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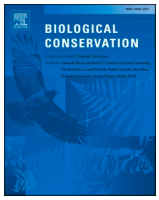

Short communication

Major mining road could be death knell for Sumatra's lowland rainforests

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In October of 2019, the Indonesian Ministry of Environment and Forestry gave approval for construction of an 88 km-long mining road through the Harapan Forest, an area with outstanding biodiversity values on the island of Sumatra, Indonesia (Diana, 2020). The road approval, granted to Indonesian mining firm PT Marga Bara Jaya, immediately prompted protests from scientists and conservation groups in Indonesia and internationally, as well as from indigenous communities residing within the forest (Diana, 2020; Engert et al., 2021). Construction of the road, which is yet to penetrate the Harapan Forest, is likely to cause significant loss of Sumatran lowland rainforest, a critically endangered ecoregion currently represented by only around 3 % of its original extent (Fig. 1) (Laumonier, 1997; Olson et al., 2001).

While road construction is expected to destroy over 400 ha of the Harapan rainforest, the expected indirect impacts of the project are of even greater concern. These potentially include many thousands of hectares of additional forest loss via illegal or unofficial land clearing associated with the road (Diana, 2020; Engert et al., 2021). The road would also likely promote illegal mining, logging, poaching, and wildfires within the Harapan Forest (Laurance et al., 2009; Alamgir et al., 2017). If the severely degraded Tesso Nilo National Park in central Sumatra can be used as an indicator (Poor et al., 2019), the proposed road might even spell the end of the Harapan Forest entirely.

Compared to forests in Amazonia or Borneo, the Harapan Forest has received very little attention in the media and scientific communities. Nonetheless, the 77,000-ha forest has outstanding biological values. It is the largest surviving tract of Sumatran lowland rainforest, harboring about 20 % of what remains of this critically endangered ecoregion. Similarly, the Harapan Forest is crucial habitat for thousands of plant and animal species, including over two thirds of Sumatra's frog species (Diana and Jong, 2021). The forest is also a vital refuge for critically endangered Sumatran tigers, Sumatran elephants, and Sunda pangolins (Fig. 2; Diana and Jong, 2021). As such, the loss or severe disruption of the Harapan Forest could imperil an entire ecoregion as well as numerous threatened, charismatic, and biologically important species.

Road construction within the Harapan Forest also represents a significant undermining of Indonesian Forestry law. In particular, the road contradicts existing regulation (P.23/2019 of the Ministry of Environment and Forestry) that stipulates that strategic road placement is essential to minimize negative environmental impacts in state forests (Ministry of Environment and Forestry, 2019a). Both the Indonesian environmental group FORMAPHSI (Diana and Jong, 2021) and international scientists (Engert et al., 2021) have proposed alternative, lower-impact routes that take advantage of existing roads outside the Harapan Forest, allowing the project to conform to the aforemention regulation. FORMAPHSI have even submitted their proposal to Indonesian President Joko Widodo, to no avail.

Construction of this mining road within the Harapan Forest would not have been possible prior to revision of Indonesian government legislation in 2019 (with Regulation No. 27/2018 transformed into Regulation No. 7/2019) that significantly weakened national forest protections (Hermawan, 2020). The 2019 revision allows development within state forests to promote a long list of 'strategic goals', including

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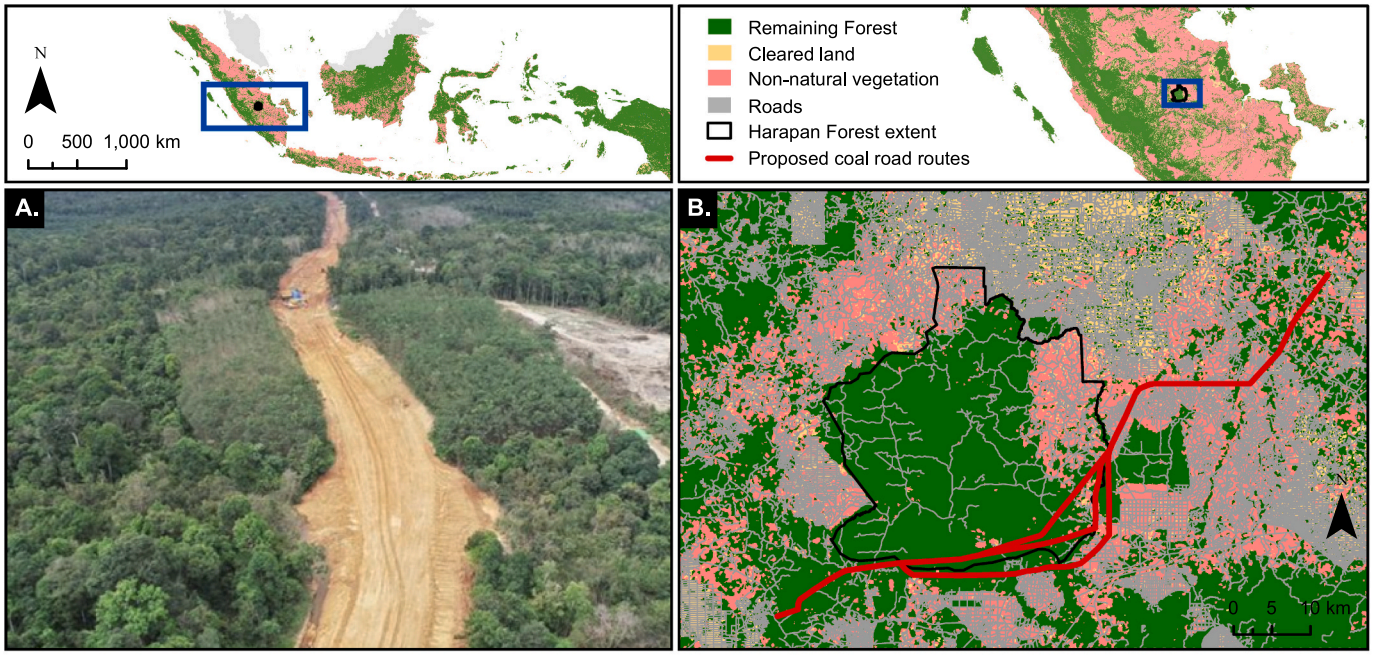

Fig. 1. The Harapan Forest is an 'island' of intact forest in a 'sea' of modified land. (A) Aerial photo of preliminary land clearing for construction of the 88 km-long road (Photo credit: Erwan Hermawan, Tempo). (B) Map of land use in the region surrounding the Harapan Forest and locations of proposed mining road routes (modified from Engert et al., 2021).

Fig. 2. The Harapan forest is an important refuge for critically endangered species, including (left) Sumatran elephant (*Elephas maximus sumatranus*, photo credit William Laurance), and (right) Sumatran tiger (*Panthera tigris sondaica*, photo credit Sumatran Orangutan Conservation Programme).

development of industrial mines and supporting infrastructure, certain agricultural land uses, and roads for transportation of bulk products (Ministry of Environment and Forestry, 2019b). Across Indonesia, tens of millions of hectares of state forest fall within land-use classes covered by this regulation (Ministry of Environent and Forestry, 2020). With such an extensive list of destructive land-use practices permitted, this new regulation must be seen as a major setback for Indonesian forest conservation.

Approval of the coal-road project within the Harapan Forest by the Indonesian Ministry of Environment and Forestry could push Sumatra's imperiled lowland rainforests, and the many species they harbor, markedly closer to the brink of extinction. Failure to protect the last remnants of this hyperdiverse ecosystem, along with downgrading of many environmental protections by the Indonesian government (Jong, 2021), should sound an urgent warning for the future of imperiled rainforests in Sumatra and beyond.

CRediT authorship contribution statement

Jayden Engert: Conceptualization, Writing – Original Draft. **Hariadi Kartodihardjo:** Writing – Review & Editing. **William Laurance:** Supervision, Writing – Review & Editing.

Declaration of competing interest

No conflict of interest has been declared by the authors.

Data availability

No data was used for the research described in the article.

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