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Newly Discovered Orangutan Species Requires Urgent Habitat Protection

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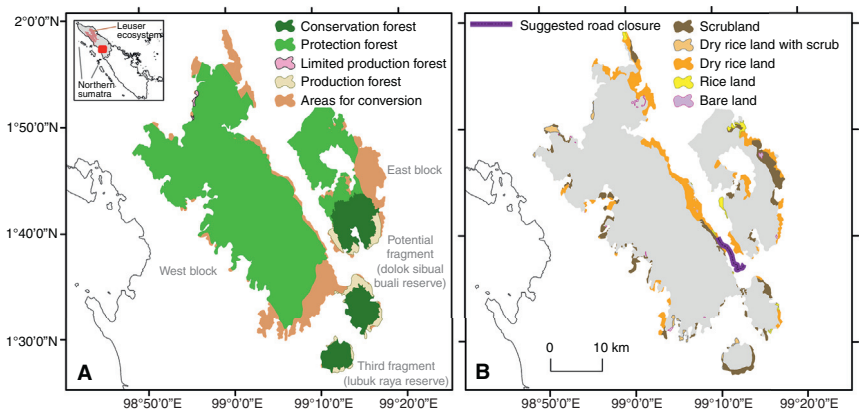

Figure 1. The estimated range of *Pongo tapanuliensis* in northern Sumatra, Indonesia, shown as a function of (A) legal forest-use designations, and (B) non-forest land covers. (A) Both 'conservation forest' and 'protection forest' prohibit forest exploitation and conversion. The 'production forest' designations allow selective logging (with lesser intensities where 'limited') and prohibit forest conversion, although in practice such conversion often occurs [5]. (B) Scrubland' and the various rice-cover classes are largely comprised of agricultural-forest mosaics and patchworks of regrowth forest.

Nater, *et al*. [1] recently identified a new orangutan species (*Pongo tapanuliensis*) in northern Sumatra, Indonesia—just the seventh described species of living great ape. The population of this critically-endangered species is perilously small, at only ~800 individuals [1], ranking it among the planet's rarest fauna. We assert that *P. tapanuliensis* is highly vulnerable to extinction because its remaining habitat is small, fragmented, and poorly protected. While road incursions within its habitat are modest—road density is only one-eighth that of northern Sumatra—over one-fifth of its habitat is zoned for agricultural conversion or is comprised of mosaic agricultural and regrowth/degraded forest. Additionally, a further 8% will be affected by flooding and infrastructure development for a hydroelectric project. We recommend urgent steps to increase the chance that *P. tapanuliensis* will persist in the wild.

Remaining habitat for *P. tapanuliensis* is threatened by forest fragmentation, habitat degradation, and conversion that are slated to continue. These are critical factors for the survival of large primates, and particularly Sumatran orangutans, including *P. tapanuliensis* [2]. Presently, individuals of this species are divided among three forest fragments in the Batang Toru region of Sumatra (Figure 1A). Based on population-viability simulations, subpopulations of Sumatran orangutans must number >200 individuals to remain viable in the medium term (100 years), and >500 individuals to ensure long-term stability [3]. Thus, further habitat fragmentation, degradation, or conversion would severely undermine the survival of *P. tapanuliensis.*

The remnant habitat has persisted because its topography has discouraged road penetration and associated human pressures [2,4]. Roads are a primary factor of forest degradation, loss, and wildlife poaching regionally [2]. We assessed the distribution of all official and unofficial roads in northern Sumatra via visual interpretation of Google Earth imagery and available government maps [5]. Within the *P. tapanuliensis* habitat (1195 km^2) [1], official and unofficial roads have a low mean density of 0.19 km/km^2, compared to 1.58 km/km^2 across the rural and forested areas of northern Sumatra (North Sumatra and Aceh Provinces; Table S1, Figure 1A). Road density within *P. tapanuliensis* habitat is also lower than that of the nearby Leuser Ecosystem (Table S1), a national strategic area for ecological protection sustaining 89% of remaining habitat for the Sumatran orangutan (*P. abelii*) [4]. Despite its importance, the Leuser Ecosystem faces major road developments that imperil its wildlife and their habitat [2,5].

The habitat of *P. tapanuliensis* is far from fully intact. The species' range comprises two larger forest fragments (hereafter, "West Block" and "East Block") and a third, smaller fragment comprised by the Lubuk Raya reserve (Figure 1A). The two larger fragments are separated by roadways and agricultural lands and are threatened by further conversion. Furthermore, a corridor of the West Block is nearly bisected by roads and associated incursions, with only a ~700 m-wide segment remaining uncut (Figure 1A). If this corridor is lost, the species' range will become even more fragmented, as the habitat defined by the Dolok Sibual Buali reserve would become isolated (Figure 1A). This new fragment would contain ~5% of remaining habitat. Population-viability simulations [3] and estimated orangutan densities [2] suggest that neither this new fragment nor that defined by the Lubuk Raya reserve (Figure 1A) could retain viable orangutan populations. Orangutan densities are relatively low across the remaining habitat [2], underscoring the importance of retaining large, contiguous habitats.

Without rapid action to limit conversion and restore key habitat, the long-term survival of *P. tapanuliensis* is in serious doubt. Forest-use designations in Indonesia are fundamentally orientated towards exploitation, so that threatened-species ranges typically overlap a hodgepodge of forest designations and concessions intended for logging, mining, and oil palm, among others [4,5]. Approximately 14% of *P. tapanuliensis* habitat is zoned for agricultural use and thus eligible for forest conversion [6] (Figure 1A). Alarmingly, this area includes more than one-fifth of the East Block and all of the West Block

corridor leading to the Sibual Buali reserve (Figure 1A). Other parts of *P. tapanuliensis'* habitat are threatened by land degradation, with up to 14% characterised by agriculture-forest mosaics and patchworks of regrowth [7] (Figure 1B).

In northern Sumatra, forests tend to persist in steep uplands while the lowlands are converted for agriculture. Each fragment of *P. tapanuliensis* habitat has a small nucleus of intact upland forest designated for ecological conservation surrounded by a complex landscape mosaic—including forested lands and non-forest designations, areas of past or potential human incursion, and 'permanent' forest designations that have been illegally cleared. Indeed, both the Sibual Buali and Lubuk Raya reserves (Figure 1A) are highland refugia that are fully isolated from one another despite being situated within a single permanent forest-management zone, now widely converted. To help ensure the survival of this species, we advance three urgent recommendations for Indonesia's forthcoming Orangutan Action Plan. We focus on habitat integrity and protection, although conservation will also depend on other spheres, particularly hunting and community engagement.

First, all remaining *P. tapanuliensis* habitat should be immediately designated for strict protection. This might entail its redesignation as 'conservation forest', which would effectively gazette a new protected area under central-government management. However, given the failure of the 2007 Orangutan Action Plan and regional spatial planning [5], some local experts advocate instead for the expansion of 'protection forest'—a more common and less strictly regulated designation protecting hydrological function rather than biodiversity per se. This would allow a greater capacity to influence decisions at the local level, where most development proposals and forest concessions arise and are approved. Although either redesignation would legally prohibit further forest degradation and loss, these activities still occur commonly throughout Indonesia. For instance, small-scale agricultural conversion and rough roadways are observable in the protection forest of the East Block. Halting such activities is an urgent priority.

Second, cleared lands around the fragments (some being zoned for permanent forest management) must be restored as faunal corridors. There is potential to link the East and West blocks along narrow (~200 m-wide) corridors by restoring only a few hundred hectares of agro-forest mosaic—a land cover orangutans are known to use when free from hunting or human persecution [8]. Mosaic landscapes are relatively forested alongside the northern and southern reaches of the East Block, although some current agricultural activities would need to be decommissioned. The greatest challenge to connectivity is the roaded, riverine valley that separates the East and West Blocks. By far the most robust action would be to close a segment (~5-9 km) of the existing roadway between the East and West Blocks (see purple line, Figure 1B). This would markedly increase population connectivity with limited socioeconomic cost, given that settlement and agriculture here are sparse and that an alternative road route exists south of the West Block. If this segment were closed, orangutan movements between the East and West Blocks should be possible because forest-canopy connections span the river locally. Additional strategies, such as inexpensive rope bridges (which have helped orangutans cross rivers [9]) and more costly translocations [10], might also facilitate movements.

Finally, the proposed hydroelectric project should be cancelled. This project would alter at least 8% (96 km^2) of high-quality orangutan habitat by 2022. It would likely preclude connections between the West and East Blocks as well as the Sibual Buali Reserve, and aggravate threats to populations, such as inbreeding and demographic stochasticity [1,10]. In addition to forest losses and isolation from flooding, hydropower projects often provoke a suite of further land-use changes via the roads required for construction and maintenance. We therefore underscore the extreme inadvisability of this proposed project.

SUPPLEMENTAL INFORMATION

Supplemental Information including one table, can be found with this article online at https://doi.org/10.1016/j.cub.2018.04.082.

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AUTHOR CONTRIBUTIONS

W.L. conceived of the research; S.S. performed the analysis; S.S., W.L., M.C. M.A. and J.S. wrote the manuscript.

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