



WRL reference	M04 D03
Module	M04 Ecosystems – Tropical Rainforests
Data set	D03 The effect of altitude on dung beetle community structure

Research questions/tasks:

1. How do you identify the different species of dung beetle
2. What is the effect of altitude on dung beetle community structure?
3. What other environmental and habitat variables might affect dung beetles?

Answer and discussion to the research questions and tasks:

Task 1: Beetle identification

In the research folder open - **Dung beetle genus species list** – for a detailed breakdown of the ID task, open **ID full answers**

Research Question 2: What is the effect of altitude on dung beetle community structure?

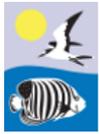
Both abundance and richness of the dung beetle community as a whole decrease with increasing elevation. Within guilds the response is less clear, but generally shows a decrease across all guilds. In general, temperature decreases with altitude, between 5.5 and 6.5°C with every 1000m. Lower temperatures mean fewer mammals to produce dung, less productive flora to produce vegetative detritus to feed on, and lower metabolic rates for invertebrates, so higher habitats can support fewer species and fewer dung beetles in total. Precipitation and temperature range also vary with altitude, so these might also affect dung beetles or the producers of their food.

Task 3: What other environmental and habitat variables might affect dung beetles?

In a tropical montane (mountain) cloud forest, there is also considerable habitat change over altitude, from broad leaf and pine to dwarf forest at the highest elevations. High places tend to be more affected by wind, causing more natural disturbance creating canopy gaps and open spaces, which insects often don't fly across to avoid predation. However, high places are also more likely to be in cloud for longer, which results in more water condensation and higher growth rates for plants, especially plants such as epiphytes. Higher plant growth rates could then support more diverse insect and animal communities. There is an incredibly complex set of interactions between the environment and the tropical forest community because dung beetles are so widely linked to both the producers of their resources and also to the ecosystems they support and it is very difficult to make clear predictions and find clear results in environments such as this. Most of the other variables measured will show only minor effects, if any, on dung beetle communities.

Interactions between variables are probably very important such as dung beetles may prefer softer soils, but only in areas where rainfall is low enough to prevent them becoming easily waterlogged. In areas of high tree and understory density, overall temperature variation may not be felt because of the buffering effect of the vegetation. Furthermore, different components of the dung beetle community may respond differently to different variables, in ways that our groupings may not reflect – for example, high leaf litter density might dissuade teleocoprids (rollers) because of the





wallace resource library

brought to you by Operation Wallacea

difficulty of moving dung away, but attract paracoprids (tunnellers) because the ground is well sheltered and supplied with nutrients, possibly resulting in a cancelling effect!

Accounting for which variable is the most important is a very difficult task to measure.

For further ideas see **Variables discussion Table** in the Research folder.



Operation Wallacea | www.opwall.com | info@opwall.com

These data were gathered from the Opwall Honduras expedition: <http://opwall.com/sixth-form-high-school/locations/honduras-school-expeditions/> Copyright: these resources are the sole property of Operation Wallacea although they may be used freely for educational purposes within the classroom or for internal examinations. Further use will require permission which can be gained by email.