

Drones Are Changing Our Views



Photo by Yair Ben-Jacov

Out on Otter Survey



Canadian Organization for Tropical Education & Rainforest Conservation



In This Issue of Raphia

| | |
|----|--|
| 3 | Rescuing Snakes •• Lessons re-learned |
| 4 | Howlers •• The leaf-eating monkeys |
| 6 | Ten Weeks of Jungle Life •• Yair brings his drone to Caño Palma |
| 7 | Tracking Otters •• Ryan tracks otters on the South transect |
| 8 | The Impact of Research-based Tourism on the Tortuguero Area - Part 4 |
| 9 | How Conservation Saved Tortuguero •• A bit of history |
| 11 | Drones on the Beach •• Testing drones to detect nesting turtles and poachers |
| 13 | Station Happenings •• Report from research coordinator |
| 14 | Remittances Rising •• Their impact on Central American and Mexican economies |

Follow Us By Clicking On

Website - www.coterc.org

Facebook - [Station Caño Palma](#)

Facebook - [Canadian Organization for Tropical Education and Rainforest Conservation \(COTERC\)](#)

Instagram - [canopalmabiostation](#)

Twitter - [@coterc](#)

Eye of the Drone

Yair Ben-Jacov arrived at Caño Palma from the Netherlands with his own pic-snapping drone. Through his eyes and the eyes of the drone, we get a different view of our world. Just take a look at this issue's cover featuring an overhead shot of interns doing a measurement out on otter survey.

Drones are difference makers. New uses are regularly unveiled for everything from agriculture to firefighting to collecting whale snot non-invasively. ([Scientists use drones to collect whale snot | British Council](#))

As well, we're all concerned with recurring pollination failures as bees succumb to various diseases like colony collapse disorder. Pollination affects us all since it's necessary for much of our food production. Ongoing research into pollinating plants with the assistance of drones is providing solutions. Here's one company's story: [Dropcopter creates buzz with pollinating drones | Farm Progress](#)

The picture at top shows their drone spreading pollen over fruit trees.

All of which sparks the idea of using drones to patrol beaches in search of nesting turtles and poachers. On Page 11, you can learn how things are going on one beach in Costa Rica. DD

Previous issues of *Raphia* can be found at - <http://www.coterc.com/raphia-newsletters.html>

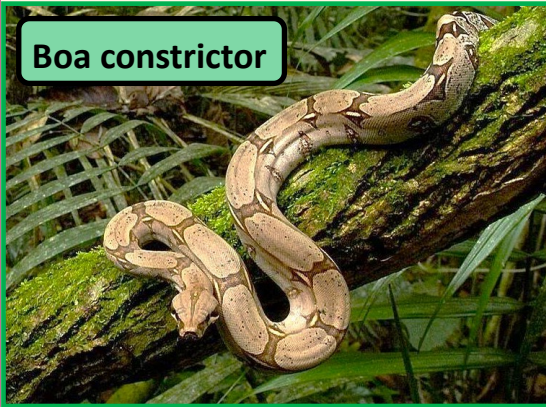
ISSN 2564-5927 (Online)
ISSN 1188-2425 (Print)

Rescuing Snakes in the Community -- Lesson Re-Emphasized

2010

Report from Mike Dunn, Caño Palma's station manager in 2009 and 2010, in the Winter 2010 issue of Raphia.

I was called over to San Francisco to catch a fer-de-lance (*Bothrops asper*) from a resident's house. I had two things on my mind: keeping the snake safe from the humans and keeping the people safe from the snake (most snakebite cases happen when a person is trying to kill a snake).



Amelia, the school-program coordinator, led me to the house where I observed a very scared boa constrictor. Villagers were giving it a wide berth. They gasped as I caught the snake with my

bare hands because they thought it was venomous. But a boa constrictor, as its name suggests, is a constricting (squeezing) snake with no need for venom. I told the crowd that the snake was harmless to people and they slowly came forward to see this intriguing animal.

Too often snakes are misidentified as venomous snakes and killed out of fear. Many totally harmless species have been killed when I was unable to reach houses in time to save them. Luckily on this occasion, I was in time, and the snake and the people were safe.

I took this opportunity to talk with the community about snake myths and snake safety. In the end, many of the children who were previously afraid of the snake were asking to hold it. Snakes have an amazing ability to dispel fear, often after a single touch, by being smooth and sleek instead of slimy and disgusting.

Conservation of all animals is important in all ecosystems and is vitally important to the future of humanity. One of the first steps that we can take is to remove our fear of nature and its inhabitants. We have lived with nature for all of our existence and still rely on its bounty to survive. A good gift to our planet could be to find an animal that you're afraid of and learn more about it online or from books at your local library. You may surprise yourself by how much less you fear animals once you understand them a bit more.

2022

This was posted to CPBS's Instagram page in the spring by Charlotte.

We've had a couple of good snake months, but today's 11.9 kg boa constrictor took everyone's breath away.

We often get calls from the local community when neighbors spot a snake that makes them nervous, and this boa next to the primary school elicited a cascade of calls. Relocation is far preferable to having a snake killed so we were happy to help. Manuel did the pickup (below) and the boa was released a good distance from the school. We wish him happy hunting.

Since 2011, we've captured 1294 snakes, across 64 species. Snakes that are of a suitable size are pit-tagged so that we can repeat measurements when they're recaptured.

Just last week, a tree boa captured as a juvenile in 2017 was caught again just 200 meters from the spot it was originally found.

Thanks to the many neighbors who called and to Lianne Woudstra for hunting out these tidbits from our database.



Winter

2023

Howlers -- The Leaf-Eating Monkeys (Part 1) by Doug Durno

Would it be too cheeky to call the lifestyle of howler monkeys slothful? Not at all. It's no coincidence that sloths and howler monkeys are the only mammals in the New World to exist on a mostly leaf-based (folivorous) diet as the mantled howler at right can be seen munching on. That's a low-energy diet. And they are both low-energy species – though howlers of course amble around high in the treetops much more quickly than sloths.

Still, howlers spend much of the daytime resting. In a study of mantled howler monkeys (*Alouatta palliata*), researchers at Caño Palma found they spent 77% of the daytime resting (Graham, Bulloch *et al*, 2013). Compare that to the significantly lower resting times of other monkey species found around the station - white-faced capuchins were measured at 6% and black-handed spider monkeys at 31%.

If you've been to Caño Palma, you'll probably have heard howlers before you've observed them. When a group lets loose, usually at dawn or dusk, with what are described as loud, whooping barks or roars, they can be heard up to 5 kilometers away. Here's a sample:

<https://www.youtube.com/watch?v=xxzbqmFkXwU>

But this howling, among the loudest vocalizations of any animal, is a high-energy behavior. So, the question is why a low-energy species would spend precious energy engaging in it?

Well, howling is seemingly an energy-saving device. Instead of constantly chasing around using up their limited energy to warn other troops off their turf, it's less energy expensive to shout a message to them. This works because lower-frequency sounds like the howler's roar are generally associated with bigger body size, a warning that reduces the risk of a confrontation that could very well turn bloody.

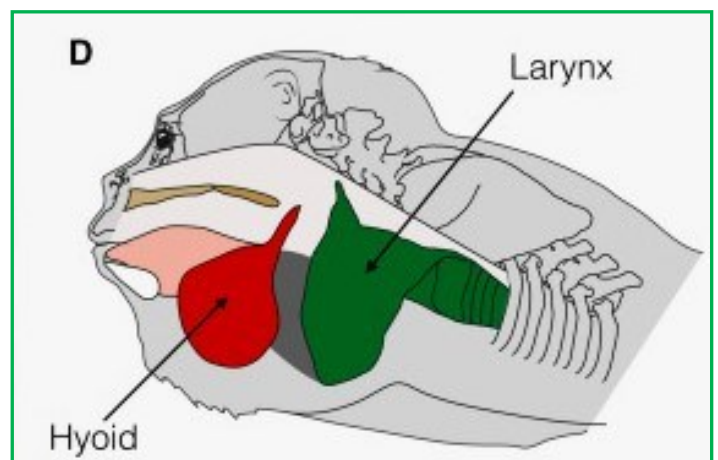
Their roar is possible because of a greatly modified larynx and considerably enlarged hyoid bone. This bone, located at the top of the larynx (or voice box), is topped by the vocal cords, which are folds of tissue that vibrate to create sound. The enlarged hyoid, 25 times larger than a spider monkey's, contains an air sac that acts as a resonating chamber, amplifying sounds emitted by (cont'd on next page)



(Note - Howlers also eat fruits, which are higher energy. But mantled howlers, the species in our area, are limited by the distances they usually have to travel to find ripe fruit and by the competition for it.)



Mantled Howler



Howler Monkeys (cont'd)

vocal cords that are three times longer than a human's. Put it all together and you get their loud whooping roars.

Intriguingly, researchers are now theorizing that, among the 15 howler species, the size of the male's hyoid may inversely relate to the size of his testes. Based on his research, Dr Jacob Dunn of the University of Cambridge hypothesizes that "roaring is so costly that there is simply not enough energy left to invest in the testes. On the other hand, roaring loudly might make bigger males back off, producing fear while making females amorous."

Dr Dunn says it's a form of sexual selection: "There's evidence in other animals that when males invest in large bodies, bright colors, or weaponry such as horns or long canines, they are unable to also invest in reproductive traits. The howler-monkey species that invest in larger vocal organs ... are the first evidence in any species for a trade-off between vocal investment and sperm production."

In this low-energy family, it all has to do with where it's best to invest their limited energy. Researchers have noted that the size of the hyoid varies quite a bit between the different species of howler. Plus, species have varying tribe sizes and male/female ratios in addition to differing testes sizes. In species with multi-male tribes, the females tend to mate with several males. So, in such a competitive environment, the males have evolved to invest their energy in larger testes that produce more and/or faster sperm, which will increase an individual's chances of fertilizing an egg. On the other hand, in a polygynous species – one male and more than one female – the male only has to attract a female to his harem so he's invested in a



Mantled Howler

larger hyoid that produces the deeper calls that attract the ladies. That's besides the louder roar that gives competitors the impression that you're bigger than you are so that they might leave you alone with your harem.

Howlers have a few other intriguing adaptations to their low-energy diet – including why several species have trichromatic color vision, the only New World non-human primates to entirely have this adaptation. Tune in to *Raphia's* Spring issue as we explore this and other of their adaptations.

References

Evolutionary Trade-Off between Vocal Tract and Testes Dimensions in Howler Monkeys - ScienceDirect

<https://unews.utah.edu/deeper-calls-smaller-balls/>

<https://www.sciencedirect.com/science/article/pii/S0960982215011719>

Ten Weeks of Jungle Life by Yair Ben-Jacov

Yair, a recent intern at Caño Palma, is from the village of Castricum in the Netherlands. He's studying International Development at Van Hall Larenstein University of Applied Sciences, specializing in sustainable value chains. Yair hopes to work on conservation projects, focusing on marine and freshwater systems.

Amazed by the beauty of this place! That's how I would describe my first impression of when I set foot on the station dock for the first time. The view from the little Sansa airplane to Tortuguero was already astonishing and made me very excited and nervous at the same time. Where would the station be? What will it look like? When Manuel and León picked me up from the airport, I had no clue where we were going. As the boat ride continued, I was anxiously looking at every turn in the river, wondering if the station is just around this bend. And then I wondered about the next bend. It all turned out to be even more exciting and prettier than what I ever expected.

Dropping in at the peak of green-turtle nesting season wasn't quite easy. With an extremely high quantity of turtle activity, the beach had to be worked for hours and hours every day. Besides, I was used to the cool temperatures of the Netherlands, so the first few weeks certainly weren't that comfortable. Nevertheless, I came to the station with a mission: I wanted to conduct an internship that would give me insights into nature conservation and

community engagement. It turned out that Caño Palma was excellent for this purpose. I was amazed by how dedicated my co-interns and staff were - which made

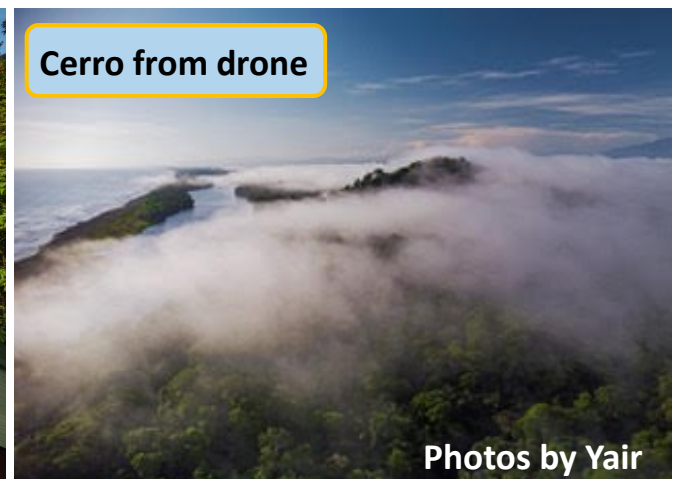
working and living with this group in the middle of the jungle an extremely valuable and educational period, which I'll remember for many years. Sipping coconuts with Mister Coca (or as he calls himself "Jorge") or cooking the most random jungle dishes, it all added extra value to this delightful time.

As an intern with a non-biologist background, I was amazed by how extremely beautiful and sophisticated all aspects of the ecosystems are. From the smallest creatures to the biggest trees in the area, everything had its own charm. Luckily, I brought my drone to the station, which gave me the opportunity to capture some of this beauty (as seen below). Joyfully it turned out that the footage was very useful for Caño Palma's promotional activities. Win win!

Thanks for this amazing experience!



Dock as seen by drone



Cerro from drone

Photos by Yair

Winter

2023

Tracking Otters by Ryan Jack

The sighting began on the South transect around 9:00am and lasted till around 9:50am. The current was flowing at a slow but consistent pace out of the canal. Several boats passed by just before the sighting began, and one passed as the otters were deep in the flooded forest.



One of Ryan's otters

I spotted the first otter (officially the Neotropical river otter) near the mouth of the canal. It was fishing along the west bank. On noticing me, it was startled and dove underwater. I tracked it by its bubble trail, and it popped up on the opposite bank and swam north at a fast pace, coming up to breathe frequently. At this point, I lost it for a few minutes, but found it around a bend, having joined a second otter. They were on the bank acting very social, climbing up onto a log, then back down and out onto the bank again. [Here's a

video that Ryan took (from Caño Palma Instagram page): <https://www.instagram.com/p/Cl6Wa6mjKfM/>

I was able to tell that one was a bit larger. It seemed to have more white on the chest and throat whereas the smaller one was almost all brown. They began moving up the canal staying on the east bank. I managed to follow them deep into a pocket in the tree line and saw one of them catch a small suckermouth catfish. While I watched, they foraged underwater and then moved up onto a small island. After a while, they left this pocket, only seeming to be semi-disturbed by my close proximity. The larger of the two otters seemed to almost always be in the front as they moved upriver. After catching another fish, I could hear the otter gnawing on it behind one of the flooded trees.

At one point, when I got close to the larger otter, it snorted at me, looked down the canal at the smaller otter that gave a "yip" call, and then dove underwater. The "yip" call was made frequently back and forth as they foraged and as they were startled by me at various points. They continued to forage up the east bank of the canal and deep into various pockets of flooded forest. They would enter pockets and then exit in the same area, always working along the main bank of the canal before entering a new pocket upstream. I was able to get a final good video clip of the pair exiting a flooded forest pocket, again the larger



Ryan out on the beach doing nest excavation

one taking the lead. Finally, about halfway between the station and the mouth of the canal, the otters crossed the canal and went deep into impenetrable flooded forest on the west side. This was roughly in the same area where we'd seen a lone large otter with significant white on its throat and chest the afternoon prior while doing an otter survey.

The Impact of Research-Based Tourism on the Tortuguero Area -- Part 4 by Laurentian University students

This is the fourth and final installment of a paper produced by students of Laurentian University in Sudbury, Ontario. Participants were Carole Anderson, Gregory Robillard, Alexandra Stankiewicz, Katrina Tisdale and Mitch Harrow. Project Head was Dr. Snarr, Chair of the COTERC Board. It has been lightly edited. Original paper can be found at: [re-search based tourism 2016 snarr laurentian university class report 1 .pdf \(coterc.org\)](https://www.coterc.org/research-based-tourism-2016-snarr-laurentian-university-class-report-1.pdf)

Environmental Impacts (Page 18 of the original paper that's linked above)

Volunteers and researchers travelling to other countries often don't realize the impacts they can have on the local environment. This was highlighted in our interviews. All but one visitor felt strongly that they contribute much less waste here at the station than they do at home. They also felt that that the station either met or exceeded their expectations as an 'environmentally-conscious' space.

This is a misconception that numerous studies have shown exists in ecotourism, research-based tourism and scientific expeditions. One paper says ecotourism is an oxymoron as any travel is detrimental to the environment via the burning of fossil fuels for transportation. Visitors, rather than acknowledge their negative impacts, focus on the benefits to the environment they feel they're contributing.

Another issue that came up in the interviews was that visitors didn't consciously purchase locally sourced goods. They were inclined to buy whatever was cheapest or most readily available. For example, of those who purchased ice cream in San Francisco, only one stated that they buy locally produced ice cream - the rest were buying commercially produced varieties. This results in reduced revenues for the

local community (economic leakage). And it can be detrimental to the environment as well since goods need fuel to be transported into the village.

Visitors believed they produced minimal waste. They knew little about how their waste was disposed of, or even that San Francisco has sorting and recycling facilities. The consequences of this obliviousness were laid out in a 2009 study in Tortuguero. When the local recycling plant was forced to close down for long periods, waste piled up in front of the plant and waste-disposal bins were overflowing. The main producers of the waste - hotels and resorts - are located far from the plant. They aren't affected by the mess. Rather it's the locals who have to deal with it. As with visitors to the station, there's a disconnect between those who produce the waste and its processing and disposal.

On the other hand, local communities sometimes benefit from the presence of facilities such as CPBS when the facility reaches out to provide environmental education. As the station manager put it:

"One of the biggest things we provide is hands-on experience for the kids. Here, the forest, the beach, lots of areas are private. Kids don't get up close and personal so they don't understand.

(cont'd on next page)

The Impact of Research-Based Tourism on the Tortuguero Area -- Part 4 (Cont'd)

We help ... give them a view. High-school kids get credits for participating in our marine-debris monitoring. They have to do presentations. It helps them get better grades. With Conservation Club, ... we show them that we can make a difference if we work together. It does not solve the problem, but helps. Attitudes are difficult to change. At the library, they acquire different skills such as computer skills, and it helps with their view of the environment."



Still, as has been found at other research stations, adults don't benefit as much from increased environmental education. This may be due to a lack of willingness to participate in the community programs that CPBS offers. Or maybe the educational opportunities are more geared to children. Future investigation into the impacts of child vs. adult environmental education should be examined.

We found that, in regard to environmental impact, areas to be potentially improved include better methods for solid-waste disposal (garbage, recycling), proper disposal of grey water, and continuing to make use of more compost through fruit and vegetable gardening at the station.

How Conservation Saved Tortuguero by Doug Durno

The turtles of Tortuguero have long attracted people from around the Caribbean. But the present-day village was first settled in the 1930s by a Colombian family who set up trade in coconut oil. In the 40s, settlers were enticed by American logging companies promising jobs and prosperity. By the 50s, canals were carved out and the wood floated to sawmills to be cut and shipped by sea down to Limón for distribution around Costa Rica and abroad. Ocean transport was often treacherous though, and wood was too often lost to rough seas. To avoid that, in the 1960s, an 80-km waterway was dredged from Limón to Tortuguero by connecting natural rivers with canals, and it remains a main route to this day.

Regardless, the logging business didn't prove financially viable, and the companies departed, leaving

their equipment behind, some of which still sits rusting away in Tortuguero's central square. The village reverted to its sleepy past with the few remaining residents going back to subsistence farming, hunting and fishing. They also took advantage of the seemingly endless supply of sea turtles to get more protein in their diets as well as some extra cash in their pockets, gained by selling turtle meat and shells. At the same time, the turning point from sustainable catch to endangered species occurred. Foreign ships were coming to Tortuguero to slaughter the turtles for export to the U.S. and Europe.

Meanwhile, Tortuguero's salvation had already arrived. That would be Dr Archie Carr, an American biologist who had begun researching sea turtles in Tortuguero in the 1950s. (cont'd on next page)

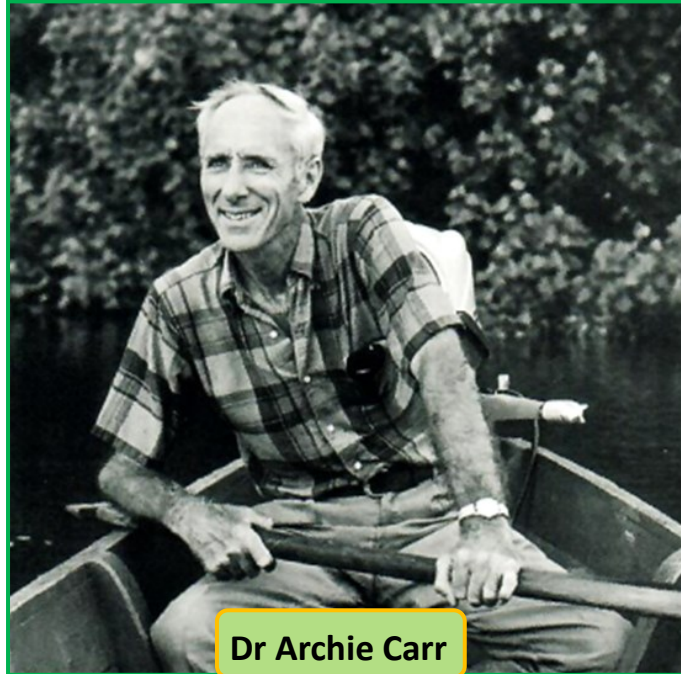
How Conservation Saved Tortuguero (cont'd)

Eventually, he recognized sea turtles were doomed unless action were taken to stop the slaughter and the intercontinental trade.

Thus, the Caribbean Conservation Corporation was formed in Tortuguero in 1959, dedicated to sea-turtle protection, conservation and research. The CCC's work eventually helped influence the Costa Rican government to introduce wildlife-protection laws – though enforcement was too often lacking.

In 1975, Dr Carr invited the Costa Rican President, José Figueres Ferrer, to Tortuguero. After hearing Carr's stories of declining sea-turtle populations and witnessing a mutilated turtle on the beach, President Figueres was moved to establish Tortuguero National Park that very year.

Dr. Carr also realized that he had to have buy-in from locals if poaching were to be stopped. That meant they had to have an alternate source of income beyond selling turtle meat, eggs and shells. He saw that tourism – or what we now call eco-tourism – could offer the villagers a sustainable alternative.



Dr Archie Carr

He predicted "that, if the people of Tortuguero could work together to conserve its natural resources, tourists from all over the world would visit the area, creating jobs and prosperity for the whole village". Essentially, that's what has happened. Tens of thousands of tourists arrive in Tortuguero annually to see the turtles nest and visit the National Park. Tortuguero has grown to 1500 inhabitants, most of whom

benefit from tourism in some way.

Though problems persist with poaching by locals, Archie Carr's conservation program has seen the sea-turtle population increase greatly since its inception.

References

[2013-In-The-Beginning-There-Was-Archie-Carr.-Chapter-2-In-Turning-Turtles-in-Tortuguero-by-Anne-Ake.-Larry-Ogren-Consultant..pdf](#)
(georgehbalazs.com)



Dr Carr and wife Marjorie with El Cerro in background

Heat-sensing drone cameras spy threats to sea-turtle nests

by Liz Kimbrough

Below is an edited version of an article that appeared in Mongabay on October 17, 2022.

On a beach in Costa Rica's Osa Peninsula, researchers using heat-detecting cameras mounted on drones detected 20% more turtle-nesting activity than on-the-ground patrollers did. The drone imagery also revealed 39 nest predators and other animals, as well as three people, assumed to be poachers, that were not detected by patrollers.

Sea turtles lumber from ocean to shore to lay their eggs in the sand. In some places, this effort is protected by humans who patrol beaches on foot, warding off poachers, predators and naïve tourists. But might there be a more effective way?

Researchers used thermal infrared sensors mounted on drones to monitor sea turtles nesting on a beach in Costa Rica's Osa Peninsula. Using these heat-detecting cameras, scientists could not only see the turtles moving, but also see their tracks, differentiate the tracks of different species, detect hatchlings, and observe other wildlife and potential poachers.

This technology has been used before, but this is the first time these methods have been empirically tested for nighttime sea-turtle monitoring.

"Something that really surprised me was that the drone was able to detect tracks, because sometimes even for the patrollers it's hard to differentiate them," said lead author Bárbara Sellés-Ríos, a researcher with Osa Conservation, an NGO. And the fact they were able to get such clear images, she said, "was amazing".

Sellés-Ríos and her team first took the drone out for test flights to find the best height and angle for the drone and mode for the camera to capture clear images while not disturbing the wildlife. At 50 meters (164 feet), they found the drone sound was almost imperceptible over the sound of the ocean, and they

didn't notice any response from the turtles.

After optimizing the gear, the team set up an experiment to compare the detection of turtle activity by human patrols versus the drone images. For seven nights in 2021, patrollers walked while drones flew multiple passes over a 1.7-kilometer (1.1-mile) sec-



Johan Ortiz García, flying the thermal drone on beach.
Photo by Andy Whitworth.

tion of beach, looking for turtles, eggs, tracks and other signs of life.

Using thermal infrared imagery from the drone, researchers detected 20% more turtle nesting activity than the on-the-ground patrollers did. The drone imagery also revealed 39 nest predators and other animals as well as three people, assumed to be poachers, that were not detected by patrollers.

"We could see on the screen that the patrollers were walking 30 meters [98 feet] away from the poachers hiding in the vegetation," Sellés-Ríos said. Without the drone, they

(cont'd on next page)

Heat-sensing drone cameras spy threats to sea-turtle nests (cont'd)

might have been missed.

"Sea turtles are slow to mature, and for some populations it's estimated this may take up to or over 25 years," said Helen Pheasey, a lecturer in conservation science at the University of Kent, U.K. who has studied the sea-turtle egg trade in Costa Rica. "This is significant, as it means the damage of removing eggs today will not be seen for 25 years when the offspring of the 'poached generation' fail to arrive at their nesting beaches."

"The application [of the thermal imaging drones] for beaches that are dangerous to human patrollers is extremely attractive," the study authors write.

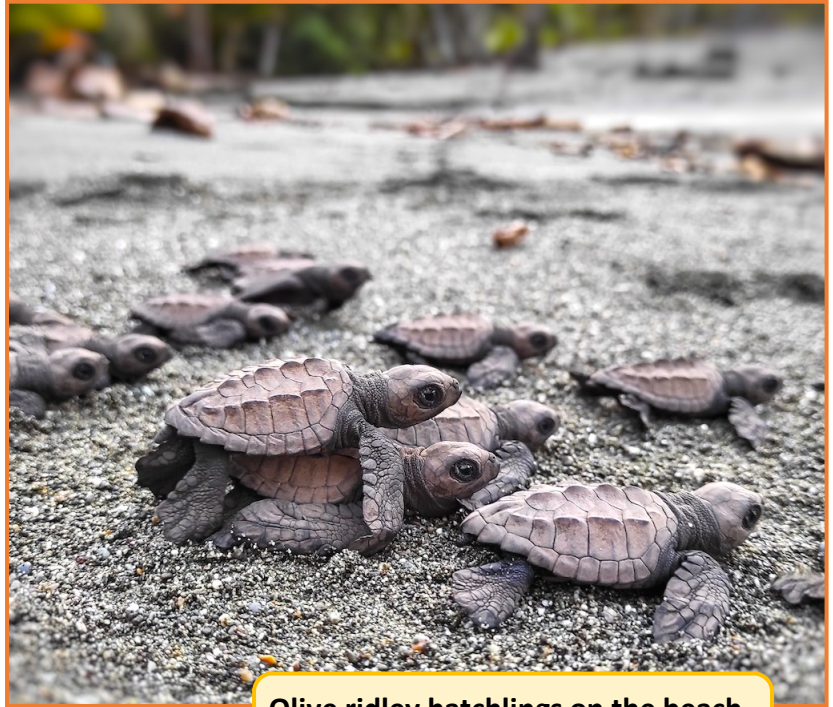
"If you're a poacher and you see the drone flying above you," Sellés-Ríos said, "you may think twice about poaching the nest, right?"

The authors acknowledge several limitations. First, it's expensive. The drone alone costs around \$10,000, not to mention other equipment. Battery life is also a limiting factor, making larger areas more difficult to monitor.

Processing the images from the thermal infrared camera also takes a lot of time, and might not be feasible for under-resourced conservation groups.

Sellés-Ríos says drones aren't a replacement for patrollers but could be an extra tool they can use to get a big improvement on night patrols, especially on nesting beaches that are dangerous and inaccessible.

"Although it's in its infancy in turtle research, there is real potential here," Pheasey said in an email to Mongabay. "This is especially valuable as it is increasingly difficult to recruit volunteers to do the ground-work. I can see drone research really taking off as techniques improve and costs come down."



Olive ridley hatchlings on the beach in Osa. Photo by Bárbara Sellés Ríos.

References

[Frontiers | Warm beach, warmer turtles: Using drone-mounted thermal infrared sensors to monitor sea turtle nesting activity \(frontiersin.org\)](https://doi.org/10.3389/fnins.2022.987451) - Original paper that the article is based upon.

<https://vdocuments.net/drones-for-turtles-controlling-poaching-of-nesting-for-the-enforcement-of-a.html?page=1> - Drone experiment in Africa

<https://www.aerotime.aero/articles/31889-drones-conservation-war-poaching-africa-uav> - Drones used to fight rhino poachers

[Heat-sensing drone cameras spy threats to sea turtle nests \(mongabay.com\)](https://www.mongabay.com/news/conservation/heat-sensing-drone-cameras-spy-threats-to-sea-turtle-nests/) - Original article in Mongabay

<https://www.dronezon.com/drones-for-good/wildlife-conservation-protection-using-anti-poaching-drones-technology/>

Station Happenings by Alex Lascher-Posner, Research Coordinator

November

Large mammals - Interesting to note the mammals with larger numbers observed this month. Five surveys were done. Detections are made using tracks, evidence of foraging, active burrows, trails and visual sightings.

| | <u>Total</u> | |
|---------------------------------|--------------|--------------------------------|
| Central American agouti | 120 | 57 at Caño Palma |
| White-lipped peccary | 103 | 92 at Caño Palma |
| 9-banded armadillo | 86 | 62 at El Cerro |
| Red brocket deer | 41 | 37 at Tortuguero National Park |
| Collared peccary | 21 | 19 at Caño Palma |
| Jaguar | 18 | 15 at Tortuguero National Park |
| Mantled howler monkey | 17 | 11 at El Cerro |
| Geoffroy's spider monkey | 15 | 14 at El Cerro |
| Baird's tapir | 11 | 6 at Caño Palma |
| Tayra | 9 | 8 at Caño Palma |
| Paca | 5 | 5 at Tortuguero National Park |

A **white-nosed coati** (aka coatimundi) was observed for the first time in months.

Tent-making bats – On 8 surveys, 349 tents were checked and 45 had bats present on at least one survey. Intriguingly, 10 new tents were found on the Caño Palma transect.

– The pilot study looking at the diversity of fruit consumed by the bats is continuing. The next step will be placing fruit that bats were observed eating on seed tables. This allows us to test hypotheses about bat foraging.

Neotropical river otters - In November, we conducted eight otter surveys, four on the Caño Palma South transect, two on the Caño Palma North transect, and two in Tortuguero National Park. (The South transect for otters starts immediately to the right of the dock and continues until you hit the mouth of the Caño as it enters into the Tortuguero River. The North transect starts to the left of the dock and ends at the sign and turnoff for Cabinas Laguna Cuatro.)

Two scat samples and one anal-jelly sample were found in Tortuguero National Park, and two on the North transect. However, and excitingly, we saw an otter during a South-transect survey. Furthermore, we have been seeing otters near the station nearly every day for a week, possibly indicating a temporal shift in otter populations. We are still in the process of developing a longer-term study looking at fish size (and potentially animal diversity in general) found in the scat. For now, this would be quantifying scale size.

December

Neotropical river otters - Otters continue to be observed in the vicinity of the station. We piloted the longer-term study looking at parasite load in feces. With a few modifications, it will be ready for at least two incoming students later in 2023.



Remittances Rising by Doug Durno

From a recent Financial Times article - "Marco Flores, 31, from the Mexican state of Jalisco, works as a waiter in Kentucky and sends about one quarter of his US\$5,000 monthly income to his parents and wife back home."

Marco's story is common. Mexicans and Central Americans are crossing into the USA and finding jobs in ever-increasing numbers. Plus, with wages in the U.S. rising faster because of political pressures, these migrants have been sending remittances back home in record amounts in 2021 and 2022.

What are remittances? As in Marco's situation, they're pretty straightforward: Individuals from less-developed countries emigrate to richer countries and send money back home to their families. In the table below, if you add up remittances sent back to the 7 Central America countries in 2021, they total US\$33 billion. Of that, \$32 billion went to just 4 countries – Guatemala (\$15 billion), El Salvador (\$7 bn), Honduras (\$7 bn) and Nicaragua (\$2 bn). In 2021, 1 million Central Americans emigrated (mainly to the USA), and 2022 numbers are quite a bit higher.

Obviously, those funds greatly assist recipient families. As a percentage of household income, remittances are generally in the range of 50 to 80%. The table shows that in poorer countries – like Guatemala, El Salvador, Honduras and Nicaragua – with their low

GDPs, a relatively high percentage of households are receiving remittances. Their economies also benefit hugely. For example, remittances amount to about 24% of both El Salvador's and Honduras's GDP. They help to reduce poverty, improve nutrition, enhance health care, and boost school-enrollment rates.

In the table, you'll notice that Mexico received US\$54 billion in remittances in 2021. That's a lot more than what the Central American countries received. But, on a per capita basis, Mexicans received \$419 vs. \$660 for Central Americans. (Mexico's population is 129 million vs. 50 million in the 7 Central American countries.) Mexico's GDP is US\$1.15 trillion vs. \$277 billion in all Central American countries combined.

On the other hand, Costa Rica and Panama, countries with more stable political situations, better business climates and less crime, receive comparatively little in remittances, amounting to only 0.8% of their GDP in 2021. In fact, migrants to Costa Rica, primarily from Nicaragua, remit almost as much to their home countries as Costa Rica receives from their own emigrants.

References

<https://www.thedialogue.org/wp-content/uploads/2022/07/Task-Force-Research-Paper-Orozco-Migrant-Remittances-EN-1.pdf>

[The Unexpected Rise in Remittances to Central America and Mexico During the Pandemic \(imf.org\)](#)

| All \$\$ = US dollars | Population (000's) 2022 est | GDP (Billions) 2022 est | GDP Per Capita 2022 est | Remittances (Billions) 2021 | Remittances % of GDP 2021 | % Households Receiving Remittances |
|-----------------------|-----------------------------|-------------------------|-------------------------|-----------------------------|---------------------------|------------------------------------|
| Mexico | 129,150 | \$ 1150 | \$10,950 | \$ 54.1 | 4.0% | 5% |
| Guatemala | 17,703 | \$ 79 | \$4,880 | \$ 15.4 | 14.8% | 32% |
| El Salvador | 6,568 | \$ 26 | \$4,883 | \$ 7.5 | 24.1% | 59% |
| Honduras | 9,459 | \$ 23 | \$2,970 | \$ 7.2 | 23.5% | 27% |
| Nicaragua | 6,301 | \$ 14 | \$2,380 | \$ 2.2 | 15.3% | 40% |
| Costa Rica | 5,204 | \$ 65 | \$13,090 | \$.59 | 0.8% | 8% |
| Panama | 4,337 | \$ 68 | \$16,170 | \$.57 | 0.8% | |
| Belize | 441 | \$ 1.8 | \$6,100 | \$.14 | 5.6% | |

Winter

2023

Canadian Organization for Tropical Education & Rainforest Conservation COTERC

ADVISORY COMMITTEE

Tom Mason
Dr Kevin Kerr
Dr Wm. Rapley

Founder
Marilyn Cole

BOARD OF DIRECTORS

Chair • Dr Kymberley Snarr
Vice Chair • Shelley Hutchinson
Finance • Greg McLean
Marketing • Vacant
Data Integrity • Dr Roberta Fulthorpe
Research & Conservation • Dr Emily Khazan
Station Advancement • Dr Nathan Lovejoy
Development • Amy Cocksedge
Special Events • Barbara Arn
Grants • Nick Humphreys
Web Services • Jess Sutton
Director at Large • Dr Sarah Ivers
Director at Large • Brandee Diner
Raphia • Doug Durno

To ensure you feel involved, we welcome any comments or suggestions. If you have an idea for an article, or better yet, would like to write one yourself - if you have a photo or two you think we could use - if you have a suggestion for improving Raphia, please send it along to us at raphia@coterc.org

Contact COTERC at:

info@coterc.org

OR

Box 335
Pickering, Ontario L1V 2R6
Canada

To unsubscribe from our distribution list, please send your request to: raphia@coterc.org

COTERC is a registered Canadian non-profit charitable organization

#890096183 RR0001 (est. 1991)