

**Luff, M. L. 1982.** Population dynamics of carabidae. *Annals of Applied Biology* **101**: 164-170.

**Southwood, T.R.E. and P. A. Henderson. 2000.** *Ecological Methods*, 3rd ed. Blackwell Science Inc., London, 575 pp.

**Southwood, T. R. E. 1966.** *Ecological Methods: With Particular Reference to the Study of Insect Populations*. Methuen & Co., London, 409 pp.

## **MY EXPERIENCES CONDUCTING RESEARCH IN NORTH SULAWESI, INDONESIA**

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I recently returned to Edmonton, Alberta to complete my Ph.D. thesis on the diversity of spiders in the cacao agroforests of North Sulawesi. I'm a native of that part of the world, so it was a wonderful opportunity for me to spend two years conducting spider research in my parents' hometown of Manado, North Sulawesi. Originally I had hoped to conduct this research in Southeast Sulawesi, the location of my home university. However, because of the political unrest in that part of Indonesia it was necessary to conduct my work in a safer place. My work has been sponsored by the Eastern Indonesia Universities Development Project, a project supported by the Canadian International Development Agency.

I spent the last month of the new millennium under the blazing sun, selecting study sites within four types of cacao agroforests that represent the typical gradient in cacao agroforest strategies in North Sulawesi. These ranged from pure monocultures to mixtures of cacao and other trees. It is assumed that the greater diversity of trees in the agroforestry stand types will provide the necessary structure to maintain generalist predator populations, thus minimizing the dependency on costly insecticides. However, the efficacy of these mixed stand strategies for pest management and for biodiversity protection is not known. In my Coconuts-Glyricidia-Cacao forest type, I established one site in Kima. This particular site is a 4 ha private cacao estate consisting of 17 years cacao, 13 years Glyricidia, and 40 years coconuts, 13.6 km from campus. The other one was in Pungkol that is the Coconuts-Glyricidia-Cacao type and the Glyricidia-Cacao type, 35 km from campus. It's a 600 ha private cacao estate with 10 years cacao, 12 years Glyricidia, and 10 years coconuts. Later on I was able to find two more sites, Paniki for the Coconut-Glyricidia-Cacao type, and Tiniawangko for three types; the Glyricidia-Cacao type, the Cacao Monoculture type, and the Natural Shade Trees-Cacao type. The first one is a 1.8 ha private cacao estate with 15 years cacao, 13 years Glyricidia, and 40 years coconuts, 10 km from campus. The second one is a 50 ha state cacao estate and 200 ha coconuts, about 150 km from campus.

I installed and maintained pitfall traps, and used a sweep net to sample the trees and the ground for spiders every other week in each of my nine sites. There was one site in Kima (the Coconuts-Glyricidia-Cacao I), one site in Paniki (the Coconuts-Glyricidia-Cacao II), three sites in Pungkol (the Coconuts-Glyricidia-Cacao III, the Glyricidia-Cacao I and the Glyricidia-Cacao II which were apart about 12 km with different elevation), and four sites in Tiniawangko (the Glyricidia-Cacao III, the Cacao Monoculture I and the Cacao Monoculture II which were apart by the main road and the Natural Shade Trees-Cacao). Therefore I was able to sample three replicates for the Coconuts-Glyricidia-Cacao, three replicates for the Glyricidia-Cacao, two replicates for the Cacao Monoculture, and only one replicate for the Natural Shade Trees-Cacao. That's the best I could achieve in North Sulawesi with regards to time, budget, safety reason for conducting the research, and permission from the owners to conduct my research in those sites.



**Figure 1.** The field crew in Kima. Sitting from left to right: Agus & Novly (my field assistants). Standing from left to right: the driver, Maxie (field assistant), me (Lusiana), Ferdinand (field assistant), Hamsy (works fo a cacao estate in Kima), and his son.

The day-to-day logistics were challenging in Indonesia, to say the least. North American researchers take transportation, laboratory and field work, and communication for granted, but in Indonesia, all of these activities are often times exercises in frustration. Public transportation to my research sites was either nonexistent or unreliable. My assistant and I often had to rent motorcycles to reach Kima and Paniki, a mere 13.6 km and 10 km from campus, respectively. To reach the more distant agroforest types in Pungkol and Tiniawangko, I had to hire more field assistants and most importantly, a driver to take us there (Figure 1). The driver was the most important member of my team. This was not lost on him because he negotiated a wage, free meals, and a steady supply of cigarettes. The road conditions to Pungkol were really bad: no hot mix asphalt but there were big holes scattered everywhere!! The road was worse during the rainy season because these potholes were hidden by a continuous layer of water across the road. Only an experienced driver can get into Pungkol without getting stuck during these conditions. I couldn't complain because Pungkol was penetratingly hot and steamy in the dry season. So, we enjoyed the rainy season by getting wet and muddy; this was our way to cool down. The road to Tiniawangko is also treacherous because it has a long, 'W'-shaped bridge that is almost now in pieces because of the big flood in November 2000. Every time we went over this bridge, we took deep breaths and prayed; even I was unwilling to sacrifice my life for spider research and my fellow travelers were less enthusiastic than I.

My laboratory and fieldwork supplies were either very expensive or unavailable in Manado. Because I needed a large supply of glass vials, cheese cloth, 70% alcohol, 40% formalyn, and twist ties for my collecting needs, I secured a deal in Jakarta. The problem was I had to wait one month or more to get them shipped to Manado. The direct flight from Manado to Jakarta requires four hours and, by boat, it takes 4-6 days depending how many ports are called. I couldn't delay my collections, so I was forced to occasionally purchase alcohol and formalyn in Manado at five times the price in Jakarta. I temporarily replaced the glass vials with 35 mm film canisters, and instead of using twist ties I used soft soldering wire - or whatever else worked out okay for me. Doing science in Indonesia is something akin to a sober form of improv.

At the University of Alberta I now receive free access to high-speed Internet and email. In North Sulawesi, I had only painfully slow computers in post offices or internet cafés at a rate of \$ 1.50 or Rp 7,500 per hour. It also cost approximately \$40 or Rp 200,000 (depending on the exchange rate) to send 200 mg worth of first class mail. Faxes and long distance calls from Indonesia to Canada were also very expensive largely because of the poor exchange rate.

The results from my research will hopefully be informative for anyone interested in the significance of web building and ground dwelling spiders in the various cacao agroforestry types and perhaps even on Sulawesi, in general. I also hope the results will be useful for farmers in private and state cacao estates who are concerned about cacao pests yet wish to minimize pest control costs. After I complete my degree, I will return to Southeast Sulawesi and will continue my research on spiders in Southeast Sulawesi.