

structure at Realolo village Resort Mallawa, Babul NP has a good condition considering the stem diameter has an inverse J-shaped curve. This needs to be maintained in the conservation management of this area. On the other hand, the existence of many rare species within the protected area makes this area vulnerable. Relatively good vegetation structures in Babul NP are essential for biodiversity in the Wallacea region especially Sulawesi considering the disturbance to vegetation in this area.

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REFERENCES

- [1] C. H. Cannon, M. Summers, J. R. Harting, and P. J. A. Kessler, "Developing conservation priorities based on forest type, condition, and threats in a poorly known ecoregion: Sulawesi, Indonesia," *Biotropica*, vol. 39, no. 6, pp. 747–759, 2007.
- [2] W. F. Laurance, "Reflections on the tropical deforestation crisis," *Biol. Conserv.*, vol. 91, no. 2, pp. 109–117, 1999.
- [3] A. Vifia, "Evaluating vegetation indices for assessing productivity along a tropical rain forest chronosequence in Western Amazonia," *Isr. J. Plant Sci.*, vol. 60, no. 1–2, pp. 123–133, 2012.
- [4] S. J. DeWalt, S. K. Maliakal, and J. S. Denslow, "Changes in vegetation structure and composition along a tropical forest chronosequence: implications for wildlife," *For. Ecol. Manage.*, vol. 182, no. 1, pp. 139–151, 2003.
- [5] T. Whitten, G. S. Henderson, and M. Mustafa, *Ecology of Sulawesi*. Tuttle Publishing, 2012.
- [6] B. T. N. Babul, "Rencana Pengelolaan Jangka Panjang Taman Nasional Bantimurung Bulusaraung Periode 2008–2027 Kabupaten Maros dan Pangkep," *Direktorat Jenderal Perlindungan Hutan dan Konserv. Alam. Balai Taman Nas. Bantimurung Bulusaraung, Maros*, 2008.
- [7] A. K. Wakka, N. Muin, and R. Purwanti, "Toward Collaborative Management of Bantimurung Bulusaraung National Park, South Sulawesi Province," *J. Penelit. Kehutan. Wallacea*, vol. 4, no. 1, pp. 41–50, 2015.
- [8] Å. Ramlund, "Structure and tree diversity of lowland limestone forest on Seram Island, Indonesia," 2011.
- [9] M. T. Naidu and O. A. Kumar, "Tree diversity, stand structure, and community composition of tropical forests in Eastern Ghats of Andhra Pradesh, India," *J. Asia-Pacific Biodivers.*, vol. 3, no. 9, pp. 328–334, 2016.
- [10] P. S. Ashton, "Species richness in plant communities," in *Conservation biology*, Springer, 1992, pp. 3–22.
- [11] T. C. Whitmore, *Tropical Rain Forests of the Far East*. Clarendon Press, 1984.
- [12] R. Pitopang, I. Khaeruddin, A. Tjoa, I. F. Burhanuddin, and M. M. J. Van Balgooy, "Pengenalan Jenis-Jenis Pohon Yang Umum Di Sulawesi," 2008.
- [13] D. Mueller-Dombois and H. Ellenberg, *Aims and Methods of Vegetation Ecology*. Blackburn Press, 1974.
- [14] W. W. Daniel, *BioStatistics: A Foundation for Analysis in the Health Sciences*. Wiley, 2009.
- [15] M. Kent, *Vegetation description and data analysis: a practical approach*. John Wiley & Sons, 2011.
- [16] J. K. Cronk and M. S. Fennessy, *Wetland plants: biology and ecology*. CRC press, 2016.
- [17] A. G. Floyd and Forestry Commission of New South Wales, *N.S.W. rain forest trees. Part 3., Family Myrtaceae*. Research Centre, Forestry Office, Coffs Harbour, [N.S.W.], 1973.
- [18] E. L. Webb, B. J. Stanfield, and M. L. Jensen, "Effects of topography on rainforest tree community structure and diversity in American Samoa, and implications for frugivore and nectarivore populations," *J. Biogeogr.*, vol. 26, no. 4, pp. 887–897, 1999.
- [19] D. Hakizimana, M.-C. Huynen, and A. Hamburgers, "Structure and floristic composition of Kibira rainforest, Burundi," *Trop. Ecol.*, vol. 57, no. 4, pp. 739–749, 2016.
- [20] H. Culmsee and R. Pitopang, "Tree diversity in sub-montane and lower montane primary rain forests in Central Sulawesi," *Blumea-Biodiversity, Evol. Biogeogr. Plants*, vol. 54, no. 1–1, pp. 119–123, 2009.
- [21] H. WAWANGNINGRUM and D. M. Puspitaningtyas, "Keanekaragaman Araliaceae di Suaka Alam Sulasih Talang, Sumatera Barat dan Aklimatisasinya," *Biodiversitas*, vol. 9, no. 2, pp. 123–127, 2008.
- [22] H. Krisnawati, M. Kallio, and M. Kanninen, *Aleurites moluccana (L.) Willd.: Ekologi, Silvikultur dan Produktivitas*. Cifor, 2011.
- [23] E. P. Odum, *Fundamentals of ecology*, vol. 3. JSTOR.
- [24] A. K. Sarkar, "Ecological Studies of Tree Vegetation," *Ecol. Stud.*, vol. 5, no. 7, pp. 53–59, 2016.
- [25] P. Rajbongshi, K. Zaman, S. Boruah, and S. Das, "A review on traditional use and phytopharmacological potential of *Bischofia javanica* Blume," *Int. J. Pharm. Sci. Rev. Res*, vol. 24, no. 2, pp. 24–29, 2014.
- [26] A. O. Oladoye, A. M. Aduradola, and M. O. Adedire, "Composition and stand structure of a regenerating tropical rainforest ecosystem in South-western Nigeria," *Int. J. Biodivers. Conserv.*, vol. 6, no. 11, pp. 764–776, 2014.
- [27] D. H. Janzen, "Herbivores and the number of tree species in tropical forests," *Am. Nat.*, vol. 104, no. 940, pp. 501–528, 1970.
- [28] M. Begon, J. L. Harper, and C. R. Townsend, *Ecology. Individuals, populations and communities*. Blackwell scientific publications, 1986.
- [29] J. C. Budke, J. A. Jarenkow, and A. T. de Oliveira-Filho, "Relationships between tree component structure, topography and soils of a riverside forest, Rio Botucaraí, Southern Brazil," *Plant Ecol.*, vol. 189, no. 2, pp. 187–200, 2007.
- [30] K. Sidiyasa, T. C. Whitmore, I. G. M. Tantra, and U. Sutisna, *Tree flora of Indonesia: check list for Sulawesi*. Ministry of Forestry, Agency for Forestry Research and Development, Forest Research and Development Centre, 1989.
- [31] N. S. Ariyanti, M. M. Bos, K. Kartawinata, S. S. Tjitrosodirdjo, E. Guhardja, and S. R. Gradstein, "Bryophytes on tree trunks in natural forests, selectively logged forests and cacao agroforests in Central Sulawesi, Indonesia," *Biol. Conserv.*, vol. 141, no. 10, pp. 2516–2527, 2008.
- [32] N. Dudley, *Guidelines for applying protected area management categories*. IUCN, 2008.
- [33] A. Arrijani, "Vegetation structure and composition of the montane zone of Mount Gede Pangrango National Park. Biodiversitas," *J. Biol. Divers.*, vol. 9, no. 2, pp. 134–141, 2008.
- [34] N. C. A. Pitman *et al.*, "A comparison of tree species diversity in two upper Amazonian forests," *Ecology*, vol. 83, no. 11, pp. 3210–3224, 2002.
- [35] P. Davidar, J. P. Puyravaud, and E. G. Leigh, "Changes in rain forest tree diversity, dominance and rarity across a seasonality gradient in the Western Ghats, India," *Journal Biogeogr.*, vol. 32, no. 3, pp. 493–501, 2005.
- [36] M. G. Barbour, J. H. Burk, and W. D. Pitts, *Terrestrial plant ecology*. Benjamin/Cummings., 1980.
- [37] C. Li, S. Frolking, and R. Harriss, "Modeling carbon biogeochemistry in agricultural soils," *Global Biogeochem. Cycles*, vol. 8, no. 3, pp. 237–254, 1994.