frontiers

Supplementary Material

Papua at the crossroads: A plea for systematic conservation planning in one of the largest 1 remaining areas of tropical rainforest

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Methods

Elevational and ecoregional representativeness

A (30x30 m) digital elevation model (DEM) of Tanah Papua was derived from NASA's Shuttle Radar Topography Mission (Farr et al., 2007) to assess the elevational representativeness of the existing protected area network and land-use concessions. All analyses were conducted in R (R Core Team, 2018). An open-access layer of the world's ecoregions (Dinerstein et al., 2017) was cropped to the study region for the same purpose. We created three polygon layers covering protected areas (UNEP-

WCMC & IUCN, 2019), publicly available land-use concessions (Global Forest Watch, 2019), and all areas without available land designations. For elevational analysis, we used the *extract* function in the *raster* package (Hijmans et al., 2019) to extract elevation for all pixels within each polygon layer. We categorized pixels into five classes based on their DEM elevation (0-500 m, 500-1000 m, 1000-2000 m, and 2000-3000 m) and grouped them according to their land designation. We further calculated the sum of all pixels per elevation class and land designation and divided by the sum of pixels to derive the area percentage per land designation and elevation class (Figure 2A). A similar approach was applied to analyze ecological representativeness by ecoregion. Instead of elevation class, pixel sum for each ecoregion per land designation was extracted and area percentage calculated. Ecoregions were then grouped into the categories 'Montane', 'Lowland', and 'Islands' according to their elevation for easier distinguishing and visualization (Figure 2B).

Supplementary Tables

Table S1 Elevational representativeness of Tanah Papua's main land designations used in this study

Land designation	Elevation class	% of total land designation	% of total land area
Concession	0-500 m	94.23	26.82
	500 - 1000 m	5.33	1.52
	1000 - 2000 m	<1	<1
	2000 - 3000 m	<1	0

	>3000 m	<1	<1
Protected Area	0-500 m	70.73	37.09
	500 - 1000 m	10.68	5.6
	1000 - 2000 m	10.16	5.33
	2000 - 3000 m	6.32	3.31
	>3000 m	2.12	1.11
No Designation	0-500 m	56.53	10.8
	500 - 1000 m	12.41	2.37
	1000 - 2000 m	16.53	3.16
	2000 - 3000 m	7.51	1.44
	>3000 m	7.01	1.34

Table S2 Ecoregional representativeness of Tanah Papua divided by Ecoregions as defined by Dinerstein et al. (2017) and three land designations used in this study

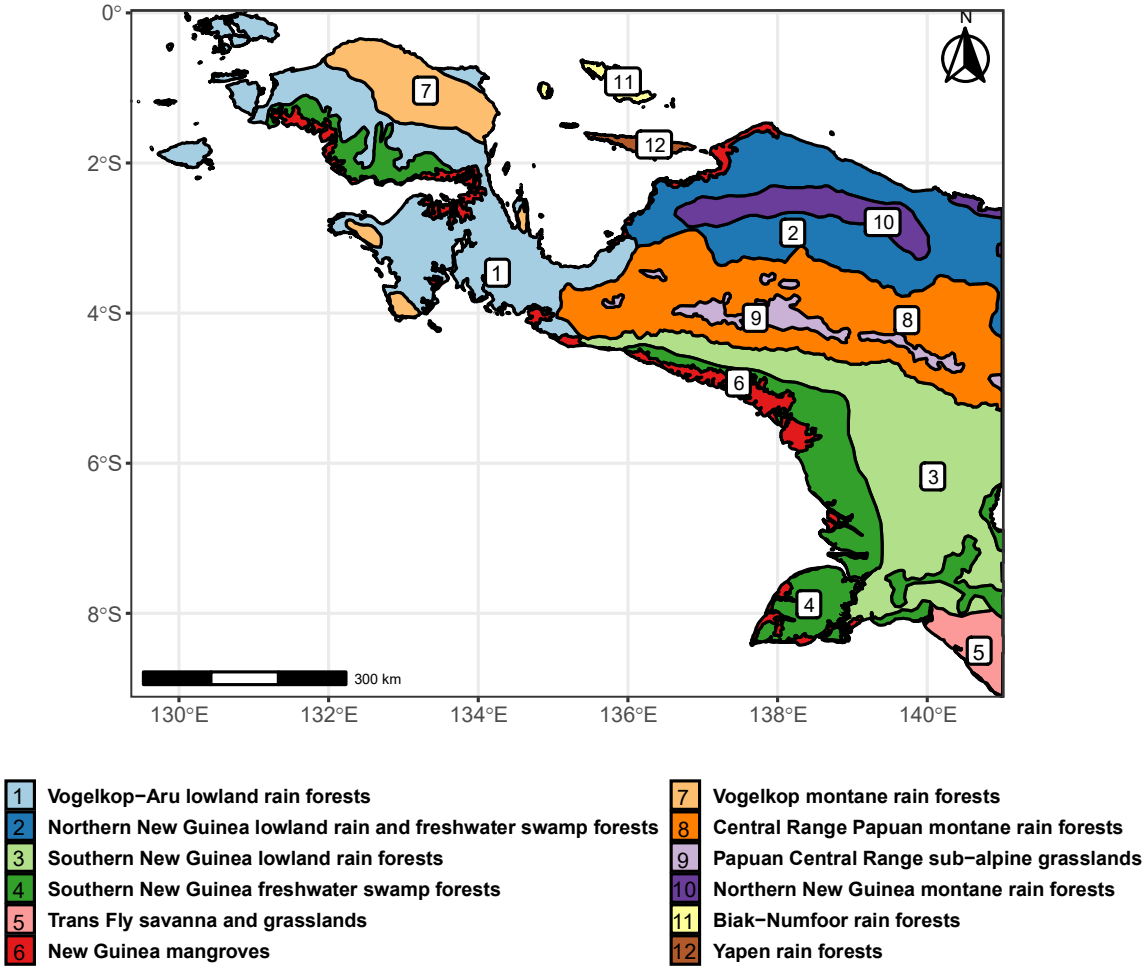
Ecoregion	% of total land area	Class	Land designation	% of total land designation	% of total ecoregion	ratio of land designation area to total land area
	0.62	Islands	Concession	<1	0	0

Biak-Numfoor rain forests			Protected Area	<1	18	0.11
			No Designation	1.05	82	0.51
Central Range Papuan montane rain forests	18.33	Montane	Concession	2.26	3.79	0.70
			Protected Area	24.40	27.15	4.98
			No Designation	25.92	69.06	12.66
New Guinea mangroves	4.86	Lowland	Concession	3.30	20.87	1.01
			Protected Area	6.10	25.61	1.25
			No Designation	5.33	53.52	2.60
Northern New Guinea lowland rain and freshwater swamp forests	14.60	Lowland	Concession	17.06	35.94	5.25
			Protected Area	15.83	22.13	3.23
			No Designation	12.53	41.93	6.12
Northern New Guinea montane rain forests	4	Montane	Concession	4.09	30.84	1.26
			Protected Area	4.05	20.27	0.83
			No Designation	4.08	48.88	1.99
	2.39	Montane	Concession	<1	0	0.00
			Protected Area	6.75	57.61	1.38

Papuan Central Range sub-alpine grasslands			No Designation	2.08	42.39	1.01
Southern New Guinea freshwater swamp forests	12.31	Lowland	Concession	13.08	32.65	4.02
			Protected Area	10.23	16.95	2.09
			No Designation	12.71	50.4	6.21
Southern New Guinea lowland rain forests	18.60	Lowland	Concession	30.73	50.84	9.45
			Protected Area	6.23	6.84	1.27
			No Designation	16.10	42.32	7.86
Trans Fly savanna and grasslands	2	Lowland	Concession	<1	7.38	0.15
			Protected Area	4.99	50.48	1.02
			No Designation	1.74	42.14	0.85
Vogelkop montane rain forests	16.3	Montane	Concession	1.99	11.62	0.61
			Protected Area	12.95	50.03	2.64
			No Designation	4.15	38.36	2.03
	5.28	Lowland	Concession	27.00	50.8	8.30
			Protected Area	6.55	8.17	1.34

Vogelkop-Aru lowland rain forests			No Designation	13.73	41.03	6.71
Yapen rain forests	0.57	Islands	Concession	<1	<1	0
			Protected Area	1.36	48.42	0.28
			No Designation	<1	51.4	0.29

Supplementary Figures



Supplementary Figure 1. Tanah Papua's twelve Ecoregions according to Dinerstein et al. (2017). Numbers align with Fig. 2 of the main text.

Literature

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