Schools' Booklet

Coral Triangle Indonesia 2024

Contents

1. Study Area

Sulawesi and the surrounding smaller islands of the Lesser Sundas and the Moluccas were identified as a unique biogeographic region by the naturalist Alfred Russell Wallace in the late 19th century. These islands are now known as the Wallacea region of Indonesia (defined by the area within the dotted line on the map below), and formed their unique fauna due to their isolation from other landmasses by the deep ocean channels that surround the islands. During past Ice Ages sea levels here dropped by up to 100m. This led to the large 'Greater Sunda' islands to the west (Borneo, Java, Sumatra and Bali) being linked to mainland Asia by land-bridges, and therefore allowing large mammalian fauna to spread throughout this area. However, the deep ocean channel between Borneo and Wallacea remained impassable to large mammals, so few are found in the region. The islands to the east of Wallacea would have been linked to Australasia, and have many species of marsupials and other Australian fauna. Again, the ocean channels between Wallacea and New Guinea were too deep for most mammals to cross. However, birds, reptiles and insects were able to cross the channels, and Wallacea has species of both Asian and Australian origin.

Figure 1. Location of the Wallacea biogeographical region

Sulawesi is the fourth largest island in Indonesia (159,000 km2) and has a high percentage of endemic species on land (those that occur nowhere else in the world other than in Sulawesi).

The underwater biodiversity in this region is also spectacular given that it falls within the Coral Triangle. Often compared to the Amazon, the Coral Triangle is one of the world's richest areas of marine life. Stretching across six countries in Southeast Asia and the Pacific (Indonesia, Philippines, Malaysia, Papua New Guinea, Solomon Islands and Timor Leste), the area has 76% of all known coral species in the world and is home to 37% of the world's total coral reef fish.

Our Hoga Island Research Centre is located in the Wakatobi Marine National Park, in Southeast Sulawesi, which is right at the heart of the Coral Triangle area.

Figure 2. Map of the Coral Triangle

The two week expedition will be spent at Operation Wallacea's Hoga Island Marine Research base in the Wakatobi Marine National Park in Southeast Sulawesi, Indonesia. The Hoga Island research programme has been designed by the Coral Reef Research Unit at Essex University and has an outstanding publication record. Over the time that we have been working in the area, over 200 peer reviewed articles have been published in academic journals. The site is the location of a Darwin Initiative-funded conservation management programme which is working with the local community to develop a sustainable reef fishery.

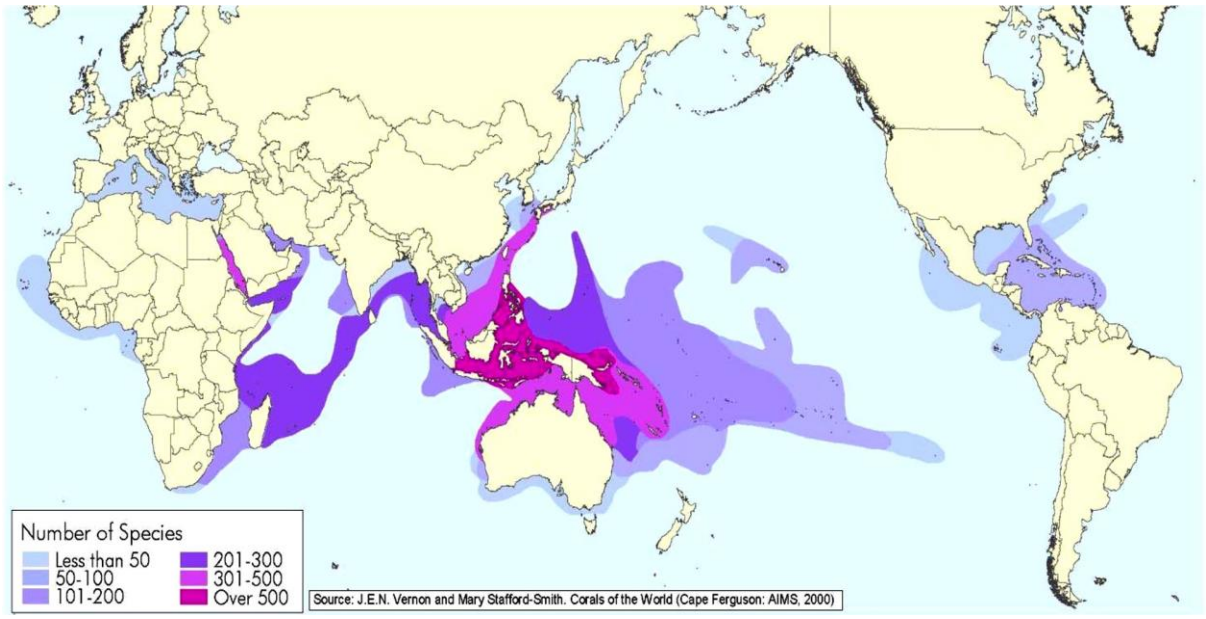

Figure 3. Coral Triangle – Distribution of Hard Coral Species

Figure 4. Important locations.

2. Itinerary Overview

The students will complete the full two weeks of their expedition at the remote Hoga Island Marine research site in the Wakatobi Marine National Park in Southeast Sulawesi. The group will arrive into a hub in Indonesia such as Jakarta or Bali, then travel via domestic flight to Baubau in Southeast Sulawesi. Generally an overnight in a hotel in Jakarta, Bali or Makassar enroute to Baubau will be necessary.

The group will arrive in Baubau airport on a Saturday afternoon, where an Opwall representative will meet and transfer them to a small hotel in the centre of Baubau town. The group will have dinner and overnight here before transferring to Hoga Island the following day by car and ferry, arriving at the Hoga Marine site on the Sunday afternoon around 3pm.

The first six days on Hoga Island will involve training and the Saturday at the end of the week will be a rest day. During the second week further training and research activities will be undertaken, with the group leaving the island on the final Saturday morning to start their journey back to their home country.

The group will travel by ferry and car back to Baubau on Buton Island, departing Hoga at 6am, and taking a flight out of Baubau airport at 3pm the same day.

3. Coral Triangle Expedition Activities

The students will complete two weeks of training in marine science at the Hoga Island marine research base, with a day allocated for rest in the middle of the expedition. There will also be the opportunity to visit local villages and learn about the rich culture of the area.

During the first week, students have the option of completing their PADI Open Water dive qualification (see section 5). If students are already dive trained or opting to snorkel they will immediately begin the Indo-Pacific Reef Ecology course (see section 4). A third alternative is to complete the theory and confined water practicals before coming out on the expedition, and then completing 4 open water training dives on-site to achieve the PADI Open Water qualification, moving on to the reef ecology course for the remainder of the week. This is known as an PADI Open Water Referral Course (see section 6).

During the second week, newly certified divers will progress on to the Indo-Pacific Reef Ecology course (see section 4). Those students who have completed this course in their first week will complete a week of survey techniques and data collection alongside our teams of marine biologists (see section 7). All students will also be expected to complete an individual mini-project during their time onsite, and asked to present it to the group at the end of the second week.

4. Indo-Pacific Coral Reef Ecology Course

Table 2 shows an example timetable of the activities that students undertaking the Indo-Pacific Coral Reef Ecology Course will complete over the week. The contents of the timetable are comprehensive but the timing of the sessions will vary for each group. The practical element of the reef ecology course can be completed by either diving or snorkeling. If students are already qualified divers by the time they arrive on site, they will be required to complete a compulsory check dive with a PADI Professional at the start of the course. The Indo-Pacific Coral Reef Ecology Course is designed specifically for students aged 16-18 yrs in mind. It covers a range of topics suitable to support A-Level biology and geography students, IB Biology and ESS students and those studying a range of different senior school syllabuses. Lectures will be supported by in-water practicals. In addition to the lectures, a discussion/activity element will be sure to engage the students into the science and get them thinking themselves of the importance of the study topic.

Table 2. Indicative timetable for those taking the Reef Ecology Course. Note there may be changes depending on fitness of students, weather conditions or operational considerations.

Day	Schedule for reef ecology students
Sunday am	Arrive marine site, welcome and house allocations
Sunday pm	Health and safety briefings Dive documentation First in-water session – Check snorkel
Sunday eve	Lecture 1: Intro to Coral Reefs & Independent Project Briefing

Monday am	Lecture 2: Importance of Coral Reefs Dive/snorkel practical 1 – check dive/ Intro to skin diving (snorkelers)
Monday pm	Workshop: Reef Complexity Dive/snorkel practical 2 – Buoyancy Skills Dive/ Duck Diving Skills Snorkel
Monday eve	Dive Logs/Coral Reef Ecology Taxonomy Skills Session: Corals & Inverts
Tuesday am	Lecture 3: Reef Species & Interactivity Dive/Snorkel practical 3 – Coral Growth Forms
Tuesday pm	Workshop - Benthic Assessment, Transects & Quadrats Dive/Snorkel practical 4 – Benthic Assessment
Tuesday eve	Dive Logs/Coral Reef Ecology Taxonomy Skills Session: Fish
Wednesday am	Lecture 4: Underwater Surveys Dive/snorkel practical 5 – Invert Belt Transect
Wednesday pm	Lecture 5: Mangroves & Seagrasses Snorkel practical 6 – Mangrove & Seagrass Snorkel
Wednesday eve	Dive Logs/Guest Lecture - Science on Hoga
Thursday am	Workshop: Build a Fish & Fish ID Symbols Dive/snorkel practical 7 – Fish ID
Thursday pm	Lecture 6: Threats to Reefs & Mitigation Dive/snorkel practical 8 – Assessing levels of coral bleaching using PADI's 'Coral Watch' guidelines
Thursday eve	Dive Logs/Science Activity/Documentary Night
Friday am	Fun dive Cultural visit to Sampela Sea-nomad Village
Friday pm	Independent Project Presentations Pack up Feedback
Friday eve	Social night
Saturday am	Degas Day – rest and optional activities (or Depart marine site if course undertake in second week of expedition)

5. PADI Open Water Diver Course

This course consists of three different elements of learning; dive theory (knowledge development), confined water dives and open water dives. Each component plays its own role in the students' development to meet the performance requirements and objectives they need to become a qualified diver.

Please be aware that as a part of the PADI Open Water Course, all students will be required to complete some basic stamina tests on site. Student divers will need to demonstrate that they can comfortably maintain themselves in water too deep in which to stand by completing a 10-minute swim/float without using any swimming aids. Instructors will also have students complete a 200m continuous surface swim or a 300 m swim with mask, fins and snorkel. Table 3 shows an example timetable of the activities that students complete during the PADI Open Water Course. The contents of the timetable are comprehensive but the timing of the sessions will vary for each group.

Table 3. Indicative timetable for those taking the PADI open water diver course. Note there may be changes depending on fitness of students, weather conditions, tides or operational problems.

Day	Activity
Sunday am	Arrive marine site, welcome and house allocations
Sunday pm	Health and safety briefings First In-water Practical – Check Snorkel
Sunday eve	Lecture 1: Intro to Coral Reefs & Independent Project Briefing Dive documentation
Monday am	Dive Theory 1 Confined water dive
Monday pm	Dive Theory 2 Confined water dive
Monday eve	Dive Logs/Coral Reef Ecology Taxonomy Skills Session: Corals & Inverts
Tuesday am	Dive Theory 3 Confined water dive
Tuesday pm	Dive Theory 4 Open Water 1 dive
Tuesday eve	Dive Logs/Coral Reef Ecology Taxonomy Skills Session: Fish
Wednesday am	Dive Theory 5 Open water 2 dive
Wednesday pm	Dive Theory – Dive Tables Open Water 3 dive
Wednesday eve	Dive Logs/Guest Lecture - Science on Hoga
Thursday am	Dive theory exam Open Water 4 dive
Thursday pm	Dive certification catch up dive/ Fish ID Dive
Thursday eve	Dive Logs/Science Activity/Documentary Night
Friday am	Fun dive Cultural visit to Sampela Sea-nomad Village
Friday pm	Independent Project Presentations Pack up Feedback
Friday eve	Social night
Saturday am	Degas day – rest and other option activities

6. PADI Open Water Referral Course

For those students who have completed both the dive theory and confined water sessions prior to expedition, they can complete their PADI Open Water Referral Course on site. The students will first complete a check dive with their instructor to demonstrate that they still remember and can confidently perform the necessary skills to progress on to complete their open water dives.

Once referral students have successfully completed the final stages of their PADI Open Water course, they will be able to progress on to the Coral Reef Ecology course. Although there will not be enough time to run the full course, referral students will be able to join at a stage where they can get the chance to learn about the application of survey techniques in the marine environment and how that supports the all-important management of coral reefs. The lectures of the coral reef ecology course are organized so that all referral students will be able to attend these lectures around their dive training requirements. Table 5 shows an example timetable of the activities that students finishing the PADI Dive Referral Course will complete over the week. The contents of the timetable are comprehensive but the timing of the sessions will vary for each group.

Table 4. Indicative timetable for those taking the PADI open water referral course. Note there may be changes depending on fitness of students, weather conditions, tides or operational considerations.

Day	Activity
Sunday am	Arrive marine site, welcome and house allocation
Sunday pm	Health and safety briefings Dive documentation First In-water session: Check Snorkel
Sunday eve	Lecture 1: Intro to Coral Reefs & Independent Project Briefing
Monday am	PADI Theory: Quick Review Session Lecture 2: An Introduction to Coral Reefs Dive Training: Confined Water Scuba Skills Refresher
Monday pm	Workshop: Reef Complexity Dive Training: Open Water 1
Monday eve	Dive Logs/Coral Reef Ecology Taxonomy Skills Session: Corals & Inverts
Tuesday am	Lecture 3: Reef Species & Interactivity Dive Training: Open Water 2
Tuesday pm	Workshop - Benthic Assessment, Transects & Quadrats Dive Training: Open Water 3
Tuesday eve	Dive Logs/Coral Reef Ecology Taxonomy Skills Session: Fish
Wednesday am	Lecture 4: Underwater Surveys Dive Training: Open Water 4 & Certification
Wednesday pm	Lecture 5: Mangroves & Seagrasses Dive practical 1 – Buoyancy Skills (or catch up training dive)
Wednesday eve	Dive Logs/Guest Lecture - Science on Hoga
Thursday am	Workshop: Build a Fish & Fish ID Symbols Dive practical 2 – fish identification skills
Thursday pm	Lecture 6: Threats to Reefs & Mitigation Dive/snorkel practical 8 – Assessing levels of coral bleaching using PADI's 'Coral Watch' guidelines
Thursday eve	Dive Logs/Science Activity/Documentary Night
Friday am	Fun dive Cultural visit to Sampela Sea-nomad Village

Friday pm	Independent Project Presentations Pack up Feedback
Friday eve	Social night
Saturday am	Degas Day – rest and optional activities

7. Survey Techniques & Data Collection

Those students who complete the Indo-Pacific Reef Ecology course in their first week will spend their second week assisting our marine biologists with data collection across a variety of research projects, via either diving or snorkelling. The daily schedule will involve two in-water practical sessions each day and a range of other workshops, activities, and data entry sessions etc.

Projects that students will get involved in may include, but are not limited to:

- Underwater Visual Census (UVC): this standardised survey technique gives students the opportunity to use the ID skills gained from the Indo-Pacific Coral Reef Ecology course to assess the abundance and diversity of fish populations in the study system.
- Line intercept video surveys: students will use videographic techniques to film benthic transects in-water. Videos will then be uploaded and analysed back on land to quantify the relative abundances of key benthic components, including hard and soft corals, macroalgae and sponges.
- Macro-invertebrate belt transects: students swim in pairs 1m either side of a 50m long transect to create a survey area of 100m2. All macro-invertebrates encountered within this area are recorded.
- 3D modelling: using single GoPro cameras, students will film 2x2m benthic quadrats. The video can then be uploaded and manipulated to create a 3D model of the underlying reef architecture from which key measures of habitat structure are calculated. These data can be used in conjunction with those collected on the biodiversity surveys to identify the drivers of abundance and diversity in the study system.
- Coral Reef Regeneration Research: In 2017 Opwall began working on a large-scale coral reef restoration project in partnership with the Mars foundation. Teams use cameras and visual census surveys to assess the success of the project, and rates of reef regeneration.
- Coral Rehabilitation project using a unique system of interlocking reef star frames anchored to the sea bed, along with coral transplantation techniques. This is an opportunity to get hands on experience assisting with reef rehabilitation.
- Patch Reef Research looking at reef complexity and its relationship to biodiversity.
- Fish behaviour studies which involves various methods of monitoring the ecology of differing fish families such as clown fish and cleaner wrasse.

Throughout both weeks, students will meet regularly with Operation Wallacea scientists who will give talks about the specifics of their research projects. Alongside the educational courses and surveys, students will be expected to complete an independent research project over the course of their two-week expedition and will present their findings to the group at the end of their second week. This is a great opportunity for students wanting to use the expedition to collect data towards an IB Extended Essay or Internal Assessment.

8. Reef Ecology Lectures & Workshops

Lecture 1: Introduction to Coral Reefs

- Assessing current knowledge of marine ecosystems
- How the world learns about science and the environment
- The concept of charismatic species
- Introduction to hard and soft corals
- Coral anatomy, feeding and reproduction

Land-based activity: Group research project briefing
In-water activity: Check dive/snorkel

Lecture 2: Importance of Coral Reefs

- Discussing how coral reefs are important (biodiversity, productivity etc)
- Furthering examples with fisheries and coastal protection
- How does tourism contribute to importance?
- How coral reefs are distributed globally
- The intermediate disturbance hypothesis

Land-based activity: Reef Complexity workshop
In-water activity: Buoyancy skills

Lecture 3: Reef Species & Interactivity

- Defining interaction types
- Discussing competition, predation and symbioses
- Deep dive into parrotfish (discussing their importance and interactions)
- Deep dive into butterflyfish (discussing their importance and interactions)
- Deep dive into damselfish (discussing their importance and interactions)

Land-based activity: Benthic Assessment & Transect laying
In-water activity: Coral Growth Forms

Lecture 4: Underwater Surveys: Theory and Execution

- What is marine monitoring, and what considerations need to be made?
- An introduction to the benthic environment (benthos)
- How can the benthic environment be surveyed?
- An introduction to the midwater environment (fish)
- How can the benthic environment be surveyed?

Land-based activity: Benthic Assessment & Transect laying
In-water activity: Benthic Assessment with Quadrats

Lecture 5: Mangroves and Seagrasses

- Introduction to mangroves
- Adaptations of mangroves to their environment
- Introduction to seagrasses
- Adaptations of seagrasses to their environment
- Ecosystem functions of mangroves and seagrasses

In-water activity: Snorkel in Mangroves and on a seagrass bed

Lecture 6: Threats to Reef & Mitigation

- Required conditions for coral growth and survival
- Threats to coral reefs
- Outlining ocean acidification, unsustainable fishing practices and phase shifts
- Ecological resilience
- The future of coral reefs

In-water activity: Assessing coral bleaching using PADI's 'Coral Watch' guidelines

ID Lecture 1: Invertebrates and Corals

- Sponges
- Non-sessile invertebrates
- What is an invertebrate / coral?
- Defining ecosystem architects
- Coral morphologies

In-water activity: Invertebrate Belt Transect

ID Lecture 2: Fish

- There is no such thing as a fish!
- How do we describe fish?
- The different body shapes
- How to describe markings / patterning
- Examples of local reef fish

Land-based activity: Build a fish
In-water activity: Fish Identification

Land-based activity: Group research project presentations

9. Curriculum Links Table (A-Level exam boards, AP & IB)

The following two tables highlight how your Opwall expedition relates to the AS and A level syllabuses across all exam boards, the AP and IB. The red and blue blocks indicates that the keywords listed are covered on our expedition (through lectures, practical's or in discussion topics) and that these keywords are also within As, A level, AP or IB topics as shown.

Topic	Biology	AQA		C	CCEA		C.Int		Ed/Sal		OCR		SQA		WJEC		AP	IB
	Levels: S=AS 2=A2 H =Highers	S	2		S	2	S	2	S	2	S	2	H	AH	S	2		
Evolution, Classification and DNA	Evolution; Speciation; Species; Endemism; Gene pool; Allopatric; Sympatric; Isolation; Variation; Adaptive radiation Adaptation; Wallace; Darwin		◆	◆		◆		◆	◆		◆		◆	◆		◆	◆	◆
	Classification; Taxonomy; Binomial system; Dichotomous Keys	◆		◆	◆			◆	◆	◆	◆			◆	◆			◆
Ecology and Ecosystems	Ecology; Habitat; Niche; Abiotic; Biotic		◆	◆	◆		◆		◆	◆	◆					◆	◆	◆
	Biome; Ecosystems; Rainforests; Deserts; Coral reefs; Mangroves; Marine; Coasts; Hot arid; Semi-arid; Woodland Bush; Tropics; Tropical		◆	◆		◆	◆					◆				◆	◆	◆
	Populations; Competition; Interspecific; Intraspecific; Predator Prey; density dependent; independent: Symbiosis		◆	◆		◆	◆					◆				◆	◆	◆
	Succession; Climax community		◆			◆				◆	◆	◆				◆		◆
	Biodiversity	◆		◆	◆			◆	◆	◆	◆				◆		◆	◆
	Practical work; Field techniques; Ecological sampling; Random sampling; Transects; Capture, mark, release and recapture; Biodiversity indexes; Data handling and; presentation; Quadrats; Statistical testing; Measuring; GIS; Research tools		◆	◆		◆				◆	◆	◆	◆	◆		◆	◆	◆
	Written reports; Research project; Report; Case studies			◆					◆				◆	◆		◆	◆	◆
Agriculture, Human activities, Conservation and Sustainability	Sustainability	◆		◆					◆	◆		◆				◆		
	Agriculture; Agricultural impact; Agricultural exploitation; Cultivation crops; Food production; Sustainable agriculture; Sustainability; Forestry; Timber; Deforestation; Fisheries; Over fishing; Deforestation; Human management; Human effects; Human activities	◆				◆						◆	◆			◆	◆	
	Fair-Trade; Coffee; Rain Forest Alliance; Ecotourism; Tourism; Carbon trading; Greenhouse gas emission control (REDD+)															◆		
	Indicator species; Pollution; Climate change; Global warming Carbon footprint; Fossil fuels		◆	◆		◆				◆	◆		◆				◆	◆
	International conservation; Endangered species; Invasive species; Biological control; Pests; CITES; Ethical, Local; Global	◆	◆	◆		◆		◆			◆	◆	◆			◆		◆
	National Parks; Wildlife reserves							◆										◆
	Environment; Environmental monitoring; Environmental impact; SSSI																	
Behaviour	Animal behaviour; Primate Social behaviour; Courtship; Territory; Co-operative hunting; Herbivores; Grazing	◆		◆	◆			◆				◆	◆	◆		◆	◆	◆

Table: Highlighted in Black are topics that you might experience at your research site. Key: C = Cambridge. Pre-U, C.int = Camb. Int. CCEA = N.Ireland; Ed/Sal = Edexcel Salters, S= SQA ; Edex = EdExcel ; IB = International Bacc; AP=Advanced Placement (v. 20/11/14)

Topic	Geography, APES and ESS	IB ESS	APES	AQA		CCEA		Edex		OCR		WJEC	
				Geography									
	Levels: S=AS 2=A2			S	2	S	2	S	2	S	2	S	2
Evolution, Classification and DNA	Evolution; Speciation; Species; Endemism; Gene pool; Allopatric; Sympatric; Isolation; Variation; Adaptive radiation Adaptation; Wallace; Darwin												
	Classification; Taxonomy; Binomial system; Dichotomous Keys	◆											
Ecology and Ecosystems	Ecology; Habitat; Niche; Abiotic; Biotic	◆	◆							◆			
	Biome; Ecosystems; Rainforests; Deserts; Coral reefs; Mangroves; Marine; Coasts; Hot arid; Semi-arid; Woodland Bush; Tropics; Tropical	◆	◆	◆	◆		◆		◆	◆	◆	◆	◆
	Populations; Competition; Interspecific; Intraspecific; Predator Prey; density dependent; independent: Symbiosis	◆	◆										
	Succession; Climax community	◆											
	Biodiversity	◆	◆		◆				◆				
	Practical work; Field techniques; Ecological sampling; Random sampling; Transects; Capture, mark, release and recapture; Biodiversity indexes; Data handling and; presentation; Quadrats; Statistical testing; Measuring; GIS; Research tools	◆	◆		◆	◆		◆		◆	◆	◆	
	Written reports; Research project; Report; Case studies	◆	◆		◆		◆	◆		◆	◆		
Agriculture, Human activities, Conservation and Sustainability	Sustainability	◆	◆		◆		◆			◆	◆		
	Agriculture; Agricultural impact; Agricultural exploitation; Cultivation crops; Food production; Sustainable agriculture; Sustainability; Forestry; Timber; Deforestation; Fisheries; Over fishing; Deforestation; Human management; Human effects; Human activities	◆	◆		◆		◆						
	Fair-Trade; Coffee; Rain Forest Alliance; Ecotourism; Tourism; Carbon trading; Greenhouse gas emission control (REDD+)						◆	◆		◆	◆		◆
	Indicator species; Pollution; Climate change; Global warming Carbon footprint; Fossil fuels	◆	◆				◆	◆		◆			
	International conservation; Endangered species; Invasive species; Biological control; Pests; CITES; Ethical, Local; Global	◆			◆					◆			
	National Parks; Wildlife reserves								◆				
	Environment; Environmental monitoring; Environmental impact; SSSI												
Behaviour	Animal behaviour; Primate Social behaviour; Courtship; Territory; Co-operative hunting; Herbivores; Grazing												

Table: Highlighted in Black are topics that you might experience at your research site. Key: C = Cambridge. Pre-U, C.int = Camb. Int. CCEA = N.Ireland; Ed/Sal = Edexcel Salters, S= SQA ; Edex = EdExcel IB ESS = Env Systems and Societies; APES = Advanced Placement Env. Science (v. 20/11/14)

10. Reading & Research Questions

In the last few years an increasing number of students joining our research programmes take this opportunity to undertake Independent Research Projects (IRPs). These research projects take many different forms, but what they all have in common is the need to pose and answer a research question. Examples of these include Extended Project Qualification (EPQ), Extended Essay (EE) for IB, as well as many different projects specific to various education systems worldwide.

We can support a selection of different topics for either essay-based research projects or data-led research projects that are tailored towards what the students will experience on site. It is a fantastic opportunity for a student to witness first-hand many of the aspects of their research question and, in many cases, they will have access to samples of past datasets for their project. Students may also have the opportunity to talk with the actual scientists involved which will give them a convincing 'slant' to the way in which they answer their research question.

For success with IRPs, careful planning is needed by the student and a lot of the work will be done prior to their expedition. They will need close guidance from their school supervisor, and the scientists in the field need to be briefed so that support can be provided where they can. If you or your students are interested in undertaking a research project with us, you should contact roger.poland@opwall.com

For more information visit the Opwall website - https://www.opwall.com/schools/educational-benefits/independent-research-project/.

Useful reading:

Malay Archipelago, Alfred Russell Wallace (1850) – available in Kindle format from Amazon for £6-57. The whole text is also available online here: www.papuaweb.org/dlib/bk/wallace/cover.html

Song of the Dodo, David Quammen (1997).Best description of island biogeography

A Naturalists Guide to the Tropics, Marco Lambertini (2000).Best introduction to tropical forests

Coates, Brian J. and Bishop, K. D. - A Guide to the Birds of Wallacea: Sulawesi, the Moluccas and Lesser Sunda (1997). Best bird ID guide for Sulawesi and the surrounding islands, Indonesia.

SAS Survival Guide Wiseman, J. (1999) Collins GEM. Best overall guide to field survival

Robson, Stuart and Millie, Julian (2004) Instant Indonesian: Everything You Need to Speak Indonesian in 100 Key Words and Phrases.

11. Research Areas & Activities being carried out on Hoga

Assessing the impacts of tourism in the Wakatobi Marine Park, Indonesia.
Supporting fisheries management policies in the Wakatobi
Quantifying the resilience of marine dependent communities to climate change and resource depletion in Indonesia.
Environmental impact and feeding habits of the Crown of thorns starfish Acanthasterplanci in a low density population in the Wakatobi, Indonesia.
The importance of different coral growth forms for reef biodiversity in Indonesia.
Physiological adaptations of the unique salt-water frog.
The physical and biological structure of a light-limited coral reef.
Environmental driven variations in reef architecture.
Environmentally driven changes to the primary causes of coral mortality.
Wakatobi Culture, Community and Environment.
The sustainability of fisheries activities within the Wakatobi.
The environmental impact of fish fences within the Wakatobi.
Niche partitioning of Fiddler crabs in biodiverse and highly competitive environments in Indonesia.
Mangrove habitats of the Wakatobi, Indonesia.
Seagrass habitats of the Wakatobi.
Ecology and behaviour of fiddler and sentinel crab populations.
Sponge ecology and coral reef phase shifts in Indonesia.
Competitive interactions between sponges and other reef organisms in Indonesia.
The diversity, distribution and abundance of Nudibranchs in Indonesia.
The role of territorial Damselfish in sculpturing coral reef biodiversity in Indonesia.
Resource utilisation of reef fish across environmental gradients in Indonesia.
The ecology of Anemonefish in Indonesia.
The ecological impact of smothering sponge and ascidians on coral reefs in Indonesia.
The behaviour and functional role of reef fish cleaners in Indonesia.
The abundance and impact of coral bio-eroding invertebrates across environmental gradients in Indonesia.
The ecology and biology of shallow subtidal patch reefs in Indonesia.
Methods of reef assessment and the effect different survey techniques have on estimations of reef fish abundance and functional biomass in Indonesia.
Conservation of herbivore biomass and functional biology of reef systems.
Opwall Coral Reef monitoring programme underpinning scientific research.
The eco-physiology of juvenile reef fish: preparing for future climate change.
Are animals living in extreme environments best equipped to deal with climate change?
Thermal induced rapid coral mortality in Indonesia.