The role of lemurs and other frugivores as facilitators of ecological restoration in the Ambatotsirongorongo Protected Area, south-east Madagascar

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Summary

The Ambatotsirongorongo Protected Area in the Lavasoa-Ambatotsirongorongo mountains (Figure 1), is home to a collection of small forest fragments (Lavasoa, Bemanasa and Ambatotsirongorongo), the remnants of what was once a continuous forest in the extreme south of Madagascar. Characterised as a transitional habitat comprising of a combination of flora characteristic of both humid and spiny forests[1], these fragments support a unique array of wildlife that traditionally occupy separate habitats. From a primatological perspective, there have been ten species of lemur reported within these fragments, seven of which can usually be found in humid forests, and three which occur in dry spiny forest[2] (Table 1). The conservation importance of these fragments is compounded by the fact that they are one of the last refuges of the Bemenasy mouse lemur (*Microcebus manitatra*) and Lavasoa dwarf lemur (*Cheirogaleus lavasoensis*), both of which have been included on the list of the World's 25 Most Endangered Primates in the last decade[3], and nine of the ten lemur species found in this area have been designated as Endangered or worse on the IUCN Red List[4]. The forests also provide vital resources for local people who rely on them for their livelihoods but destructive anthropogenic activity, primarily illegal logging, threatens these fragments and the unique biodiversity they support[5]. In 2021 a reforestation programme, funded by the search engine Ecosia, was launched by Tropical Biodiversity and Social Enterprise (TBSE, Madagascar), Oxford Brookes University and University of Hamburg with the aim of restoring and connecting the forest fragments within the Ambatotsirongorongo Protected Area[3].

The purpose of my PhD research is to contribute to guidelines of good practice to facilitate the role of seed dispersers in the ecological restoration at Ambatotsirongorongo. Specific objectives of the research are:

1. To conduct vegetation surveys to quantify the floristic composition and phenology of the Ambatotsirongorongo Protected Area

2. To conduct focal tree observations and install camera traps to identify key seed dispersers

3. To conduct germination trials on digested and undigested seeds to explore the effect of gut passage on seed germination

I received a conservation grant from PSGB for the initial season of fieldwork (June-August 2024), where I primarily addressed the first objective. A key aim of the tree planting initiative is to encourage lemurs and other frugivores into the plantation zones to facilitate seed dispersal and natural regeneration, and so recording the current floristic diversity and composition of the remaining forest is crucial baseline data. Vegetation plots (10m x 100m) were established at 200m intervals across 8 transects in the two largest forest fragments. With the assistance of local plantsmen, the vernacular names of all trees within the plots with DBH (diameter at breast height) >5cm were recorded. We also began to tag trees to monitor for the phenology (the annual cycle of flowering and fruiting), aiming to tag at least 5 trees per species across all transects. Work has begun on pairing the local names for these plants with their botanical names by using plant lists complied by TBSE. Together, these data will allow a comparison of the vegetation between the main fragments

and other forests in the region, and identification of species to include in the tree planting project. Additionally, after the results of seedling survival monitoring in the plantation zones conducted by TBSE in early 2024, we decided that seedling survival experiments would be beneficial to test the suitability of tree species to different planting locations (e.g. distance from forest edge, aspect, etc.) to maximise the survival of the seedlings. Potential test sites and species to include in the experiment were identified in the first fieldwork season, and planting is due to take place from February 2025, the heart of the rainy season in Madagascar.

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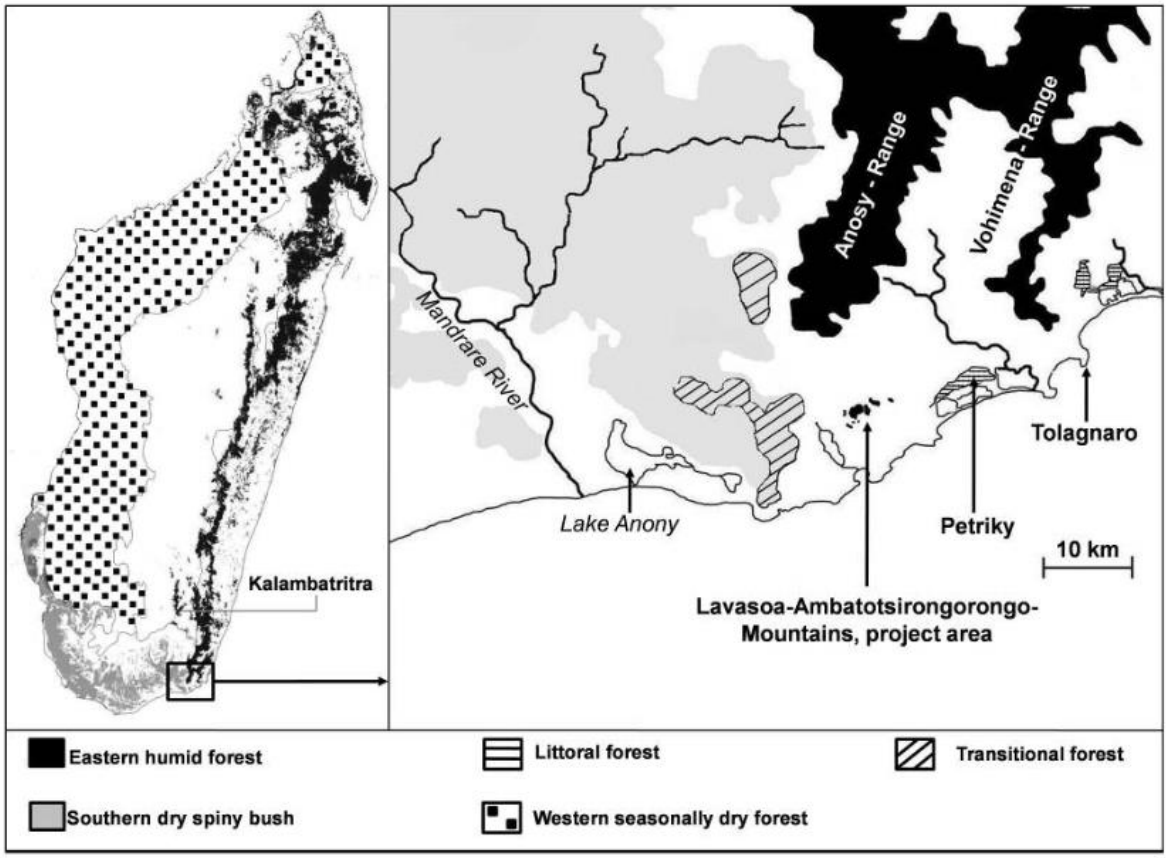

Figure 1: Location of the Lavasoa-Ambatotsirongorongo mountains, Southern Madagascar (after Andrianjaka and Hapke, 2015)

Table 1: Lemurs found with the Ambatotsirongorongo Protected Area

Lemur species	**IUCN Red List Status**	**Typical Habitat**
Avahi meridionalis	Endangered	Humid forest
Cheirogaleus lavasoensis	Endangered	Humid forest
Cheirogaleus thomasi	Endangered	Humid forest
Daubentonia madagascariensis	Endangered	Humid forest
Eulmur collaris	Endangered	Humid forest
Hapalemur meridionalis	Vulnerable	Humid forest
Lemur catta	Endangered	Dry forest
Microcebus manitatra	Critically Endangered	Dry forest
Microcebus tanosi	Endangered	Humid forest
Propithecus verreauxi	Critically Endangered	Dry forest

Figure 2: Looking east over the fragment of Bemanasa