



CONSERVING WILD BEES AND OTHER POLLINATORS OF COSTA RICA



PLANNING CHECKLIST

PLANNING CHECKLIST

IMMEDIATELY

- Make sure you understand and agree to Earthwatch's **Terms and Conditions** and the **Participant Code of Conduct**.
- If you plan to purchase additional travel insurance, note that some policies require purchase at the time your expedition is booked.

6 MONTHS PRIOR TO EXPEDITION

- Log in at earthwatch.org to complete your participant forms.
- If traveling internationally, make sure your passport is current and, if necessary, obtain a visa for your destination country.
- Bring your level of fitness up to the standards required (see the Project Conditions section).

90 DAYS PRIOR TO EXPEDITION

- Pay any outstanding balance for your expedition.
- Book travel arrangements (see the Travel Planning section for details).
- Make sure you have all the necessary vaccinations for your project site.

60 DAYS PRIOR TO EXPEDITION

- Review the packing list to make sure you have all the clothing, personal supplies, and equipment needed.

30 DAYS PRIOR TO EXPEDITION

- Leave the Earthwatch 24-hour helpline number with a parent, relative, or friend.
- Leave copies of your photo ID and flight reservation number with a parent, relative, or friend.

Read this expedition briefing thoroughly. It provides the most accurate information available at the time of your Earthwatch scientist's project planning, and will likely answer any questions you have about the project. However, please also keep in mind that research requires improvisation, and you may need to be flexible. Research plans evolve in response to new findings, as well as to unpredictable factors such as weather, equipment failure, and travel challenges. To enjoy your expedition to the fullest, remember to expect the unexpected, be tolerant of repetitive tasks, and try to find humor in difficult situations. If there are any major changes in the research plan or field logistics, Earthwatch will make every effort to keep you well informed before you go into the field.

TABLE OF CONTENTS

NOTE FROM THE PI	2
THE RESEARCH.....	4
DAILY LIFE IN THE FIELD	6
ACCOMMODATIONS AND FOOD.....	8
PROJECT CONDITIONS.....	10
POTENTIAL HAZARDS	11
HEALTH & SAFETY	12
TRAVEL TIPS	13
EXPEDITION PACKING CHECKLIST	14
PROJECT STAFF	16
RECOMMENDED READING	17
LITERATURE CITED.....	17
EMERGENCY NUMBERS	18



NOTE FROM THE PI

DEAR EARTHWATCHER

Welcome to the *Conserving Wild Bees and other Pollinators of Costa Rica* expedition!

In 2014, the U.S. president released a memorandum calling for the development of a federal strategy to promote the health of pollinators. This call came in response to the scientific consensus that over the past few decades we have experienced a significant loss of pollinators, including native bees, birds, butterflies and bats. The loss is global and widespread, and has significant repercussions for the sustainability of our food production systems as well as the overall health of our environment owing to the important ecosystem service of pollination that these animals provide. Creating strategies for healthy pollinator communities will require scientific research. You are embarking on a scientific expedition aimed at understanding how we can achieve healthy populations of pollinators in the tropics, a region of particular importance for pollination services because approximately 90% of ALL plant species are animal-pollinated here as well as many valuable crop species; think coffee, cashews, vanilla, chili peppers, citrus fruits and avocados, just to name a few!

Pollinators are perhaps the most important animals on the planet, providing us directly with over one-third of the food we eat, as well as forming the base of the food chain for the majority of other animal species. You can help protect these valuable animals!

Much work needs to be done in Costa Rica to determine how to best protect pollinators and pollination services. For example, we still don't have a clear picture of what pollinator species are out there! Simply collecting and identifying pollinator species is needed and you can help with this endeavor. In addition, we need to categorize threats to pollinators including the loss of forest and climate change. We will survey pollinators across an elevation gradient and across varying levels of forest loss to see how the pollinator community changes across these gradients. Quantifying the pollinator community across these gradients is important, but it is equally important to quantify the service that these communities provide. Volunteers can help do this by moving sentinel plants to different locations and then quantifying pollinator visits and fruit production. These measurements on sentinel plants will tell us how effective the pollinator community is, and as the community changes, how does pollination change. With this information we can formulate management recommendations for pollinators.

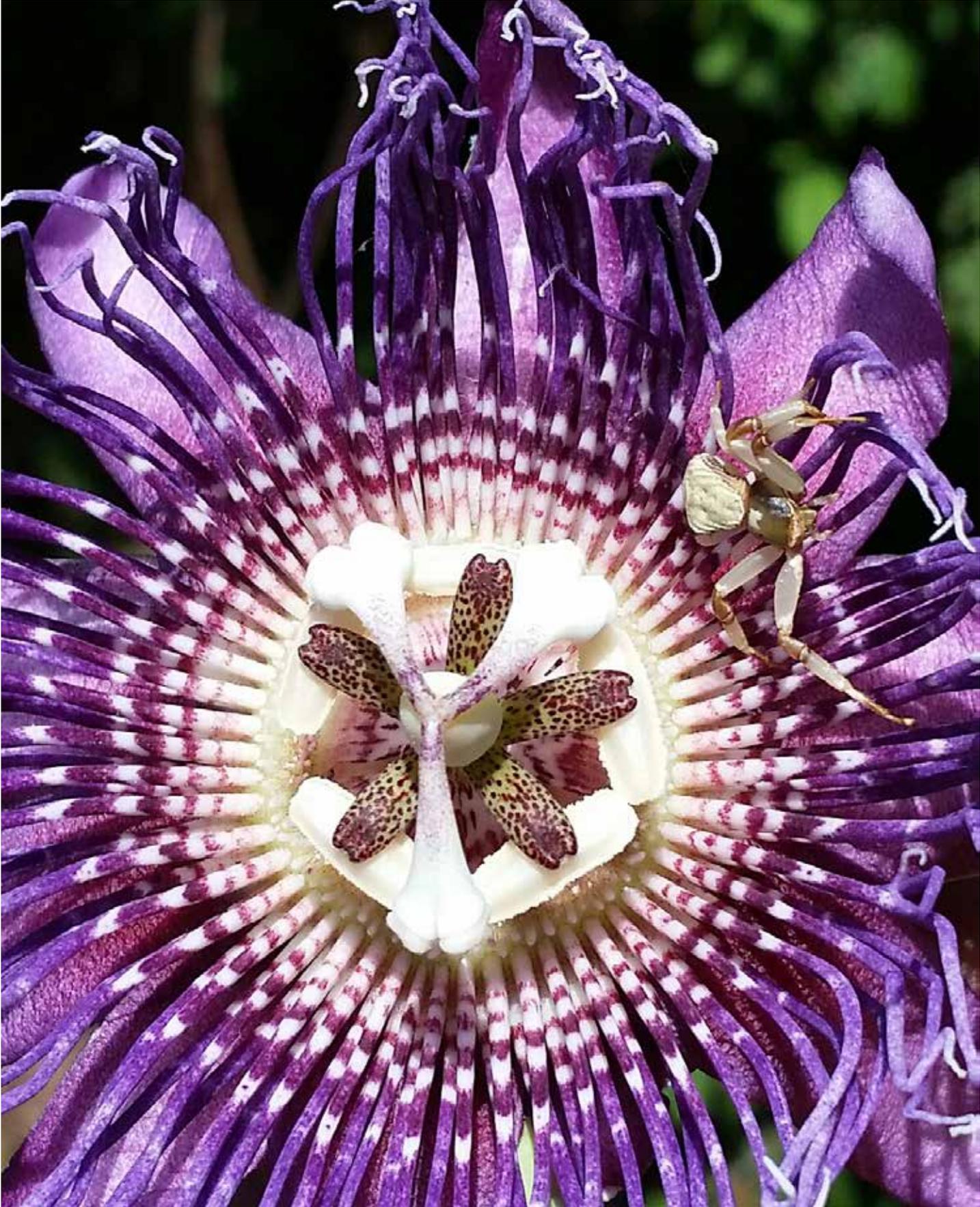
Another major part of our research aims to understand how to restore pollinator communities and pollination services. We will plant experimental restoration plantings in degraded pasture to test different restoration strategies for pollinators. You can help with this exciting experimental study through planting shrubs that flower at various times of the year and over time we can monitor pollinator recovery in the patches to determine which of the strategies works best!

We look forward to having you on our expedition.

Sincerely,

Dr. Valerie Peters
Lead Earthwatch Scientist





THE RESEARCH

CONSERVING WILD BEES AND OTHER POLLINATORS OF COSTA RICA



THE STORY

More than three-quarters of the world's crops depend on pollinators. These animals provide essential ecosystem services and play a crucial role in the production of many fruits and vegetables (Garibaldi et al. 2013). But a changing climate, pesticide use, and habitat loss or degradation threaten pollinator communities, although the full impact of these threats is not well understood. For example, warming temperatures could force pollinator species to shift their ranges to higher elevations, which could impact agricultural production, or it could be that a changing climate will cause these species to disappear altogether.

Dependence on pollinators is even more important in the tropics than in the rest of the world, as nearly all tree species in the tropics are pollinated by diverse species of bees, hummingbirds, butterflies, and other pollinators (Bawa 1990). Throughout Central America, there are still many regions where it is largely unknown which species of pollinators are present and, in some areas, pollinators have been misidentified (Freitas et al. 2009). To properly protect pollinators in these regions, it is critical to understand which species exist where, what their impact is on pollination services, and what the biggest threats to these pollinators are, such as changes in climate (Deutsch et al. 2008).





The expedition will take place in two locations: Monteverde and the Osa Peninsula. In Monteverde, you will examine how pollinator species and the services they provide may be affected by a changing climate, in part by assessing their populations at different elevations. Furthermore, the project will seek to understand whether these climate change responses may be mitigated by the presence of forest in the landscape. On the Osa Peninsula, you will test different restoration strategies for their effectiveness in the recovery of pollinators and pollination services. For example, can planted agroforests, which also benefit people through providing them with a livelihood, be as effective in recovering pollinators and pollination services compared to regenerating natural forest? Through this work we can simultaneously study how to best restore pollination services and help improve agriculture in the region. Collected bees in both locations will contribute to the Bee Barcode of Life Initiative, to ensure that the bees are properly identified and to create a database for future bee work.

HOW YOU WILL HELP

As an Earthwatch volunteer, you will be involved in all areas of research to help achieve the scientific objectives. Specifically, you will:

BOTH LOCATIONS

- **COLLECT AND OBSERVE BEES:** Hike up the mountain to set out bee traps (small colored bowls and vane traps filled with soapy water). Hand collect bees and other pollinators from flowers. Collect traps at the end of the day so that the pollinators can be sorted and observed back in the lab.
- **COLLECT AND SURVEY BUTTERFLIES ALONG TRANSECTS**

MONTEVERDE

- **OBSERVE SENTINEL PLANTS OF SQUASH OR PUMPKIN:** Observe and count pollinator visits to these plants at the different stations where they are set up. Collect fruits from these plants and count seeds to quantify pollination effectiveness.

OSA

- **PLANT SHRUBS AND TREES:** Collect seeds and cuttings from forest trails. Create a tree nursery. Plant trees in pastures to begin the process of reforestation.
- **TALK TO LANDOWNERS** to learn about potential non-timber agroforestry products

This project aims to address all three of the above questions by studying pollinators and pollination services over transects that span an elevation gradient in a semi-forested landscape. The findings from this project, combined with other research on pollinators in the region, could help Costa Rica to become the first country in Central America to institute a national policy to protect pollinators. The project will also include an experimental test of different restoration strategies to understand the most effective way to restore pollinator diversity and pollination services to previously degraded land.

RESEARCH AIMS

The research study has four core objectives:

- 1) Understand how climate change and habitat loss will impact native bee species and the ecosystem service of pollination.
- 2) Understand how climate change and habitat loss will affect other important Neotropical pollinators, particularly butterflies.
- 3) Measure the success of restoration for pollinators and pollination services.
- 4) Improve knowledge and taxonomy of Costa Rica bee species.

DAILY LIFE IN THE FIELD

PLANS FOR YOUR TEAM



The two locations for our fieldwork provide two very distinct ways to experience life in the field in Costa Rica.

One location is very mountainous and high elevation. Here, as you hike up the mountain each day, you will see breathtaking views of the Gulf of Nicoya and the overall landscape of Northeastern Costa Rica. Work here will involve surveys for bees and butterflies. Each day you will get to hike a different transect for the surveys. Some volunteers will observe sentinel plants for flower visitors. There will be lots of walking and fun times, collecting, identifying and learning the many pollinator species of the region.

The second location is much flatter, at sea level and on the Pacific Ocean. Here, daily life will include spectacular ocean views, less walking, and more planting trees and collecting seeds. This is a much more hot and humid site, with higher and less well-known biodiversity. This is the wild Osa Peninsula. Work here will also include surveys of bees and butterflies, in addition to planting the restoration treatment plots.



DAILY ACTIVITIES

ITINERARY

WEEK 1 ("A" TEAMS):

DAY BEFORE TEAM START:	volunteers arrive in Costa Rica
DAY 1	Rendezvous, introductions, travel to field station*
DAYS 2-6	Fieldwork days
DAY 7	"a" team volunteers depart project

WEEK 2 ("B" TEAMS):

DAY BEFORE TEAM START:	"b" team volunteers arrive
DAY 7	Rendezvous, introductions, travel to field station*
DAYS 8-12:	Fieldwork days
DAY 13	Team departs

*NOTE: Osa teams (team 2a and 2b) will enjoy a tour of the Finca Kobo chocolate farm (<http://www.fincakobo.com>) on the first day, where the team will get a project orientation and stay overnight before proceeding to the field station the next morning.

DAILY SCHEDULE, MONTEVERDE

7:30 a.m.	Breakfast
8:15 a.m.	Head out for fieldwork
12:30 p.m.	Lunch in field
1:30 p.m.	Continue fieldwork
3:00 p.m.	Return from field
4:00 p.m.	Downtime
5:00 p.m.	Meet in Lab to go through collected samples
6:00 p.m.	Dinner
7:00 p.m.	Possible lectures, films, night hikes or downtime

DAILY SCHEDULE, OSA

7:00 a.m.	Breakfast
8:00 a.m.	Head out for fieldwork
12:00 p.m.	Lunch at field station
1:00 p.m.	Head back out to the field
4:30 p.m.	Return from field
5:00 p.m.	Downtime
6:00 p.m.	Dinner



ACCOMMODATIONS AND FOOD

ABOUT YOUR HOME IN THE FIELD



An example of the housing at Monteverde.

MONTEVERDE: Volunteers on teams 1(a and b), 3(a and b) and 4(a and b) will stay at the UGA Ecology & Research Station in San Luis de Monteverde. Being a part of the UGA Costa Rica campus allows for a singular experience of educational and nature based activities, as well as interaction with the local community.

http://www.externalaffairs.uga.edu/costa_rica/

OSA: Volunteers on team 2(a and b) will stay at the Piro Research Station, owned and operated by the nonprofit organization Osa Conservation.

<http://osaconservation.org/visit-the-osa/research-stations/piro-research-station/>

SLEEPING

MONTEVERDE: All bedding is provided and beds are either full or bunk beds. No mosquito netting is needed at this elevation. Each room for 3 to 4 people includes a bathroom with flush toilet and shower. Depending on available space at the research station, single or couple room requests can be accommodated. Single gender rooms are assigned with 3 to 4 volunteers per room.



An example of the housing at Osa.

OSA: All bedding is provided and beds are all bunk beds. Mosquito netting is also provided. Each cabin is situated with 3 spacious, rustic bedrooms with capacity for four individuals in each room. Bedrooms are furnished with 2 bunk-beds, dressers, shelves, outlets and mosquito nets. Single gender rooms are assigned with 3 to 4 volunteers per room. If the station is not fully booked single or couple room requests may be considered.

BATHROOMS

MONTEVERDE: An en suite bathroom is located in each shared single-gender bedroom. Showers and hot water are available.

OSA: There are two shared bathrooms (toilet, sink and shower) for the 3 shared bedrooms per cabin. No hot water is available at this location, but the climate is generally very warm.



ELECTRICITY

You are welcome to bring electrical equipment. Electrical outlets in Costa Rica are 110v just like in North America. However, although most wall outlets are being switched to 3 prongs, if your device uses a 3 prong plug, we recommend bringing an adapter which converts from 3 to 2 prongs. Power can be unreliable at the Osa location, so come prepared for outages.

PERSONAL COMMUNICATIONS

Wireless Internet access is available at San Luis de Monteverde. Wireless internet access is not available at Osa Verde, but it is sometimes available (though spotty) at the nearby Piro Research Center where volunteers will be eating many of their meals. In both cases, you may bring your own laptop or tablet for free-time use.

In San Luis de Monteverde Pls and staff can be reached via telephone, cell phone, and email for both emergencies and casual communication.

The Osa Verde site is more remote. Pls can be reached via cell phone for emergencies. Internet and email access is extremely unreliable this deep in the forest and may only be available periodically. Volunteers are encouraged to take care of internet communications such as hotel or travel reservation prior to arrival at this location, as firming up those plans while on site will be difficult.

PLEASE NOTE that personal communication with outsiders is not always possible while participating in an expedition. Earthwatch encourages volunteers to minimize outgoing calls and immerse themselves in the experience; likewise, family and friends should restrict calls to urgent messages only.

FACILITIES AND AMENITIES

Both project home bases are field education and research stations. They have labs, classroom space, and dormitory-style living accommodations to support researchers and students. These may be in use by other groups when your Earthwatch team is present.

There are limited shopping opportunities nearby. If there is something that you like to have every day, we recommend that you bring it with you.

Smoking is not permitted on the UGA campus in Monteverde.

FOOD AND WATER

Both locations have a cook or cooks that will prepare all meals. Meals are typical Costa Rican fare—beans, rice, vegetables and poultry or beef. At the Osa site, more fish and less dairy will be included in meals compared to the Monteverde site. Most days will include bag lunches, but breakfast and dinner will be sit-down, family style. Volunteers will not have to do meal prep or shopping. Clean up will only include taking plates and utensils to counter near sink.

No personal refrigerator space is available, unless needed for special circumstances, e.g. medicine storage.

The following are examples of foods you may find in the field. Variety depends on availability. We appreciate your flexibility.

TYPICAL MEALS

BREAKFAST	Gallo pinto (rice and beans), eggs, toast, pancakes, arepas, cheese, plantains, fresh fruit, coffee
LUNCH	sandwich bag lunch with peanut butter & jelly, or lunch meat and cheese options plus juice, cookies
DINNER	chicken, beef or fish option, plus steamed vegetables and rice, beans, or pasta
DESSERT	Tres leches cakes, and other pastries, fruit, rice pudding
BEVERAGES	Fresh juice, water, coffee, hot chocolate

SPECIAL DIETARY REQUIREMENTS

Please alert Earthwatch to any special dietary requirements (e.g., diabetes, lactose intolerance, nut or other food allergies, vegetarian or vegan diets) as soon as possible, and note them in the space provided on your volunteer forms.

Vegetarians and vegans can be somewhat accommodated on this project, if they are prepared to be flexible. Usually there is plenty of food that the meat and dairy can just be avoided, and avocados and beans will usually be good protein substitutes, but processed vegetarian meat substitutes are not available. There is not much dairy included in the typical Costa Rican diet so lactose intolerance should not be a problem to accommodate. Wheat-based foods are also not typical in Costa Rica (rice is the primary grain consumed) and so a gluten free diet should also be easily accommodated.



PROJECT CONDITIONS

THE FIELD ENVIRONMENT

MONTEVERDE: Here the climate is cool, around 80F during the day and 60F overnight. Rainy season is from May to October and these months can be cooler, with heavy rains or fine mist. Dry season can be extremely windy. The terrain here is mountainous. The life zone is considered pre-montane. The research station sits in the valley below the Monteverde Reserve and the scenery can be breathtaking as the mountains surrounding the research station are dense with forest (an unusual sight these days!) Rainbows and double rainbows are frequently observed. 265 bird species have been observed during Christmas counts and other observations. White-faced monkeys, agoutis and kinkajous and coatis are commonly seen.

OSA: This site is a sea level site, on the ocean, and the climate is much hotter. The landscape is much flatter and the dominant land use is cattle pasture. The most pristine protected area in Costa Rica is nearby—the Corcovado National Park. The Osa peninsula has the highest biodiversity of any place in Costa Rica, with many endemic species. The life zone is lowland tropical wet forest. It can rain throughout the year but the heaviest rainfall occurs from May through November. The field site here is covered with the native almond tree and while it has fruits the trees are full of scarlet macaws, squirrel monkeys and howler monkeys. Throughout the year there is fantastic wildlife viewing including anteaters, spider monkeys and sloths. There has been no systematic survey of birds, but raptors are very abundant here, including roadside hawks and yellow headed caracaras.



GENERAL CONDITIONS

JUNE/JULY

Monteverde:

HUMIDITY: 85–90%

TEMPERATURE RANGE: 18–22°C (mid to high 60s°F)

RAINFALL: 200–600 mm

Osa:

HUMIDITY: 85–90%

TEMPERATURE RANGE: 26–30°C (low 80s°F)

RAINFALL: 100–700 mm

DECEMBER

Monteverde:

HUMIDITY: 85–90%

TEMPERATURE RANGE: 18–22°C (mid to high 60s°F)

RAINFALL: 50–150 mm

ESSENTIAL ELIGIBILITY REQUIREMENTS:

All participants must be able to:

- Follow verbal and/or visual instructions independently or with the assistance of a companion.
- Enjoy being outdoors all day in all types of weather, including rain, heat, and humidity, in the potential presence of insects, snakes and other wild animals. Fieldwork WILL continue in rainy conditions.
- Hike up to 2–5 miles total per day, over steep, slippery mountain terrain.
- Watch footing while moving through dense, tangled vegetation.
- Get low enough to the ground to plant tree seedlings and other plants, as well as collect bees from bowl traps
- Carry personal daily supplies such as lunch, water, and some small field equipment.
- Get themselves up into and down out of a four-wheel-drive vehicle, minibus, or car and ride, seated with seatbelt fastened.



POTENTIAL HAZARDS

CONSERVING WILD BEES AND OTHER POLLINATORS OF COSTA RICA

HAZARD TYPE	ASSOCIATED RISKS AND PRECAUTIONS
Transportation	We may encounter poor road conditions including landslides. Only qualified, experienced drivers will transport volunteers in project vehicles; we ensure project vehicles are well maintained. Seatbelts must be worn at all times. Volunteers are not permitted to drive. Driving after dark will be avoided, except in cases of emergency.
Hiking	You'll likely traverse uneven terrain and hike uphill in humid tropical conditions; there's a risk of sprains, strains, bruises or breaks due to falling or tripping. You should never walk ahead of your team leader, and should follow the leader's instructions. Wear appropriate footwear, with good treads and ankle support, while hiking. You may wish to use a walking stick to help with balance while hiking.
Animals	Venomous snakes are present in the area (more so in the coastal location than the mountain location). Team members should wear tall rubber boots or snake guards in the field, and should under no circumstances attempt to handle snakes. You'll likely encounter many insects; wear long-sleeved shirts and long pants and apply insect repellent frequently to avoid bites. Those with insect allergies should bring the proper emergency treatment (such as an Epi-pen, with spares) and inform staff of the problem and the location of the treatment; they should take special precautions while collecting field data. While hiking, we may encounter plants with irritating spines or sap. These plants are easy to avoid by not reaching out or touching plants while hiking.
Climate/ Weather	Dehydration, heat exhaustion, sunburn, and other heat-related illnesses can occur, but you can protect yourself by drinking sufficient water, wearing high-SPF sunscreen, and wearing appropriate clothing. Dehydration from sweating can be a problem; please bring your own water bottles that you can easily carry and refill them with electrolyte-replacing packets. Because of the high humidity, people who use a hearing aid device may find it doesn't work properly. Consider purchasing a hearing aid dehumidifier. You must be able to stay outside in the rain for extended periods of time.
Personal Security	Avoid areas designated as off limits by project staff.
Swimming	On the Osa Peninsula, the field site is adjacent to the ocean, however, ocean swimming is not permitted. There are extremely dangerous rip tides which have caused drowning even in cases where people are in the water only up to their knees. There is a non-ocean swimming that can be enjoyed by volunteers, after consultation with the field staff. There is no lifeguard present, so adults may swim at their own risk only; teen teams may not swim without a certified lifeguard present.
Distance from Medical Care	It may take an hour to reach the nearest hospital or more to arrange transport and reach the hospital. If you have a chronic condition which could require immediate medical care (e.g., heart conditions, kidney problems, severe asthma, etc.), or if you are pregnant, please discuss your participation on this expedition with your physician.



HEALTH & SAFETY

CONSERVING WILD BEES AND OTHER POLLINATORS OF COSTA RICA



EMERGENCIES IN THE FIELD

Project staff members are not medical professionals.

The project will have cell phones and two-way radios for communication among the team while conducting fieldwork.

For emergency assistance in the field, please contact Earthwatch's 24-hour emergency hotline number on the last page of this briefing. Earthwatch is available to assist you 24 hours a day, 7 days a week; someone is always on call to respond to messages that come into our live answering service.

IMMUNIZATIONS & TRAVEL VACCINATIONS

Please be sure your routine immunizations are up-to-date (for example: diphtheria, pertussis, tetanus, polio, measles, mumps, rubella and varicella) and you have the appropriate vaccinations for your travel destination. Medical decisions are the responsibility of each volunteer and his or her doctor, and the following are recommendations only. Visit cdc.gov or who.int for guidance on immunizations.

If traveling from countries or region where yellow fever is endemic, you must have a certificate of vaccination.



TRAVEL TIPS

SUGGESTIONS FOR THE ROAD

YOUR DESTINATION

LANGUAGE: Spanish. In San José and other cities, many people speak some English. The project will be conducted in English.

TIME ZONE: GMT/UTC -6.

CULTURAL CONSIDERATIONS: Casual, modest dress is acceptable nearly everywhere in Costa Rica. A 10% tip is already included in all restaurant bills, and Costa Ricans generally do not tip above and beyond this except for exceptional service. Wait staff are more accustomed to receiving an extra tip from tourists who are unfamiliar with the service tax included in the bill. Tipping taxi drivers, airport curbside baggage handlers, and hotel bellhops is customary.

Both project sites offer a similar cultural experience. The local language is Spanish and volunteers will have the opportunity to interact with local people. The work is primarily in human-dominated landscapes, not nature preserves and so on a daily basis there will be more interaction with locals. The employees of both research stations are also locals and the field team will include Costa Ricans as well. Although throughout Costa Rica there are many people who speak and understand English, both of the study sites are rural and so many Costa Ricans that volunteers will encounter there will not have English skills.

LOCAL CURRENCY: Costa Rican Colóns (CRC). U.S. Dollars are also often accepted. The approximate conversion rate is 500 colones to 1 U.S. Dollar.

COUNTRY AND PROJECT ENTRY REQUIREMENTS

Entry visa requirements differ by country of origin, layover, and destination, and do change unexpectedly. For this reason, please confirm your visa requirements at the time of booking and, again, 90 days prior to travel. Please apply early for your visa (we recommend starting 6 months prior to the start of your expedition). Refunds will not be made for volunteers cancelling due to not obtaining their visa in time to meet the team at the rendezvous. You can find up to date visa requirements via one of the following sites:

www.passportsandvisas.com

www.travisa.com

If a visa is required, participants should apply for a TOURIST visa. Please note that obtaining a visa can take weeks or even months. We strongly recommend using a visa agency, which can both expedite and simplify the process.

Generally, passports must be valid for at least six months from the date of entry and a return ticket is required.

You must keep the immigration card issued to you upon arrival in Costa Rica! Visitors are advised to keep it with their travel documents as you will be required to present it to an Immigration Officer upon your departure.

CONTACT INFORMATION

You may be required to list the following contact information on your visa application and immigration form, or if your luggage does not make it to baggage claim at your destination:

FOR MONTEVERDE TEAMS:

Joyce Leiton

UGA Ecolodge & Research Station
Apartado 108-5655, Santa Elena, Monteverde
700 m este de la Escuela Altos de San Luis
+506 2645-7363

reservCR@uga.edu

FOR OSA TEAMS:

Karla Funes

Osa Verde Conservation Campus
Apdo. 54-8203
Puerto Jiménez, Golfito, Costa Rica
Phone: +506 2735 5756 (Puerto Jimenez office)



EXPEDITION PACKING CHECKLIST

WHAT TO BRING

EXPEDITION PACKING CHECKLIST

GENERAL

- This expedition briefing
- Your travel plans, rendezvous details, and Earthwatch's emergency contact information
- Photocopies of your passport, flight itinerary, and credit cards in case the originals are lost or stolen; the copies should be packed separately from the original documents
- Passport and/or visa (if necessary)
- Certification of vaccination (if necessary)
- Documentation for travel by minors (if necessary)
- Departure tax of US\$29 in cash (U.S. Dollars or Costa Rican Colones) or payable via Visa credit card (processed as a cash advance), to be paid at the airport upon checking in for your flight home. This fee is sometimes included in your airline ticket purchase.

CLOTHING/FOOTWEAR FOR FIELDWORK

ALL TEAMS:

- Earthwatch T-shirt
- 2–3 lightweight, quick-drying, button-down long-sleeved shirts
- 2–3 pairs of quick-drying long pants
- Wide-brimmed sun hat or baseball hat
- Lightweight raincoat or poncho
- 4–5 pair of thick hiking socks (wool or synthetic—NOT cotton)
- Bandana

MONTEVERDE TEAMS:

- Hiking boots with ankle support, already broken in, OR good rubber boots

OSA TEAMS:

- Knee-high rubber boots, OR snake boots OR hiking boots with ankle support with snake chaps (available at Ben Meadows, Forestry Suppliers, Cabela's, and other retailers)
- Leather or cloth and rubber garden/work gloves

CLOTHING/FOOTWEAR FOR LEISURE

- At least one set of clothing to keep clean for end of expedition
- Sandals (preferably ones that can get wet)
- Light weight pants (jeans are not the best, if they get wet they will not dry before you leave)
- Shorts
- T-shirts / tank tops
- Sweatshirt / light jacket
- Tennis shoes / casual shoes
- Bathing suit (Osa teams only)

FIELD SUPPLIES

- Binoculars
- Daypack to carry and keep your personal items together and dry
- Sunscreen lotion with SPF 45
- Lip balm with sunscreen
- Field notebook and pencils
- 2 one-liter water bottles, OR 1 two-liter water bottle or reservoir
- Insect repellent
- Sunglasses
- Drybag or plastic sealable bags (good for protecting equipment like cameras from dust, humidity, and water)

BEDDING AND BATHING

NOTE: all bedding, as well as a bath towel, is provided at both of the research stations.

- Hand towel or washcloth (Osa teams only)
- Window bug screens are provided at Osa, but not mosquito netting over beds. If you wish to purchase a net they should be for twin size and no-see-ums mesh size.



EXPEDITION PACKING CHECKLIST

PERSONAL SUPPLIES

- Personal toiletries (biodegradable soaps and shampoos are encouraged)
- Antibacterial wipes or lotion (good for cleaning hands while in the field)
- Personal first aid kit (e.g., anti-diarrhea pills, antibiotics, antiseptic, itch-relief, pain reliever, bandages, blister covers, etc.) and medications
- Baby powder (recommended by field staff to relieve chafing in the hot, humid environment)
- Small Bottle of Aloe Vera or equivalent skin calming cream (good for bug bites and sunburn)
- Spending money
- Flashlight or headlamp with rechargeable batteries (don't forget your charger!)
- Laundry detergent packets, and a clothesline (**Osa teams only**)

OPTIONAL ITEMS

- Flip flops or sandals for the shower
- Camera, film or memory card(s), extra camera battery
- Hardware for sharing digital photographs at the end of the expedition
- Dry bag or plastic sealable bags (e.g. Ziploc) to protect equipment like cameras from dust, humidity, and water
- Books, games, art supplies, etc. for free time
- Earplugs for light sleepers

NOTE: Do not bring more luggage than you can carry and handle on your own. If traveling by air and checking your luggage, we advise you to pack an extra set of field clothing and personal essentials in your carry-on bag in case your luggage is lost or delayed.



PROJECT STAFF

YOUR RESOURCES IN THE FIELD



DR VALERIE PETERS is a community ecologist with 20 years of experience working in the New World Tropics. Valerie received her Ph.D. in Ecology from the University of Georgia. For her dissertation research Valerie studied how to best manage coffee plantations for biodiversity and ecosystem services, and for three years she was the Principal Investigator for an Earthwatch expedition on Sustainable Coffee Production in Costa Rica. Valerie recently joined the faculty in the Biology department at Eastern Kentucky University. Eastern Kentucky is home to the spectacular Red River Gorge, the Daniel Boone National Forest and many other great opportunities for hiking and exploring nature– Valerie’s favorite activity to do in her spare time. Valerie and Brian have a little boy, Ian, who will be in Costa Rica with his parents. Ian has been joining volunteers in the field since the age of six months. Ian will be 2.5 years old by team 1.



BRIAN HOVEN, Field Assistant, is an ecologist with 9 years of experience conducting ecological research in temperate forests. In 2006 he completed his B.S. in Conservation Biology at the State University of New York School of Environmental Science and Forestry (SUNY-ESF). Then in 2009, he completed his M.S. degree in Conservation Biology at SUNY-ESF, where his thesis involved disentangling the effects of fire suppression, native and invasive natural enemies, as well as host plant quality on declining populations of barrens buckmoth in Albany Pine Bush, New York. Currently he is completing his Ph.D. in Ecology at Miami University where he is studying the effects of invasive plants, deer herbivory, and emerald ash borer on future forest composition. Brian is passionate about teaching and science. In his free time he likes to hike, read, and listen to music.

GRAD STUDENT Field Assistant, TBH.

LOCAL STAFF may also be added if needed for larger teams.

An **EARTHWATCH TEEN TEAM FACILITATOR** (TEEN team only) will accompany the teen team from the time you step off the plane for the rendezvous until the end of the expedition. If you have any questions or problems, such as issues with another volunteer, homesickness, or an emergency back home, please talk to your facilitator. Follow your facilitator’s advice on safety and personal conduct. All facilitators have experience teaching and leading groups of teenagers. Remember, your facilitator is there for you. (Teen: Facilitator ratio is approx. 6:1)

NOTE: Staff schedules are subject to change.



RECOMMENDED READING

YOUR RESOURCES AT HOME

RESOURCES

ARTICLES

Bee observer cards to learn your bees! <https://www.greatsunflower.org/node/1000280>

Vanbergen AJ, and Insect Pollinators Initiative. 2013. Threats to an ecosystem service: pressures on pollinators. *Frontiers in Ecology and the Environment* 11: 251–259.

Garibaldi LA, et al. 2014. From research to action: enhancing crop yield through wild pollinators. *Frontiers in Ecology and the Environment* 12: 439–447.

BOOKS

Bees: an Upclose Look at Pollinators Around the World. By Sam Droege and Laurence Packer

PROJECT-RELATED WEBSITES

<http://earthwatch.org/Expeditions/Conserving-Wild-Bees-and-Other-Pollinators-of-Costa-Rica>

ECOLOGDE SAN LUIS AT UGA COSTA RICA: https://dar.uga.edu/costa_rica/index.php/tourists/-/tourists

OSA CONSERVATION RESEARCH STATIONS: <https://osaconservation.org/visit-the-osa/research-stations/>

EARTHWATCH SOCIAL MEDIA

FACEBOOK: [facebook.com/Earthwatch](https://www.facebook.com/Earthwatch)

TWITTER: twitter.com/earthwatch_org

INSTAGRAM: [instagram.com/earthwatch](https://www.instagram.com/earthwatch)

BLOG: <https://blog.earthwatch.org/>

YOUTUBE: [youtube.com/earthwatchinstitute](https://www.youtube.com/earthwatchinstitute)

LITERATURE CITED

YOUR RESOURCES AT HOME

LITERATURE CITED

- Bawa, K.S. 1990. Plant–pollinator interactions in tropical rain forests. *Annual Review of Ecology and Systematics* 21: 399–422.
- Deutsch, C.A., J.J. Tewksbury, R.B. Huey, K.S. Sheldon, C.K. Ghalambor, D.C. Haak, P.R. Martin. 2008. Impacts of climate warming on terrestrial ectotherms across latitude. *PNAS* 105: 6668–6672.
- Freitas, B.M., V.L. Imperatriz–Fonseca, L.M. Medina, A.M.P. Kleinert, L. Galetto, G. Nates–Parra, J.J.G. Quezada–Euan. 2009. Diversity, threats, and conservation of native bees in the Neotropics. *Apidologie* 40: 332–346.
- Garibaldi, L.A., I. Steffan–Dewenter, R. Winfree, M.A. Aizen, R. Bommarco, S.A. Cunningham, C. Kremen, L.G. Carvalhiero, L.D. Harder, O. Afik, I. Bartomeus, F. Benjamin, V. Boreux, D. Cariveau, N.P. Chacoff, J.H. Dudenhofer, B.M. Freitas, J. Ghazoul, S. Greenleaf, J. Hipolito, A. Holzschuh, B. Howlett, R. Isaacs, S.K. Javorek, C.M. Kennedy, K.M. Krewenka, S. Krishnan, Y. Mandelik, M.M. Mayfield, I. Motzke, T. Munyuli, B.A. Nault, M. Otieno, J. Petersen, G. Pisanty, S.G. Potts, R. Rader, T.H. Ricketts, M. Rundlof, C.L. Seymour, C. Schuepp, H. Szentgyorgyi, H. Taki, T. Tscharntke, C.H. Vergara, B.F. Viana, T.C. Wagner, C. Westphal, N. Williams, A.M. Klein. 2013. Wild Pollinators enhance fruit set of crops regardless of honey bee abundance. *Science* 339: 1608–1611.



EMERGENCY NUMBERS

AROUND-THE-CLOCK SUPPORT



MESSAGE FROM EARTHWATCH

DEAR EARTHWATCHER,

Thank you for joining this expedition! We greatly appreciate your decision to contribute to hands-on environmental science and conservation. It is volunteers like you who fuel our mission and inspire our work.

While at Earthwatch, I've had the opportunity to field on a few expeditions, most recently in Kenya with one of my daughters. Each expedition has touched me deeply, and made me proud to be able to roll up my sleeves alongside my fellow volunteers and contribute to such meaningful work.

As an Earthwatch volunteer, you have the opportunity to create positive change. And while you're out in the field working toward that change, we are committed to caring for your safety. Although risk is an inherent part of the environments in which we work, we've been providing volunteer field experiences with careful risk management and diligent planning for nearly 45 years. You're in good hands.

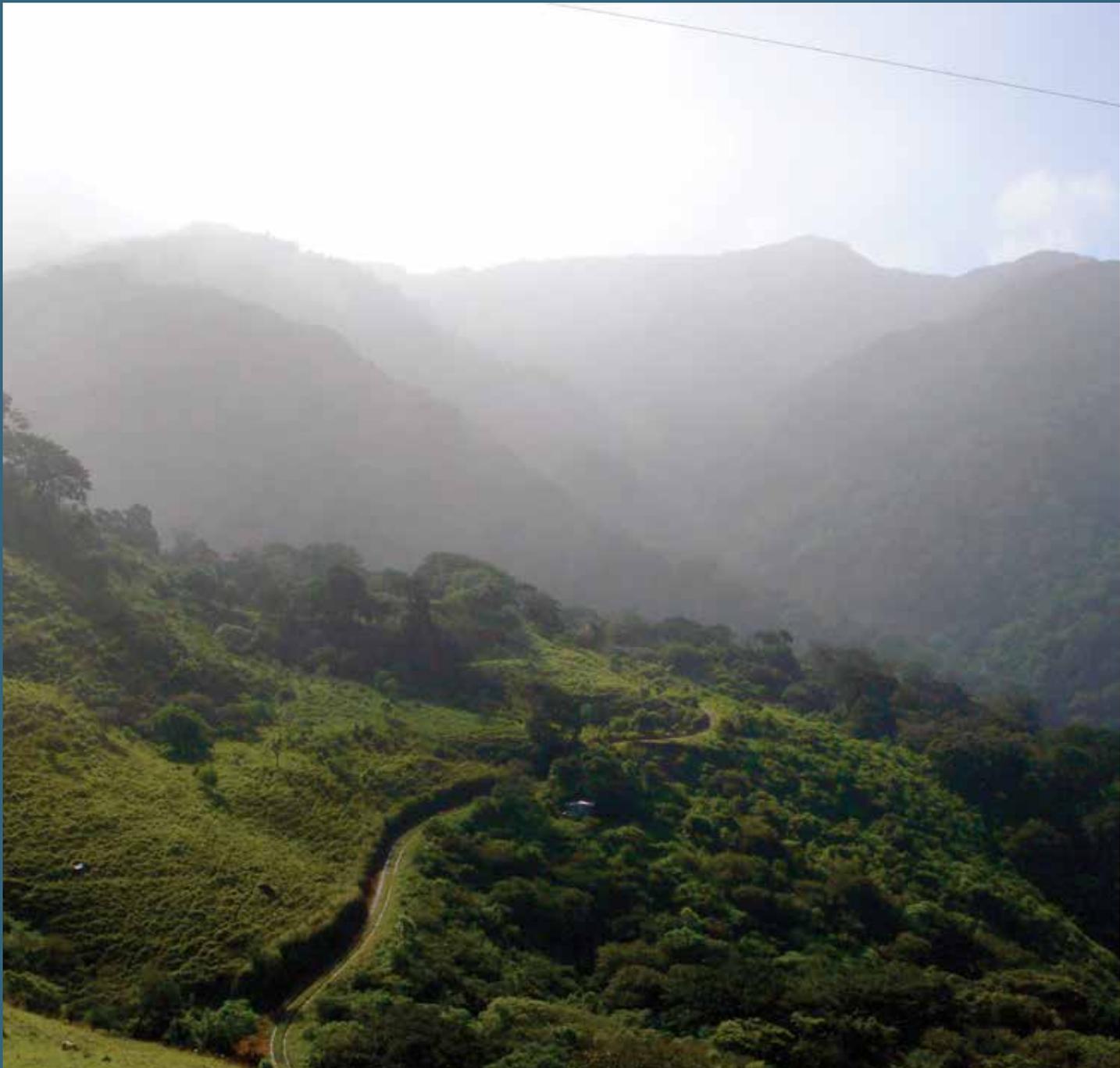
If you have questions as you prepare for your expedition, we encourage you to contact your Earthwatch office. Thank you for your support, and enjoy your expedition!

Sincerely,



Scott Kania
President and CEO, Earthwatch





Earthwatch U.S.
114 Western Ave.
Boston, MA 02134
United States

info@earthwatch.org
earthwatch.org

Phone: 1-978-461-0081
Toll-Free: 1-800-776-0188
Fax: 1-978-461-2332

Earthwatch Europe
Mayfield House
256 Banbury Rd.
Oxford, OX2 7DE
United Kingdom

info@earthwatch.org.uk
earthwatch.org

Phone: 44-0-1865-318-838
Fax: 44-0-1865-311-383

Earthwatch Australia
Suite G-07, Ground Floor
60L Green Building,
60-66 Leicester Street Carlton
VIC 3053, Australia

earth@earthwatch.org.au
earthwatch.org

Phone: 61-0-3-9016-7590
Fax: 61-0-3-9686-3652

Earthwatch Japan
Food Science Bldg. 4F
The University of Tokyo
1-1-1, Yayoi, Bunkyo-ku
Tokyo 113-8657, Japan

info@earthwatch.jp
earthwatch.org

Phone: 81-0-3-6686-0300
Fax: 81-0-3-6686-0477