OPERATION WALLACEA

Indonesia School's Booklet 2026

Contents

1. Study Area & Research Objectives

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 (those that occur nowhere else in the world other than in Sulawesi). There are 127 known mammal species in Sulawesi, of which 62% (79 species) are endemic; 700 species of bird (36% endemic); and 74 species of herpetofauna (38% endemic). Despite such high numbers of endemic species in these forests the Wallacea region remains one of the least biologically studied areas in the world, and one of the most likely places to discover vertebrate species that are new to science.

The North Buton Nature Reserve (NBNR) comprises 82,000 hectares of upland tropical rainforest located on the island of Buton. The reserve supports forests that are representative of the region's rich and endemic wildlife and as such is deemed a site of major conservation significance within the Wallacea bio-region of eastern Indonesia. The endangered dwarf buffalo

('Anoa'), the giant knobbed hornbill and the world's smallest primate ('Tarsius') are just of the unique species that inhibit these ancient forests. Much of the reserve is dominated by 'karst forest', growing on limestone rock that in ages past existed as coral reef. The tropical forests of North Buton represents an area of high conservation value, whose scientific understanding is deemed critical to its long-term protection and preservation.

The first week of the expedition will be spent at one of Operation Wallacea's field camps located on Buton Island. The teams will help collect biodiversity data across a variety of different habitat types found on the island. Whilst much of the forest on Buton Island has been impacted by illegal logging and clearing for agriculture, the island also supports some of the best examples of tropical lowland rain forest to be found anywhere in region. As such, biodiversity surveys conducted by Operation Wallacea will seek to assess and compare species distribution and abundance for selected taxa found within primary rainforests, selectively logged and disturbed forests, as well as neighboring agricultural landscapes. Such surveys will seek to understand the biological significance of these different habitat types and their role in protecting biodiversity along the edge of the reserve.

The second week will be run at the Opwall marine research centre on Hoga Island in the Wakatobi Marine National Park. The Hoga Island research programme was 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 was the location of a Darwin Initiative-funded conservation management programme which worked closely with the local community over a number of years to develop a sustainable reef fishery. Teams in the field are currently looking to bring in additional funding to build on the conservation management programme of previous years

Figure 2. Important locations.

2. Week 1 Itinerary

The students on site will complete five days of training and research. Included in this program are two afternoon sessions of jungle and science skills training, forest habitat surveys and mornings learning about biodiversity monitoring techniques and assisting our field scientists.

Students working in the North Buton camps will travel from Kendari to Ereke by ferry and car on the Sunday. They will arrive in the afternoon and trek approximately one hour into the forest camp arriving late afternoon. That evening there will be introductory lectures on health and safety, and site orientation.

All school groups will follow a timetable similar to that in Table 1. Please note that the students will work in smaller groups for the field practicals. The students should complete each of the activities listed but the timing of the sessions may vary.

Table 1. Example timetable for North Camp forest week.

Timetables will vary dependent on group size. Note there may be changes depending on fitness of students, weather conditions or operational issues.

Day	Activity
Sunday pm	Arrive at forest camp, induction, H&S talks and site orientation
Monday am	Field practical – invertebrates, birds, herpetofauna or megafauna
Monday pm	Jungle skills
Monday evening	Lecture 1 – Introduction to Indonesia and Wallacean Biodiversity Field practical – Bat survey
Tuesday am	Field practical – invertebrates, birds, herpetofauna or megafauna
Tuesday pm	Ecological Field skills
Tuesday evening	Lecture 2 – Wallacean Bird communities
Wednesday am	Field practical – invertebrates, birds, herpetofauna or megafauna
Wednesday pm	Field practical or in-camp workshop
Wednesday evening	Lecture 3 – Wallacean Herpetofauna Field practical – Herp river walk
Thursday am	Field practical – invertebrates, birds, herpetofauna or megafauna
Thursday pm	Habitat survey
Thursday evening	Lecture 4 – Wallacean Mammals Field practical – Mammal walk
Friday am	Field practical – invertebrates, birds, herpetofauna or megafauna
Friday pm	Field practical or in-camp workshop
Friday evening	Lecture 5 – Conservation Social Night
Saturday am	Pack up and feedback Depart to marine site

3. Jungle Survival Skills

Introduction to life in forest camps, and how to identify and reduce risks throughout the forest. Each group will learn the basic skills needed to live in the jungle e.g. how to select a safe camp site, make fires, shelters, field cooking, etc. During their walks into and out of the camp they will have constant reinforcement of the health and safety messages and identifications of common trees, birds and reptiles encountered.

Learning outcomes:

- Awareness of dangerous plants and animals - from the briefings and demonstrations in the field
- Awareness of disease and health issues working in a tropical rainforest - from the medical briefings and additional information given by the accompanying medic
- Safe working practices in remote locations- this is to do with trekking procedures, river crossings, taking water, hat, sunblock, organising communications etc. gained through lectures and field experience

4. Week 1 lectures

Lecture 1 - Introduction to Indonesia and Wallacea

- Welcome to Indonesia!
- Wallacea and Wallace
- Endemism overview
- Conservation and hotspots
- Biodiversity on Buton Island

Lecture 2 – Wallacean Bird communities

- Bird diversity and importance
- Birds of Wallacea and Buton
- Bird survey techniques

Lecture 3 – Wallacean Herpetofauna

- What are herpetofauna
- Wallacean Herpetofauna
- Conservation issues & the amphibian extinction crisis
- Surveying herpetofauna

Lecture 4 - Wallacean Mammals

- What is a mammal?
- Wallacean mammals
- Survey techniques

Lecture 5 - Conservation challenges

- What is conservation
- Common conservation issues
- Conservation threats and solutions in Wallacea

5. Biodiversity Practicals

In the forest surrounding the camps (working in small groups) students will complete the following field practicals:

Wallacean birds

This practical involves an early morning bird point count survey with an ornithologist. The objective will be to learn the principals of the point count survey methodology and to learn how to identify as many species by sight and sound as possible.

Herpetofauna pitfall lines

The students will be helping with the checking of pitfall traps for amphibians, reptiles and small mammals. The objective will be to learn about standardised pitfall trapping methodologies and identify the common herpetofauna species of the Buton Forests.

Megafauna surveys

This survey involves walking linear forest transects and looking for evidence of occupancy by the Islands megafauna species, most notably Lowland Anoa, Booted Macaque, and Sulawesi Wild Pig. Most of these species are very shy, and are usually detected by their tracks and signs rather than by sight. The objectives of this survey are to learn the basics of patch occupancy methodologies and to learn how to determine the presence of different mammal species by locating and identifying indirect signs.

Invertebrate surveys

This practical starts with a briefing on survey techniques followed by a butterfly survey. These surveys will use modified Pollard counts along a transect to monitor the butterflies of the Buton forests in a systematic manner. The objectives of this survey are to learn the basics of the Pollard count methodology and learn how to identify common butterfly species found in the project area.

Nocturnal amphibian surveys

This practical will involve spotlight surveys of river systems after dark with a herpetologist to monitor frog communities and opportunistically sighted reptiles. Species encountered will be identified and the main identification features explained. Students participating in this survey will learn opportunistic methodologies, distance sampling methods, and how to identify the common amphibian species found in the Buton forests.

Bat surveys

This practical will involve working with a bat scientist in the evening to set and empty harp traps and/or mist nets. The captured bats will be identified and the main identification features explained. Students participating in this survey will learn the correct bat extraction and handling methodologies as well as familiarity with the common bat species found on the Island. Students will not handle the bats themselves.

Learning objectives:

1. Be able to identify 10 local bird species by sight and sound.
2. Describe how to identify different reptile families
3. Be able to identify five species of reptile and amphibian found in Sulawesi
4. Learn how to identify large mammal species from their tracks and signs
5. Learn how to conduct butterfly Pollard counts
6. Describe key features that aid in identifying bat species
7. Be able to describe the differences between harp and mist net trapping for bats

6. Research Contribution

The major research contribution of schools students on Buton has been their efforts towards our forest habitat surveys. Since Operation Wallacea began working with groups of school students on Buton in 2007, their crucial contributions in this area have allowed us to gather large-scale forest vegetation structure data sets which form the foundations of research here.

These data have been analyzed to produce two publications. The first of these publications is a study of the accuracy of the school groups' work on Buton. Notably, the value of volunteers for collecting data on tropical forest vegetation structure had not previously been published. By comparing the plots surveyed by the students under the leadership of the local and international experts, to the plots surveyed purely by the experts, strengths and weaknesses of the students' surveys have been identified. This paper provides robust statistical support to the value of the students as surveyors and has enabled areas of weakness within the students' surveys to be targeted for improvement. The second paper presently in preparation for publication, is an assessment of the small-scale selective logging by the local community that occurs within the area of forest which runs between the road and the Lapago field camp in the South of the island. This paper seeks to answer the question of whether there is a relationship between accessibility and the degree of small-scale selective timber harvesting in this forest. In addition these data are being used as part of a study of zonation patterns of tree species on using Bayesian statistical analyses – a robust method of interrogating data that provides conclusions often regarded as more secure than frequentist analyses (such as the commonly used t-test).

All habitat surveys we do in this project are assisted by local Indonesian staff who have an intimate knowledge of the trees of Buton. These habitat surveys are an incredibly important part of our student's time on Buton and whilst the other parts of the programme can be missed if the students do not wish to participate, this is the one element of the programme that must be completed by all participating students. The vegetation structure research project looks set to provide answers to many under-studied questions.

After two successful seasons back in North Buton since the pandemic we hope bring a larger team in 2025 and collect data across a wider area of forest. The surveys are being used for two main purposes – to quantify the carbon storage value of the forest which will enable the Wallacea Trust Foundation to explore new conservation funding options that may be available for the Buton forests, and to continue the study of the effect of forest structure and disturbance levels around the biodiversity study sites which are being used for the study of other key taxa (butterflies, herpetofauna, birds and megafauna).

Sample size needs to be of sufficient size to ensure main forest characteristics such as tree basal area can be assessed within each sample. Data from forest surveys on different sample sizes on Buton has indicated that 20m x 20m squares is sufficient for accurately assessing basal area (a 'cross-section' of a tree's trunk) and other forest characteristics.

The survey teams will be divided into four groups, each under the supervision of an expert, and all students should have a chance to work with each group during the survey. Firstly, the team will use surveying tapes and compasses to mark out the perimeter of the 20 m x 20 m quadrat and then divide it into 4 smaller quadrats using ropes.

Group 1 will take the GPS coordinates of the four corners of the 20 m x 20 m plot using a GPS unit. The group will also estimate canopy cover using a canopy scope, and therefore a measurement of light hitting the forest floor. This group will also make a basic profile of the plot, taking angle measurements around the perimeter of the plot.

Group 2 will obtain data on the vegetation structure of the survey plots. A 3 m long vegetation touch-test pole will be used to quantify the density of the understory at 100 points spatially arranged with 4 samples within each sub plot.

Group 3 will collect data on the trees throughout the plot. For each tree over 15.7cm in circumference at chest height, the local guide will identify the species and the circumference will be measured. This will allow us to calculate the biomass of each tree.

Group 4 will examine disturbance and regeneration patterns throughout the plot. Within each 10 m x 10 m quadrat, the number of saplings in a 5 m x 5m quadrat will be counted. A sapling is defined >1.5 m in height and <15.7cm in circumference. Within this quadrat a 2 m x 2m quadrat will be positioned and the number of tree seedlings within it will be counted. A seedling is defined as <1.5 m in height and with a woody stem. For each 10 m x 10 m quadrat the number and circumference of any cut stumps will be recorded.

7. Week 2 Itinerary

The students will complete six days of training and research in marine science arriving at the Hoga marine site on the Sunday morning and leaving the following Saturday morning to start their journey back to their home country. The travel itinerary to Hoga will depend on the weather and the local ferry timetable, and therefore cannot be fully confirmed until a few days before travel. Option 1 will take the ferry from Ereke to Wanci (4 hours) where you will overnight in a small hotel, followed by a morning ferry to Hoga the next day (2 hours) arriving around 10am. Option 2 will be to take a car to Kamaru (5 hours drive from Ereke), then a ferry from Kamaru to Hoga (5 hours). These examples are based on timings from the North Buton forest camp.

Your six days on Hoga are divided according to the dive options selected for the week; Indo-Pacific Reef Ecology Course (with the practicals done either by diving or snorkeling), PADI Open Water Dive Training, or Dive Referral (see sections 8 – 11 below). Students will be occupied in the evenings through a series of science talks, documentary viewings and discussions/activities relative to the Coral Reef Ecology Course.

8. 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: 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	Depart marine site

9. 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	Depart marine site

10. 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	Depart marine site

11. 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

12. Curriculum Links (A-Level exam boards, AP & IB table)

The following two tables highlight how your Opwall expedition relates to the As and A level syllabuses across all exam boards. 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 or A level 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)

13. Reading and 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.

de Lang, Ruud and Vogel, Gernot - The Snakes of Sulawesi: a Field Guide to the Snakes of Sulawesi with Identification Keys (2005).

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.

14. Research Areas & Activities being carried out in Indonesia:

Examining the roles of NGOs and government in improving natural resource management in Indonesia.
Bird point count surveys.
Pollard walks for butterflies.
Forest plot measurements to understand the role of disturbance.
Influence of habitat structure on herpetofaunal assemblage composition on Buton Island. Night time frog and reptile transects.
Factors affecting bat assemblage composition in lowland forests of Indonesia.
Density and distribution of Sulawesian megafauna.
Bat netting: evening to set and empty mist nets.
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.
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.