Project Update: March 2023

After a delay in starting the project due to Covid-19 travel restrictions, I managed to enter Indonesia in July 2022. I was able to start the field work at the beginning of August after 2 weeks in Jakarta, during which I had to go through the mandatory post-arrival procedure to obtain all the necessary documentation to apply for various permits (limited stay permit - KITAS, permit for entering conservation areas – SIMAKSI, and the permit for collecting and delivering research samples - SATDN & SATLN). For this reason, I carried out the bulk of data and samples collection from August 2022 to January 2023. During this period, in collaboration with the staff of the Bantimurung Bulusaraung National Park (TNBABUL), I set up and surveyed 24 stratified-random plots (Figure 1), with a standard size of 30 ha, to cover the entire landscape variability of the National Park area (437 km²).
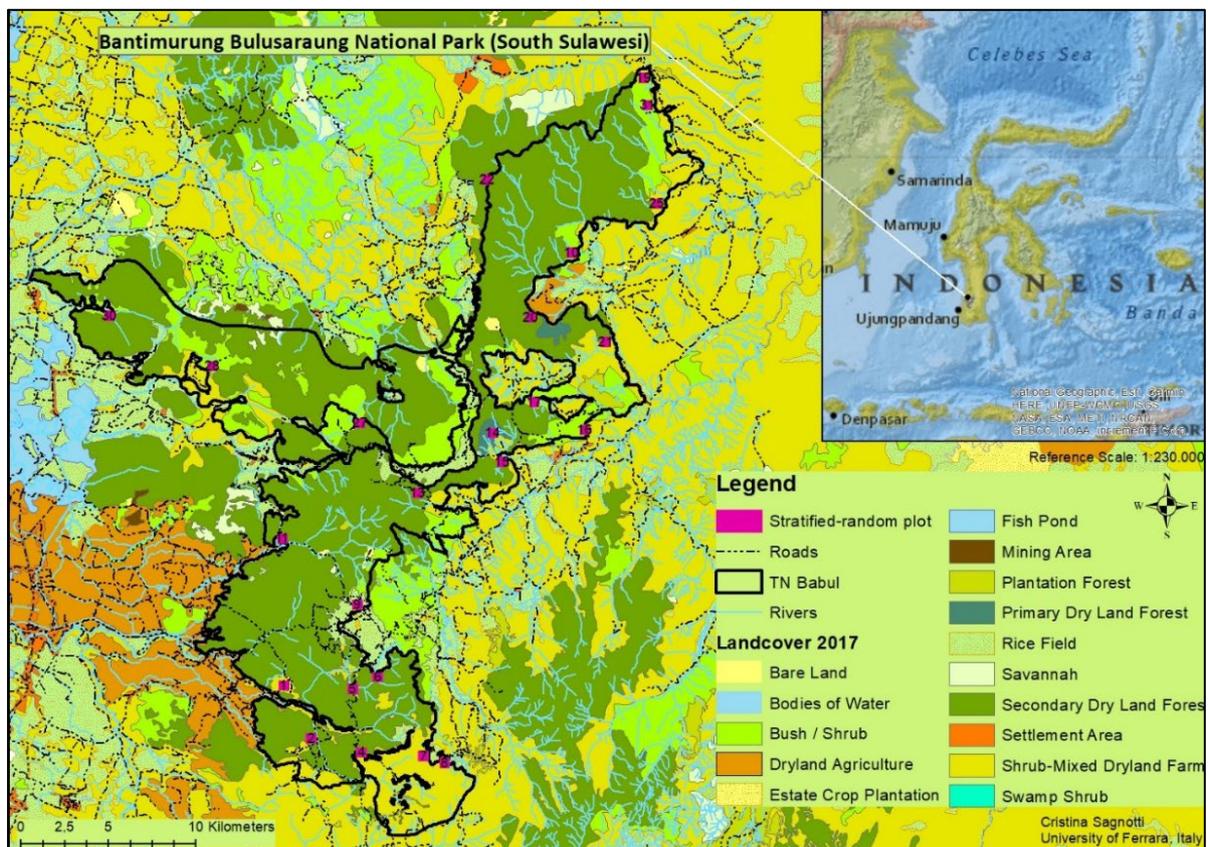

Fig.1 | Distribution of the 24 stratified-random plots in the Bantimurung Bulusaraung National Park (South Sulawesi, Indonesia).

Thanks to the 1st Rufford Small Grant I was able to involve one experienced ranger, who helped me in organising the expedition other than collecting data and faecal samples in each plot, and 34 further people (both rangers and locals), who participated during the survey in groups of 2-4 per plot. Since rangers in different geographical sectors of the national park (Resort Pattunuang, Pangkep, Camba, Bantimurung and Mallawa), the involvement of these groups of people allowed the survey protocol setting up for each area with properly trained staff. This will allow the TNBABUL to independently monitor trends in moor macaque populations in the coming years. The involvement of locals has instead made it possible to raise awareness among the TNBABUL villagers on the importance of conserving this endemic species of South Sulawesi (Figure 2).

Fig.2 | Top left: Local villagers involved in the project while looking for macaques in their cropland. **Top right:** Group photo with the staff during the last meeting at the TNBABUL headquarters. © Rendy Ansyah). **Bottom:** Group photo with 3 rangers and 2 local villagers involved during the survey in the northeast area of the TNBABUL.

At the end of the sampling period, we obtained 247 occurrence points, 194 faecal samples, and encountered a total of 30 moor macaque social groups (Figure 3).
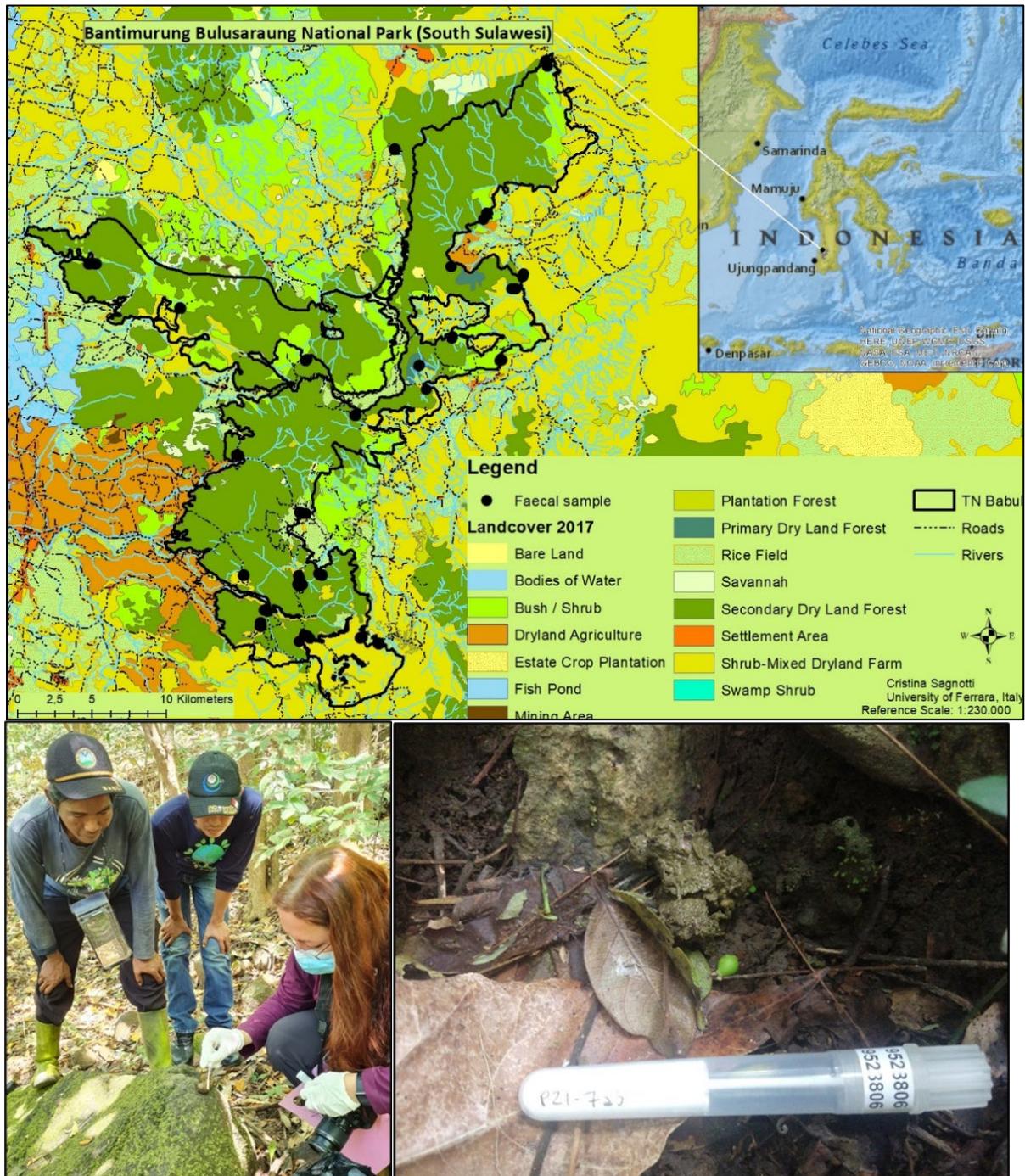
Fig.3 | Top: Distribution of the 194 faecal samples in the TNBABUL. **Bottom left:** Faecal sample collection procedure with the Genotube Livestock Swab. © Sulkarnain. **Bottom right:** Faecal sample before collection.

Each faecal sample has been georeferenced and collected using the Nsubuga and colleagues (2004) protocol (two-step method) and two GenoTube Livestock Swabs (replica A and B). To avoid DNA degradation, I regularly carried out DNA extraction of all faecal samples collected during each plot survey (around 1 day of lab working per week) at the Entomology, Zoonotic and Emerging Diseases Lab, Faculty of Medicine, Hasanuddin University (Makassar) in collaboration with Dr. Isra Wahid (Figure 4). Since we plan to test different genotyping protocols, I replicated the DNA extraction in 48 samples, resulting in a total of 242 DNA samples extracted with the DNeasy Blood & Tissue kit (QIAGEN).

All the samples collected with the two-step method and all the replicates B of the same samples collected with the Genotube Livestock Swabs are stored at the Entomology lab, while all the DNA samples extracted from the replica A have been shipped to Italy for the next genotyping phase.

Fig.4 | Entomology, Zoonotic and Emerging Diseases Lab, Faculty of Medicine, Hasanuddin University (Makassar). **Top left:** Group photo with the lab's students. © Ridwan. **Top right:** Dr. Isra Wahid during export permit procedure at the BKSDA (Balai Besar Konservasi Sumber Daya Alam) office, Makassar. © Rusman. **Bottom left:** Faecal samples during DNA extraction. **Bottom right:** DNA samples ready for the shipment.

During the survey, to identify the level of anthropogenic disturbance in each plot, I opportunistically collected data about the presence of croplands, deforested areas, traps, anthropogenic food provision, etc. (Figures 5, 6, and 7). I assigned a value on a scale from 1 to 6:

- Level 1 = absent or negligible level of anthropic disturbance (Figure 5).

- Level 6 = maximum level of anthropic impact due to evident traces of human-macaque conflict such as traps, anthropogenic food provision, etc. (Figure 6 and 7.a).

Intermediate levels are characterised by a moderate presence of croplands or deforested areas without evidence of direct human-macaque conflicts (Figure 7.b and 7.c).
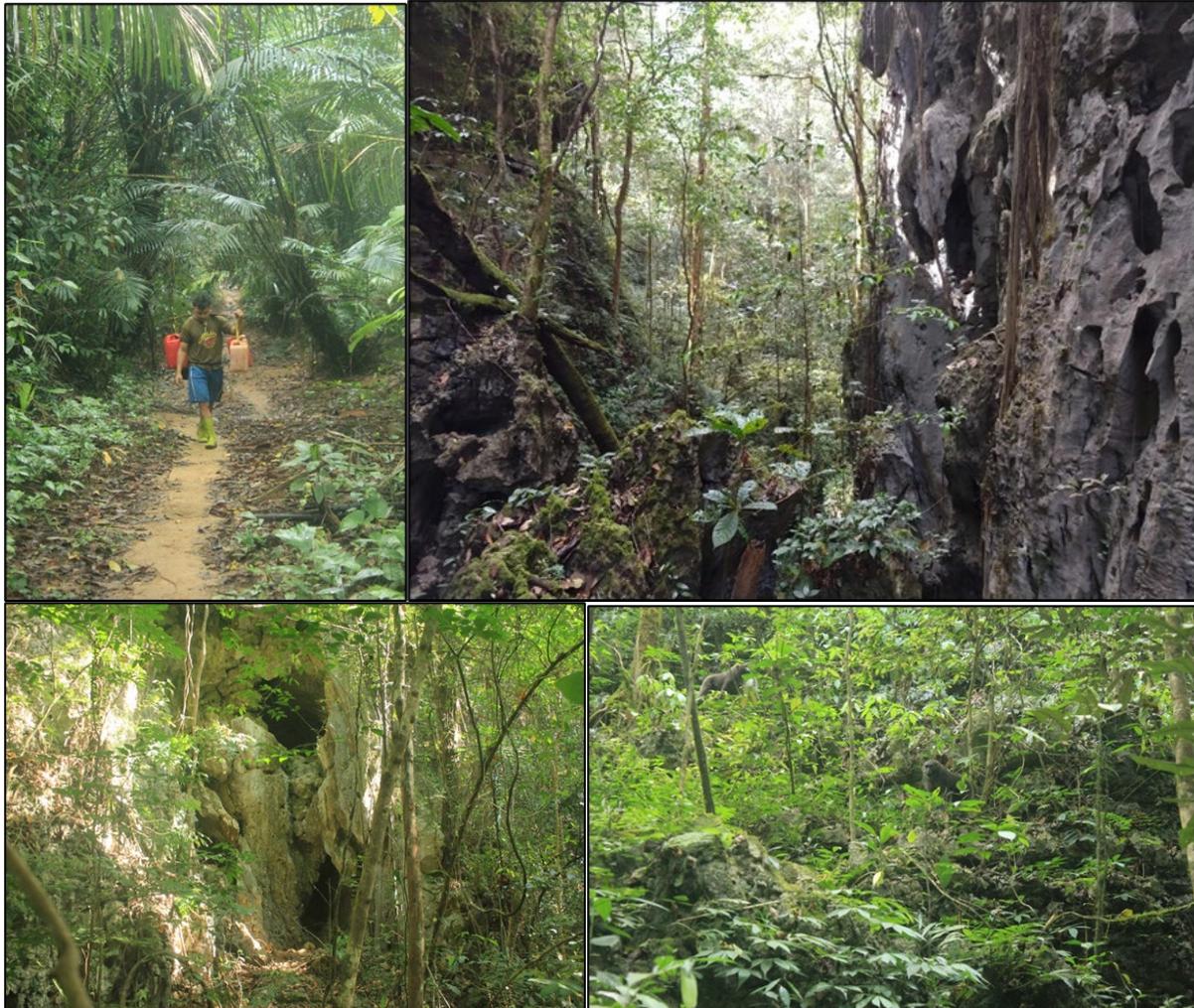
Fig.5 | Example of plots classified as level 1 of anthropogenic disturbance (with absent or negligible level of anthropic impact). **Top left:**, The human activity within the plot (production of sugar and palm wine) does not involve any conflict with the moor macaques inhabiting this area. **Top right, Bottom left & Bottom right:** Intact karst forest ecosystem with several moor macaques' social groups and no traces of human presence.
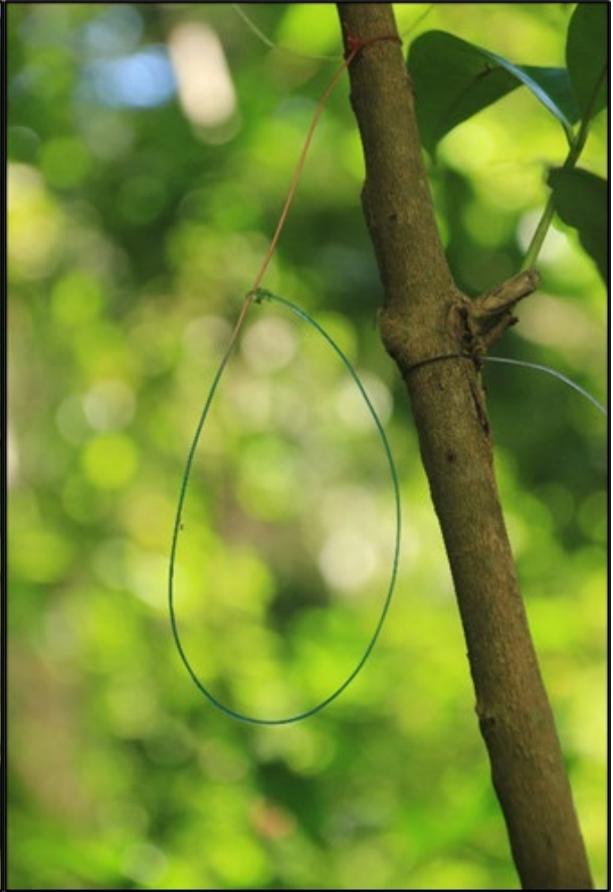
Fig. 6. Different types of macaque traps found during the survey in plots consequently classified as anthropogenic disturbance level 6.

Fig.7 | **Top:** Site of anthropogenic food provision along the main road bisecting the south part of the TNBABUL. **Bottom left:** Example of forest clear cutting for cattle shelter. **Bottom right:** Cropland inside a stratified-random plot in the south part of the TNBABUL.

I already carried out two presentations at the TNBABUL, showing preliminary results of the survey, and a presentation at the Department of Life Sciences and Biotechnology at the University of Ferrara. During each presentation I used the Rufford Foundation logo to acknowledge the support (Figure 8).

The next steps of the project will consist in the analysis of occurrence data to produce the habitat suitability map and the genotyping of the DNA samples.

Fig.8 | Preliminary results presentations at TNBABUL and University of Ferrara.