

MODEL ALOMETRIK BIOMASSA DAN KARBON MULTI SPESIES BAMBU DI DESA WISATA JATIMULYO, KULON PROGO

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INTISARI

Perubahan iklim akibat peningkatan konsentrasi gas rumah kaca, khususnya karbon dioksida (CO₂), mendorong perlunya upaya mitigasi melalui peningkatan cadangan karbon vegetasi. Bambu memiliki potensi besar sebagai penyerap karbon karena pertumbuhannya yang cepat. Namun, model alometrik di Indonesia umumnya masih disusun per spesies sehingga model multispesies masih terbatas. Desa Jatimulyo dikenal sebagai kawasan konservasi burung, tetapi penelitian terkait potensi bambu di wilayah ini belum tersedia. Penelitian ini bertujuan untuk menyusun model alometrik biomassa dan karbon multispesies serta menduga potensi biomassa dan karbon di Desa Wisata Jatimulyo.

Penelitian dilakukan melalui survei pendahuluan, pengambilan sampel destruktif, dan inventarisasi rumpun bambu sebagai tahap pengumpulan data. Sebanyak 60 batang bambu dipilih secara purposif berdasarkan kelas diameter, terdiri atas 45 data pelatihan dan 15 data validasi. Biomassa diperoleh melalui pengukuran dimensi batang, penimbangan berat basah, dan pengeringan sampel hingga berat kering, kemudian dikonversi menjadi karbon menggunakan fraksi karbon. Analisis data dilakukan dengan menyusun model alometrik biomassa dan karbon menggunakan beberapa bentuk regresi, yang dipilih berdasarkan nilai R², SEE, dan AICc, serta diuji menggunakan RMSE, MAD, dan MAB.

Hasil menunjukkan bahwa model terbaik untuk pendugaan biomassa multispesies apus, wulung, dan ampel gading adalah $B = 0,11 \times D^{2,227}$, sedangkan untuk karbon adalah $C = 0,052 \times D^{2,227}$, dengan nilai R² masing-masing sebesar 0,79 dan 0,80. Model memiliki tingkat kesalahan yang relatif kecil dan dapat digunakan untuk pendugaan di lapangan. Potensi biomassa untuk bambu apus, wulung, dan ampel gading diperkirakan sebesar 1.195,86 ton dan potensi karbon sebesar 565,32 ton di Desa Wisata Jatimulyo.

Kata Kunci: mitigasi perubahan iklim, gas rumah kaca inventarisasi hutan, analisis regresi, cadangan karbon

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***MULTI-SPECIES BAMBOO ALLOMETRIC MODELS FOR BIOMASS AND
CARBON ESTIMATION IN JATIMULYO TOURISM VILLAGE, KULON
PROGO***

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ABSTRACT

Climate change driven by increasing greenhouse gas concentrations, particularly carbon dioxide (CO₂), has intensified the need for mitigation through enhancing vegetation carbon stocks. Bamboo has strong potential as a carbon sink due to its rapid growth. However, most allometric models in Indonesia are still species-specific, while multi-species models remain limited. Although Jatimulyo Village is known as a bird conservation area, information on bamboo biomass and carbon potential in this region is still lacking. This study aimed to develop multi-species allometric models for estimating bamboo biomass and carbon stocks and to assess their potential in Jatimulyo Tourism Village.

Data collection was conducted through preliminary surveys, destructive sampling, and bamboo clump inventory. A total of 60 bamboo culms were selected based on diameter classes, consisting of 45 samples for training and 15 for validation. Biomass was obtained from culm measurements, fresh weight assessment, and oven-drying to constant weight, then converted into carbon stock using a carbon fraction. Data analysis was conducted by developing biomass and carbon allometric models using several regression forms, which were selected based on R², SEE, and AICc, and validated using RMSE, MAD, and MAB.

*The results showed that the best multi-species allometric model for estimating aboveground biomass of *Gigantochloa apus*, *Gigantochloa atroviolacea*, and *Bambusa vulgaris* var. *striata* was $B = 0.11 \times D^{2.227}$, while the best carbon model was $C = 0.052 \times D^{2.227}$, with R² values of 0.79 and 0.80, respectively. Both models showed low errors and are suitable for field application. The total biomass potential was 1,195.86 tons, with a carbon stock of 565.32 tons.*

Keywords: climate change mitigation, greenhouse gas, forest inventory, regression analysis, carbon stock

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