

Woody Plant Species Composition of Mount Data National Park, Mountain Province, Philippines

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ABSTRACT: Assessment of plant resources in the Mount Data National Park, Philippines was done using the quadrat technique. A total of 108 woody plant species were identified at the Philippine National Herbarium (PNH) of the National Museum, Manila. The 108 species belong to 63 genera in 40 families. They represent the remnants of the original woody vegetation before the Mount Data area became dominated by agriculture. Local colleges and universities, particularly the Mountain Province State Polytechnic College, should be active in the documentation of the remaining Mount Data flora. A herbarium for academic instruction, research and public service is needed, with community based resource management to help maintain as far as possible this unique environmental system.

KEY WORDS: biodiversity, floristics, herbarium, plant documentation, ecosystem services.

INTRODUCTION

The Cordillera mountain range was originally covered by broadleaved evergreen submontane, montane (mossy) forest with isolated pine stands, but man's long years of occupancy and the use of fire in *kaingin* (slash and burn agriculture) has resulted in the extensive destruction of the montane forest (Kowal, 1966). *Kaingin* was one of the principal agents in the development of pine forest and grassland (Whitford, 1911) but on steep slopes it is responsible for the possible elimination and maybe extinction of submontane and

montane broadleaved evergreen forest in the Philippines.

Mount Data National Park occupies a position exactly in the center of the physiographic heartland area of the Cordillera mountain range. The park contains the headwaters of the major rivers in the Cordillera Region (Kowal, 1966). Particularly, tributaries in the southern portion become the Agno River that drains to the South China Sea, tributaries in the eastern portion feed the Chico River that flows to the Cagayan Valley and tributaries in the northern and western portions feed the Abra River that flows to the Ilocos Region. The

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area also contains hydroelectric power plants for the country's economic development towards industrialization.

Most of the land above an elevation of 2,000 metres in the Cordillera mountain range including Mount Data (2,000 to 2,300 m) was once covered by tropical montane forest (Richards, 1952), a unique rainforest formation located in the special environmental conditions associated with high elevations. Whitford (1911) applied the term "mossy forest" to this formation when he classified the vegetation of the Philippines. On the basis of reconnaissance in the southern and central portions of the Cordillera mountain range, Kowal (1966) described the vegetation of Mount Data as fairly representative of the vegetation of the Cordillera mountain range as a whole. Beforehand, Merrill (1926) had noted that the Cordillera mountain range contained 500 species of higher plants found nowhere else in the Philippines, about 70 % of these were endemic while the remaining 30% were found chiefly in India, China, Japan, and Formosa.

The original vegetation of the Cordillera Central was probably broadleaved-evergreen submontane and montane (including mossy) forest, with isolated stands of pine. Through the activities of man, however, in the centuries of occupation, the broad-leaved trees have been cleared off, and repeated fires have prevented their reproduction. The pine, however, was

less sensitive to fires, and consequently there were broad areas of grasslands with many groves of pine (Whitford, 1911). At present, it was observed that Mount Data National Park has three natural vegetation types: montane forest (also referred as mossy forest) at the highest elevations, pine forest (*Pinus insularis*) and grassland at middle and lower elevations. Kowal (1966) described the same vegetation type and cited that the montane forest consisted of a single aboreal layer. 5-10 m in height, dominated by *Lithocarpus jordanae*, *Syzygium santosii* and *Turpinia ovalifolia*. Most were limited to mountain peaks, and were actually second growth in nature, having been exposed to kaingin or shifting cultivation for centuries.

This study aimed to determine the floral composition of the Mount Data National Park. Results can give us insights on the value of the park ecosystem and a possible appropriate sustainable management strategy for wise park use and conservation.

MATERIALS AND METHODS

Study Area

Strategically located on the raised ground at the middle of the Central Cordillera Mountain Range of Luzon with its diverse mossy forest and pine trees, is the Mount Data National Park bounded and shared by Benguet Province, Mountain Province and Ifugao Province. It was established as Mount Data National Park under Proclamation No. 634 on October 8,

1940 in order to conserve, protect and manage its biodiversity. The park covers 5,512 hectares with restrictions of 100 meters on both sides of the Halsema highway starting from kilometer 15, Tublay, Benguet to

kilometer 117, Tabbac, Sabangan, Mountain Province and enlarges on the Mount Data Plateau to an approximate area of 3,512 hectares (DENR- CENRO- Sabangan, Mt. Province, 1991).

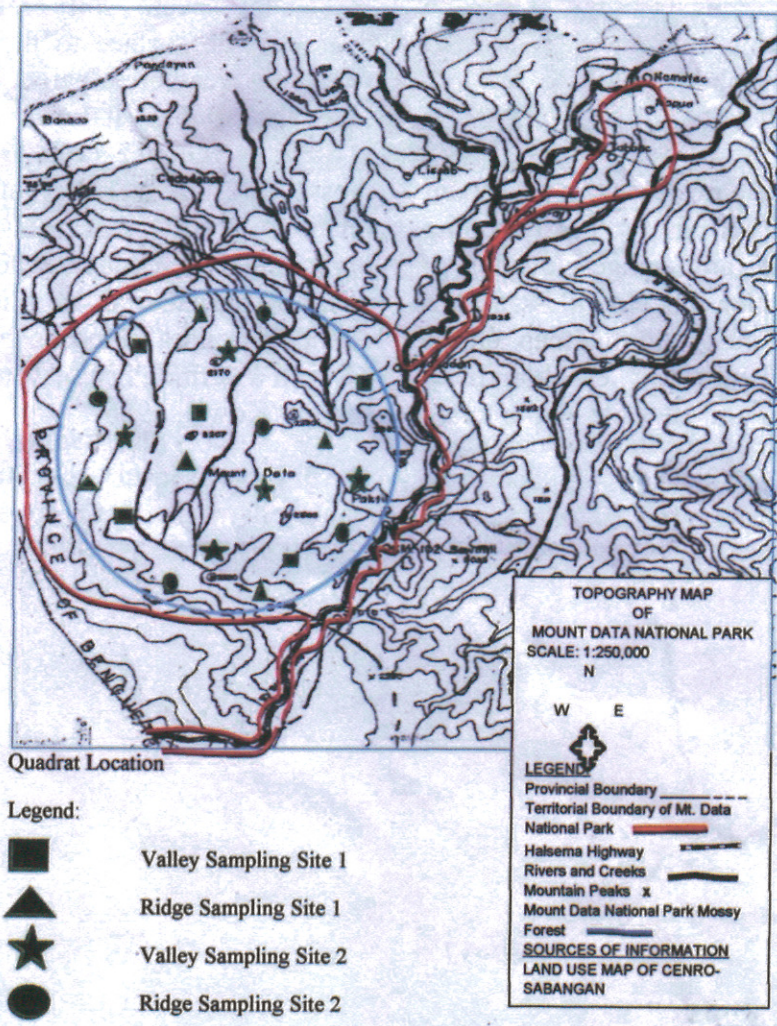


Figure 1. Topographic Map of Mount Data National Park, highlighting the location of the mossy forest (blue enclosure) as well as the location of quadrats in the western, eastern, northern, southern and central portions of the park with reference to valleys and ridges.

The vegetation of the Mount Data Plateau includes mossy forest and adjacent pine stands, and shrubland covered by Barangay. Mount Data, Sinto and Paktil in the Municipality of Bauko, Mountain Province and Barangay Cada in the Municipality of Mankayan, Benguet Province (Fig. 1) is where this study was conducted from November, 2010 to March, 2011.

The mossy forest region of Mount Data (Fig. 2) is a gently-rolling plateau with an average elevation of 2100 to 2300 m. Mount Data is a high block mountain made up almost entirely of more or less horizontal beds of tuff and andesite agglomerate (Dickerson, 1923).

Mount Data is composed mainly of highly weathered acidic igneous rock and physiographically is a highly-dissected flat terrain with very steep-walled valleys. Well-developed soil is found only on a few mountain peaks occupied by mossy forest. Elsewhere severe soil erosion has degraded the surface to the orange-red rock weathered parent material (Kowal, 1966). It was recently verified by Gomez (2008), that the mossy forest soil of Mount Data is relatively fertile because of high organic matter content whereas the adjacent agricultural land is acidic. The climate is a monsoon type (Fig. 3), with a definite dry season and wet season (Kowal, 1966).



Figure 2. Permanent gardens located in the southeastern portion of the mossy forest in Mount Data National Park.

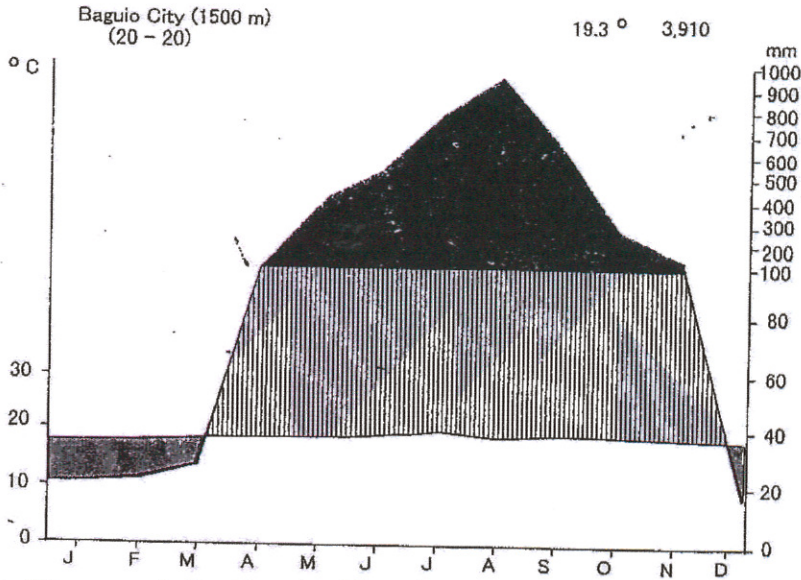


Figure 3. Climograph for Baguio City, the nearest weather station to Mt. Data National Park (Buot and Okitsu, 1999).

Reconnaissance Survey

Initial study-site inspection (Fig. 4) was done on foot within the study area. It was found that vegetation in all the portions was diverse and

heterogeneous. Indeed, Kowal (1966) described the vegetation of Mount Data as an excellent representation of the major plant communities of the Cordillera mountain range.



Figure 4. Site inspection in the central portion of the mossy forest in Mount Data National Park.

Vegetation Study

The plot method was used in field sampling following Mueller-Dombois and Ellenberg (1974). The size of every quadrat set in the north, south, west, east and central portion of the mossy forest was 100 sq. m. In each quadrat, all woody plant species were noted and measured. Collection of plant specimens with an average length of 8 inches was done. The specimens were preserved following Balangcod and Buot (2004) and were brought to the Philippine National Museum (Manila) and CAR-DENR-

Ecosystem Research and Development Bureau for taxonomic identification.

RESULTS AND DISCUSSION

Table 1 presents the species composition of the identified woody plant species from the Mount Data National Park. These are the shrubs and trees that serve as the major vegetative cover of the park and sustain its role as the headwaters of the major rivers in the watershed of the Cordillera Region.

Table 1. Species composition of woody plant species of Mount Data National Park, Mountain Province, Philippines.

#	Taxa	Common Name	Habit	Exsiccata
Acanthaceae				
1	<i>Shrub species 1</i>		shrub	Subilla 6233
Actinidiaceae				
2	<i>Saurauia elegans</i>	Uyok	tree	Subilla 6234
3	<i>Saurauia sp. (1)</i>		shrub	Subilla 6235
4	<i>Saurauia sp. (2)</i>		tree	Subilla 6236
5	<i>Saurauia sp. (3)</i>		tree	Subilla 6237
6	<i>Saurauia sp. (4)</i>		tree	Subilla 6238
Anacardiaceae				
7	<i>Buchanania arborescens</i>	balinghasai	tree	Subilla 6239
Araliaceae				
8	<i>Aralia bipinnata</i>	Sugsuga	shrub	Subilla 6240
9	<i>Schefflera insularum</i>		tree	Subilla 6241
10	<i>Schefflera microphylla</i>		shrub	
Asteraceae				
11	<i>Tree species 1</i>		tree	
12	<i>Tree species 2</i>		tree	
Betulaceae				
13	<i>Alnus japonica</i>	Alnus	tree	Subilla 6242

Table 1. Species composition of woody plant species of Mount Data National Park, Mountain Province, Philippines (Continued).

#	Taxa	Common Name	Habit	Exsiccata
	Boraginaceae			
14	<i>Cordia myxa</i>		tree	Subilla 6243
	Burseraceae			
15	<i>Canarium sp. (1)</i>		tree	Subilla 6244
16	<i>Canarium sp. (2)</i>		tree	Subilla 6245
	Buxaceae			
17	<i>Tree species 1</i>		tree	Subilla 6246
	Caprifoliaceae			
18	<i>Viburnum coriaceum</i>		tree	Subilla 6247
19	<i>Viburnum luzonicum</i>	Atelba	tree	Subilla 6248
20	<i>Viburnum odonatissimum</i>	Idog	tree	Subilla 6249
21	<i>Viburnum sp. (1)</i>		tree	Subilla 6250
22	<i>Viburnum sp. (2)</i>		tree	Subilla 6251
23	<i>Viburnum sp. (3)</i>		tree	Subilla 6252
	Chloranthaceae			
24	<i>Chloranthus glaber</i>	Gepas	shrub	Subilla 6253
	Clethraceae			
25	<i>Clethra luzonica</i>		tree	Subilla 6254
26	<i>Clethra sp. (1)</i>		tree	Subilla 6255
	Clusiaceae			
27	<i>Garcinia sp. (1)</i>		tree	Subilla 6256
	Daphniphyllaceae			
28	<i>Daphniphyllum gracile</i>		tree	Subilla 6257
	Ericaceae			
29	<i>Rhododendron sp. (1)</i>		tree	Subilla 6258
30	<i>Vaccinium barandanum</i>		tree	Subilla 6259
31	<i>Vaccinium cumingianum</i>		tree	
32	<i>Vaccinium quadrasianum</i>		tree	Subilla 6260
33	<i>Vaccinium sp. (1)</i>		tree	Subilla 6261
34	<i>Vaccinium sp. (2)</i>	Tenggel	tree	Subilla 6262
35	<i>Tree species 1</i>		tree	Subilla 6263
	Euphorbiaceae			
36	<i>Antidesma ghaesembilla</i>	Binayuyo	tree	Subilla 6264
37	<i>Claoxylon rubescens</i>		tree	Subilla 6265
38	<i>Homalanthus alpinus</i>	Malabalanti	tree	Subilla 6266
39	<i>Homalanthus megaphyllus</i>		tree	Subilla 6267

Table 1. Species composition of woody plant species of Mount Data National Park, Mountain Province, Philippines (Continued).

#	Taxa	Common Name	Habit	Exsiccata
Fagaceae				
40	<i>Lithocarpus coopertus</i>	Ulayan	tree	Subilla 6268
41	<i>Lithocarpus jordanae</i>	Katiluk	tree	Subilla 6269
42	<i>Lithocarpus luzoniensis</i>	Kilog	tree	
43	<i>Lithocarpus oligocarpus</i>	Kitaldag	tree	Subilla 6270
Gesneriaceae				
44	<i>Aeschyranthus sp. (1)</i>		tree	Subilla 6271
45	<i>Cyrtandra sp. (1)</i>		tree	Subilla 6272
46	<i>Cyrtandra sp. (2)</i>		tree	Subilla 6273
47	<i>Cyrtandra sp. (3)</i>		tree	
Hamamelidaceae				
48	<i>Polyosma linearibractea</i>		tree	Subilla 6274
Lamiaceae				
49	<i>Gomphostemma philippinarum</i>		tree	Subilla 6275
50	<i>Plectranthus sp. (1)</i>		tree	Subilla 6276
51	<i>Salvia sp. (1)</i>		tree	Subilla 6277
52	<i>Tree species 1</i>		tree	Subilla 6278
Lauraceae				
53	<i>Litsea perrotetii</i>	Dumoplas	tree	Subilla 6279
54	<i>Litsea perrotetii</i>	Marang	tree	Subilla 6280
55	<i>Neolitsea villosa</i>		tree	Subilla 6281
56	<i>Neolitsea vulcanica</i>		tree	Subilla 6282
Leeaceae				
57	<i>Leea magnifolia</i>		tree	Subilla 6283
Melastomaceae				
58	<i>Astronia quadrangulata</i>		tree	Subilla 6284
59	<i>Medinilla cordata</i>		tree	Subilla 6285
60	<i>Melastoma malabathricum</i>		shrub	Subilla 6286
61	<i>Melastoma sp. (1)</i>		shrub	Subilla 6287
Moraceae				
62	<i>Ficus benguetensis</i>		tree	Subilla 6288
63	<i>Ficus sp. (1)</i>		tree	Subilla 6289
64	<i>Ficus sp. (2)</i>		tree	Subilla 6290

Table 1. Species composition of woody plant species of Mount Data National Park, Mountain Province, Philippines (Continued).

#	Taxa	Common Name	Habit	Exsiccata
Myrsinaceae				
65	<i>Ardisia sp. (1)</i>		tree	Subilla 6291
66	<i>Ardisia sp. (2)</i>		tree	Subilla 6292
67	<i>Ardisia sp. (3)</i>		tree	Subilla 6293
68	<i>Ardisia sp. (4)</i>		tree	Subilla 6294
Myrtaceae				
69	<i>Decaspermum sp. (1)</i>		tree	Subilla 6295
70	<i>Syzygium santosii</i>		tree	Subilla 6296
71	<i>Syzygium subcaudatum</i>		tree	Subilla 6297
72	<i>Syzygium sp. (1)</i>		tree	Subilla 6298
73	<i>Syzygium sp. (2)</i>		tree	Subilla 6299
74	<i>Syzygium sp. (3)</i>	vertek babae	tree	Subilla 6300
83	<i>Prumnopitys amara</i>		tree	Subilla 6308
Rosaceae				
84	<i>Prunus grisea</i>		tree	Subilla 6309
Rubiaceae				
85	<i>Hedyotis benguetensis</i>		tree	Subilla 6310
86	<i>Psychotria sp. (1)</i>		tree	Subilla 6311
87	<i>Psychotria sp. (2)</i>		tree	Subilla 6312
88	<i>Psychotria sp. (3)</i>		tree	Subilla 6313
Rutaceae				
89	<i>Citrus sp. (1)</i>	Fukog	tree	Subilla 6314
90	<i>Evodia retusa</i>		tree	Subilla 6315
91	<i>Evodia sp. (1)</i>		tree	Subilla 6316
92	<i>Evodia sp. (2)</i>		tree	Subilla 6317
93	<i>Melicope triphylla</i>		tree	Subilla 6318
94	<i>Skimmia philippinensis</i>		tree	Subilla 6319
Saxifragaceae				
95	<i>Deutzia pulchra</i>		shrub	Subilla 6320
Smilacaceae				
96	<i>Smilax sp. (1)</i>		tree	
Staphyleaceae				
97	<i>Turpina ovalifolia</i>		tree	Subilla 6321

Table 1. Species composition of woody plant species of Mount Data National Park, Mountain Province, Philippines (Continued).

#	Taxa	Common Name	Habit	Exsiccata
Taxaceae				
98	<i>Taxus sumatrana</i>	igem/ opposite	tree	Subilla 6322
Theaceae				
99	<i>Camellia sp. (1)</i>		tree	Subilla 6323
100	<i>Cleyera japonica</i>		tree	Subilla 6324
101	<i>Eurya coriacea</i>	Bakig	tree	Subilla 6325
102	<i>Eurya flava</i>		tree	Subilla 6326
103	<i>Eurya japonica</i>		tree	Subilla 6327
104	<i>Eurya sp. (1)</i>		tree	Subilla 6328
105	<i>Thea lanceolata</i>		shrub	Subilla 6329
106	<i>Tree species 1</i>		tree	Subilla 6330
Thymelaeaceae				
107	<i>Wikstroemia ovata</i>	Suka	tree	Subilla 6331
Winteraceae				
108	<i>Drimys piperita</i>	Sepal	shrub	Subilla 6332

A total of 108 species were identified. Experts from the Philippine National Museum classified these woody plant species in terms of plant habit, 11 species were shrubs while 97 were trees. These 108 species belonged to 40 families and 63 genera. Family Theaceae dominated having one (1) genus but comprised of eight (8) species followed by family Ericaceae with three (3) genera comprised of seven (7) species and family Myrtaceae with two (2) genera comprised of seven (7) species. The least represented families were Acanthaceae, Anacardiaceae, Betulaceae, Boraginaceae, Buxaceae, Chloranthaceae, Clusiaceae, Daphniphyllaceae, Hamamelidaceae, Leeaceae, Piperaceae, Rosaceae, Saxifragaceae, Smilac-

aceae, Staphyleaceae, Taxaceae, Thymelaeaceae and Winteraceae with one (1) genus in each.

The flora of Mount Data National Park was essentially a temperate Asian one, with great similarity to the floras of Formosa (Taiwan), Japan and China. Merrill (1923) as cited by Dickerson (1923) considered the flora of northern Luzon and Formosa as representatives of the most southern and eastern extension of the Himalayan flora completely different from the floras of Mt. Makiling and with other mountains in the Visayas and Mindanao which are from Malesian flora. Furthermore, Merrill (1926) indicated that the whole of Cordillera Central contained 500 species of higher plants found

nowhere else in the Philippines. About 70% of these were endemic and the remaining 30 % were found chiefly in India, China, Japan and Formosa.

The findings were not far behind from that of Gomez (2008) on the floral assessment of Mount Data National Park. Gomez (2008) presented species that belonged to families Fagaceae with genus *Lithocarpus* composed of three (3) species, Moraceae with genus *Ficus* composed of one species, Myrtaceae with genus *Syzygium* composed of one species, Theaceae with genus *Eurya* composed of one species, Thymelaeaceae with genus *Wikstroemia* composed of one species and Winteraceae with genus *Drimys* composed of one species. Unfortunately, similar to this study, there were also species which were not scientifically or taxonomically identified in the study conducted by Gomez in 2008. Majority of species vouchers in this study as presented in Table 1 were deposited at the Institute of Biological Sciences- UPLB Herbarium (PBDH).

In the neighboring Mount Pulag, Buot and Okitsu (1998) found similar plant families to those of Mount Data such as Pinaceae, Ericaceae, Fagaceae, Podocarpaceae, Lauraceae, Saxifragaceae, Rutaceae, Caprifoliaceae and Theaceae. These families are mainly from temperate regions. Other families found were Euphorbiaceae, Clethraceae, Myrsinaceae, Myrtaceae, Rubiaceae, Araliaceae

and Winteraceae which are mainly from tropical regions.

The family having the greatest number of species was Theaceae with eight species followed by Ericaceae and Myrtaceae with seven species each.

CONCLUSION AND RECOMMENDATION

It can be surmised that this species list represents the remnants of an earlier more diverse ecosystem before agriculture dominated the Mount Data National Park area. The unique biota of Mount Data needs to be preserved and sustained so that the community may enjoy the services of the park ecosystem. A community based forest management strategy should be introduced and the local community should be guided in sustaining local ecosystem resources. Local colleges, particularly the Mountain State Polytechnic College, need to be actively involved in the documentation of plant resources and in the establishment of a herbarium for academic instruction, research and public use.

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