

Impact of Environmental Changes and Diversity of Mosquitoes on the Emergence and Transmission of Vector-Borne Diseases in South Sumatra, Indonesia

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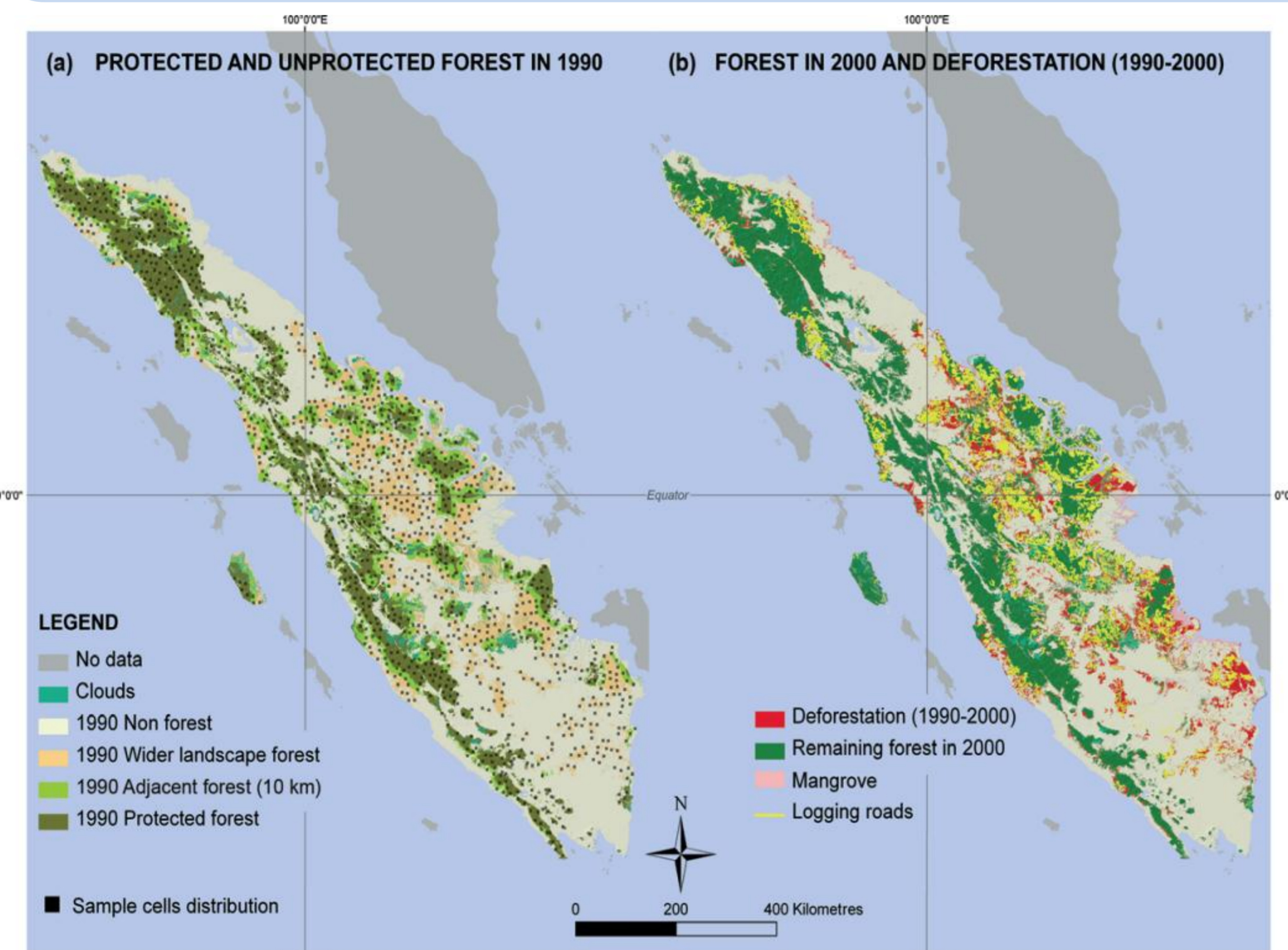


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Background & Objectives: Human-induced environmental changes have been primary drivers of disease outbreak and emergence events and can modify the transmission of infections. Land use changes have complex risks and benefits for human health. However, there are major knowledge gaps regarding this issue. Here, we address one of these which is geographical in the sense that very few modern studies on this topic have been carried out in Asia, and none in Indonesia.



Map 1: Trend of deforestation in Sumatra Island, Indonesia (Gaveau et al. 2009).

Methods:

1. Mosquito collection along eco-altitudinal gradients
2. Morphological taxonomic identification
3. Molecular taxonomy identification/characterization
4. Pathogen screening using PCR and RT-PCR
5. Molecular testing for insecticide resistance mutations
6. Blood meal analysis using PCR and sequencing
7. Ecological niche modelling
8. Development of risk maps and identification tools

Statement of the Problem: Prominent disease emergence and re-emergence events that are associated with human-induced environmental changes in Asia include Nipah virus encephalitis and simian malaria in Malaysia.

Uncontrolled land use has been suggested to act as a catalyst to changes in disease vector domination and the introduction of new pathogens. Mosquito vectors seem particularly sensitive to ecological change. Environmental alteration can lead to significant changes in the composition and population dynamics of mosquito communities.



Fig. 1: Destruction of natural rainforest to make way for pulp plantation (DGI 2011).

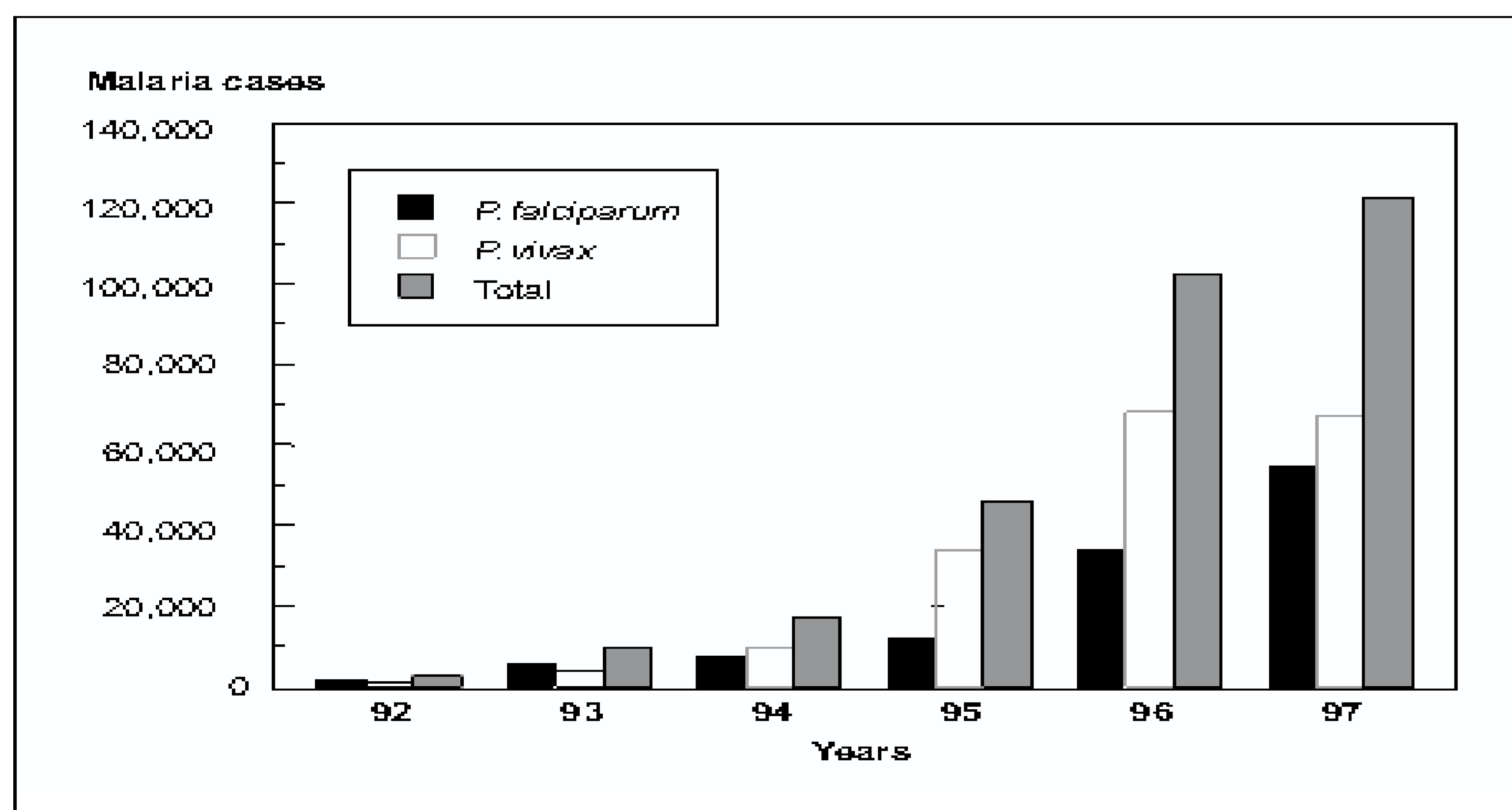


Figure 1: Malaria re-emergence incidence after deforestation in Peru (Guarda et al. 1999).

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