T.Ait	Apocynaceae	Leaf , wrap paste	Sand dune, wild plants *
6.	Tapak doro	*Catharathus roseus* (L.) G. Don	Apocynaceae	Leaf, flower	Sand dune, cultivated
7.	Klopo/kambil	*Cocos nucifera* L.	Arecaceae	All plants, vegetable, ritual	Sand dune, cultivated
8.	Sembung	*Eupatorium inulifolium* H.B.K.	Asteracae	Leaf, flower,fertilizer	Sand dune, wild plant
9	Biden	*Bidens biternata* (Lour) Merr.	Asteraceae	Animal feed	Sand dune, wild plants
10.	Tapak liman	*Gynura crepidiaides* L.	Asteraceae	Leaf, medecine	Sand dune, wild plants
11.	Telekan	*Lantana camara* L.	Asteraceae	Whole, toxic	Sand dune, wild
12.	Tempuyung	*Emilia sonchifolia* (L.) DC.	Asteraceae	Leaf, medecine	Sand dune, wild plants
13.	Wedusan	*Ageratum conizoides* L.	Asteraceae	Animal feed	Sand dune, wild plants
14.	Sundel	*Borreria alata*	Asteraceae	Leaf, animal feed	Sand dune, wild*
15.	Klateng	*Synedrella nodifora* (l.) Gaertn.	Asteraceae	Leaf, animal feed	Sand dune, wild
16.	Nanas	*Ananas camosus* (L.) Merr	Bromeliaceae	Fruit	Sand dune, cultivated
17.	Buah naga	*Hylocereus undatus* (Haworth) Britton & Rose	Cactaceae	Fruit	Sand dune, cultivated
18.	Nyamplung	*Calophyllum inophyllum*	Callophyllaceae	Stem, fruit	Sand dune, cultivated
19.	Pepaya	*Carica papaya* L.	Caricaceae	Buah, leaf, vegetable	Sand dune, cultivated
20.	Cemara laut	*Casuarina equisetifolia* L.	Casuarinaceae	Would. conservation	Sand dune, cultivated *
21.	Gewor	*Comelina nudiflora* L.	Commelinaceae	Leaf, animal feed	Sand dune, wild
22.	Tela rambat	*Ipomoea batatas* (L.) Lamk.	Convolvulaceae	Stem, leaf	Sand dune, cultivated
23.	Tali putri	*Cuscuta* sp.	Convolvulaceae	Would, conservation	Sand dune, wild*
24.	Semangka	*Citrullus lanatus*	Cucurbitaceae	Liana, fruit	Sand dune, cultivated
25.	Teki	*Cyperus rotundus* L.	Cyperaceae	Leaf, animal feed	Sand dune, wild plant*
26.	Teki	*Cyperus* sp.	Cyperaceae	Leaf, animal feed	Sand dune, wild plant
27.	Teki pasir	*Cyperus melanocephalus* Miq.	Cyperaceae	Leaf, animal feed	Sand dune, wild plant *
28.	Buntut tikus	*Acalipha indica* L.	Euphorbiaceae	Leaf, medecine	Sand dune, wild
29.	Jarak	*Jatropha curcas* L.	Euphorbiaceae	Fruit, seed, toxic	Sand dune, cultivated *
30.	Katemas	*Euphorbia heterophylla*	Euphorbiaceae	Leaf, toxic, animal feed	Sand dune, wild plants
31.	Patikan	*Euphorbia hirta*	Euphorbiaceae	Leaf, toxic, animal feed	Sand dune, wild
32.	Telo kaspo	*Monihot utilisima* Pohl.	Euphorbiaceae	Radix, stem, leave, food	Sand dune, cultivated
33.	Meniran	*Phyllanthus niruri* L.	Euphorbiaceae	Leaf, fruit, medicine	Sand dune, wild*
34.	Akasia	*Acasia auriculiformis* A. Cunn.ex Bth	Fabaceae	Would, leaf, conservation	Sand dune, cultivated, consernation *
35.	Benguk	*Mucuna pruriens* (L.) DC.	Fabaceae	Seed, toxic, tempe	Sand dune, cultivated
36.	Brobos	*Centrosoma pubescent* Bth.	Fabaceae	Leaf, animal seed	Sand dune,wild
37.	Gringging, gamal	*Glyricidia sepium* (Jacq.) Kunth ex Walp	Fabaceae	Stem, leave, animal feed	Sand dune, cultivated *
38.	Kacang brol	*Arachis hypogaea* L.	Fabaceae	Leaf, seed	Sand dune, culivated
39.	Kacang tolo	*Phasolus vulgaris* L.	Fabaceae	Fruit, vegetable	Sand dune, cultivated
40.	Krandan	*Canavalia marritima* (Aubl.) Urb.	Fabaceae	Seed: tempe, flower: pecel	Sand dune, wild*
41.	Mlandingan	*Leucaena glauca* Bth.	Fabaceae	Fruit, seed, latex medecine	Sand dune, cultivated
42.	Orok-orok besar	*Crotalaria mucronata* Desv	Fabaceae	Daun, animal feed	Sand dune, wild plants
43.	Orok-orok kecil	*Crotalaria striaca* DC	Fabaceae	Daun, animal feed	Sand dune, wild plants
44.	Rendetan	*Desmodium* sp.	Fabaceae	Leaf, animal feed	Sand dune, wild
45.	Riwilkop	*Mimosa pudica* L.	Fabaceae	Toxic	Sand dune, wild
46.	Tom	*Indigofera sumatrana* Gaertn	Fabaceae	Leaf, color	Sand dune, wild*
47.	Alang-alang	*Imperata cylindrica* (L.) Beauv	Gramineae	Leaf, medecine, animal feed	Sand dune, wild
48.	Wulu asu	*Fimbristylis* sp.	Gramineae	Leaf, animal feed	Sand dune, wild
49.	Rumput gajah	*Pennisetum purpureum* L.	Gramineae	Leaf, animal feed	Sand dune, cultivated
50.	Empritan	*Eragrostis amabilis* O.K	Gramineae	Leaf, animal feed	Sand dune, wild plants
51.	Grinting	*Cynodon dactylon* (L.) Pers.	Gramineae	Leaf, animal feed	Sand dune, wild
52.	Jagung	*Zea mays* L.	Gramineae	Fruit, leaf, food, animal feed	Sand dune, cultivated
53.	Kawatan	*Eleusin indica* Gaertn	Gramineae	Leaf, animal feed	Sand dune, wild plants
54.	Preketekan, rumput angin	*Spinifex littorius* Merr.	Gramineae	Flower, toys	Sand dune, wild *
55.	Sereh	*Adropogon citratus* DC	Gramineae	Whole plant, flavoring	Sand dune, cultivated
56.	Rumput	*Fimbristylis cymosa*	Gramineae	Leaf, animal feed	Sand dune, wild
57.	Kemangi	*Ocimum basilicum* L.	Labiatae	Leaf, young stem, vegetable	Sand dune, cultivated
58.	Sengketan	*Hyptis suaveolens* (.) Poit	Labiatae	Flower	Sand dune, wild

59.	Leng-lengan	*Leucas aspera* (Willd) L.	Lamiaceae	Herb, leaf, medecine	Sand dune, Wild
60.	Singkil	*Premma* sp.	Lamiaceae	Habitus, Conservation	Sand dune, wild
61.	Pulutan	*Urena lobata* L.	Malvaceae	Toxic, fruit	Sand dune, wild plants
62.	Sidaguri	*Sida rhombifolia* L.	Malvaceae	Leaf, animal feed	Sand dune, wild plants *
63.	Tewel, nongko	*Artocarpus heterophyllus* L.	Moraceae	Stem, fruit, vegetable, animal feed	Sand dune, cultivated
64.	Kelor	*Moringa oleifera*	Moringiaceae	Young eaf	Sand dune, cultivated
65.	Gedang,	*Musa paradisiaca* L. cv Ambon	Musaceae	Fruit, stem, latex, flower, leaf	Sand dune, cultivated
66.	Jambu klutuk	*Psidium quajava* L.	Myrtaceae	Fruit, leaf, medecine	Sand dune, cultivated
67.	Pandan duri	*Pandanus tectorius* Soland. Ex Park.	Pandanaceae	Leaf, roof, mats, conservation	Sand dune, wild plants *
68.	Nomlang	*Passiflora foetida* L.	Passifloraceae	Fruit, toxic	Sand dune, wild plants *
69.	Katu	*Sauropus androgynus*	Phyllantaceae	Leaf, fruit	Sand dune, wild
70.	Lang-layangan	*Drynaria calomelanos*	Polypodiaceae	Steril leaf kites	Sand dune, wild plants
71.	Widoro	*Ziziphus mauritiana* Lamk.	Rhamnaceae	Fruit	Sand dune, wild plants*
72.	Pace	*Morinda citrifolia* L.	Rubiaceae	Fruit, medecine	Sand dune, wild*
73.	Balaran	*Ipomoea pescaprae* (L.) R.Br	Solanaceae	Stem, roof, conservation	Sand dune, wild plants *
74.	Ipo.	*Ipomoea* sp.	Solanaceae	Herb	Sand dune, wild
75.	Cimplukan	*Physalis minima* L.	Solanaceae	Fruit, medecine	Sand dune, wild plants*
76.	Lombok kriting	*Capsicum anuu*m L.	Solanaceae	Fruit, chili	Sand dune, cultivated
77.	Lombok rawit	*Capsicum frutescents* L.	Solanaceae	Fruit, chili, vegetable	Sand dune, cultivated
78.	Ranti	*Solanum torvum* SW	Solanaceae	Fruit, leave, vegetable, medecine	Sand dune, wild
79.	Terong	*Solanum melongena* L.	Solanaceae	Fruit, vegetable	Sand dune, cultivated
80.	Tomat	*Lycopersicon esculentum* L.	Solanaceae	Fruit, vegetable	Sand dune, cultivated
81.	Pulutan	*Triumffeta indica* Auct. Non Lamk.	Tiliaceae	Consevation	Sand dune, wild
82.	Pecut kuda	*Stachypeta jamaicensis* (L.) Vahl.	Verbenaceae	Leaf, medecine	Sand dune, wild plants
83.	Lipi	*Phyla nodiflora* (L.) Righ	Verbenaceae	Fruit, conservation	Sand dune, wild plants *
84.	Laos	*Alpinia galanga* (L.) Wild	Zingiberaceae	Rhizoma, medecine, vegetable	Sand dune, cultivated
Annotation: Star Sign (*, Star) type of plant tropical sand dune Glagah village.					

Table 1: The different plants used in the five common are tabulated.

(*Anacardium occidentale*), waru (*Hibiscus tiliaceus*) and introduction of Cemara laut, Cemara udang (*Casuarina equisetifolia*), Teresidae, Gamal (*Glyrisidie sepium*), Akasia (*Acacia aurifiliformis*).

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