

Balancing act

Daniel Donato and colleagues exercised their acrobatic skills while measuring mangrove carbon stocks.

■ What was the objective of the project?

We wanted to find out how much carbon is stored in coastal mangrove forests, especially in the deep, organic-rich soils that characterize these ecosystems. A few localized studies had suggested that the numbers could be quite large, which is important, as mangroves are being rapidly deforested across the globe.

■ Why did you pick the Indo-Pacific region?

The geography and diversity of mangroves peak where the Indian and Pacific oceans meet, so we thought our large-scale attempt to measure mangrove carbon storage should start there.

■ What sort of data were you after?

We wanted to determine both above- and below-ground carbon storage, so we examined forest structure, measuring parameters such as the density and diameter of trees, and we collected soil samples, which we took back to the lab. Because mangrove trees are typically perched on high stilt roots or buttresses, the tree measurements involved a lot of acrobatics — climbing, swinging and hanging several metres above the ground. But the soil samples proved the most difficult; we had to plunge a soil corer down to depths of several metres and then extract an undisturbed core. This would often require several attempts, after which the entire team would be covered in foul-smelling mud.

■ Did you encounter any difficulties?

You have to really want mangrove data. The air is hyper-humid, hot and smells like rotten eggs because of the anoxic soils. Every step requires concentration because you are walking on mud that is extremely slippery and sometimes waist-deep with little or no warning. As a result, you need to be comfortable swimming in both water and in mud. But you don't want to slip, because there



Measuring the diameter of a mangrove tree on the island of Borneo.

are large spiky roots protruding from the ground waiting to impale you. In other places, aerial roots are so densely tangled it takes 30 min to move just 30 m. On top of all this, there is a healthy dose of biting mosquitoes. We had fun with it all, though.

■ Any encounters with dangerous animals?

We were taken out of our comfort zone in this regard. The straightforward part was dealing with venomous tree and sea snakes, of which we encountered plenty. But mangroves are also a favourite haunt

of saltwater crocodiles, so we had to get out of the mangroves before the tide came in (choosing not to swim with crocodiles), which led to some unusual working hours, in both the day and night. We saw several crocodiles, but there were no close calls. Perhaps most noteworthy were the tigers. Mangroves on the Ganges River delta house the world's largest remaining tiger population, and people are regularly eaten — one person every three days, on average. We had to have armed guards with us (who also protected us from pirates, who frequent these waterways). Although we didn't see any tigers, they saw us: one member of the field crew found tiger tracks superimposed on top of their own; it had followed them towards the plot.

■ Any close misses?

We nearly burnt down a hotel in Borneo. We were drying samples in a locally purchased kerosene oven in a storage room of the hotel. One night while we were out the samples caught fire and filled an entire hotel floor with smoke. Disaster was only averted because of the heroics of the hotel staff and one of our team members, who somehow carried the flaming oven outside. We had to re-collect those samples.

■ What was the highlight of the expedition?

One principal highlight was the locals we worked with at each site. Local knowledge is really powerful. For example, our Borneo crew — indigenous forestry professionals of Dayak descent — could navigate with no map or GPS over endless kilometres of flat, seemingly featureless forest to relocate plots with submetre accuracy.

■ Did the trip give you any ideas for future research?

Now that we understand the magnitude of mangrove carbon stores, the next big question is what happens to the carbon during and after land-use change. At present we have projects in the works to tackle these questions in several regions.

This is the Backstory to the work by Daniel Donato and colleagues, published on page 293 of this issue.

