



Cuba Schools' Booklet 2017

Contents

1. Study area and research objectives	2
2. Week 1 Itinerary.....	2
PADI Open Water Diver course	3
PADI Open Water Referral course	4
Coral Reef Ecology course	4
Reef Ecology Lectures.....	5
4. Week 2 Itinerary.....	7
Group One.....	9
Group Two	9
Group Three	10
8. Contribution to research	10
9. Links to A level syllabuses	10
10. Research questions.....	12

1. Study area and research objectives

Cuba is located in the Northern Caribbean, towards the edge of the Gulf of Mexico. The southern part of the Isle of Youth (Isla de Juventud), the largest island off the coast of Cuba, is an area of significant biodiversity importance. This southern forested area has been mainly undamaged because it is effectively separated from the rest of the island by mangrove and channels. In order to protect the biodiversity, the southern part of the island is now being proposed as a Sustainable Use and Protected Area (APRM) whilst the western end has been designated as the Punta Frances National Park. The Punta Frances National Park contains mangroves, lagoons, reefs, and semi-deciduous forests, and forms an excellent example of relatively undisturbed continuous Caribbean habitats. Operation Wallacea and the University of Havana have signed a long-term research collaboration agreement to develop and implement biodiversity monitoring programmes on the reef systems across the whole of the southern island APRM.

The University of Havana is establishing a Research Centre in the Colony Marina that will act as the base for the surveys. Much of the survey work will be based on boats operating from the Marina. In 2017 the schools' element of the project is continuing to concentrate on gathering fish community and coral transect data from a series of sites in the Punta Frances National Park, monitoring the extent of the invasive lionfish population, and assisting with the manatee population monitoring project and capture in the mangrove channels.

The Center for Marine Research at the University of Havana (UH-CIM) is also responsible for maintaining and updating the University sample collection, and currently there is an urgent need to improve it. Students will work with marine specialist in going in the field and collecting, classifying, and preserving marine vertebrates and invertebrates.

Figure 1. Study area in Cuba



2. Week 1 Itinerary

In week 1 the groups will be split into those who are completing their PADI Open Water dive training course in full (table 1), those who have already completed their theory and pool training in the UK and will be doing their open water dives followed by in-water practical designed to prepare them for the marine surveys (table 2), and those who are already dive trained (or don't want to dive at all) and are working on the reef

ecology course and preparing for the fish surveys (table 3). Note: the purpose of this first week is to get the students trained up to be able to help with the reef fish video surveys in week 2, so there are a number of compulsory lectures and practicals aimed at developing the identification skills required. In week 1 all students will be based on the dive boat from after breakfast until late afternoon.

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. Students will also complete a 200m continuous surface swim or a 300m swim with mask, fins and snorkel.

Table 1 Indicative timetable for the group in week 1 completing dive training. Note: there may be changes depending on fitness of students, weather conditions, group size or operational problems.

Day	Group 1 – dive trainees
Thursday evening	Dive documentation; Theory lectures 1 and 2
Friday am	Confined water 1
Friday pm	Reef crest to mangrove snorkel
Friday evening	Lecture 1 – The Blue Planet Lecture 2 – An Introduction to Coral Reefs
Saturday am	Confined water 2
Saturday pm	Confined water 3
Saturday evening	Lecture 3 – Conservation of Coral Reefs Theory lectures 3 – 5
Sunday am	Confined water 4
Sunday pm	Confined water 5
Sunday evening	Lecture 4 – The Diversity of Coral Reefs I
Monday am	Open water dive 1
Monday pm	Open water dive 2
Monday evening	Lecture 5 – The Diversity of Coral Reefs II
Tuesday am	Open water dive 3
Tuesday pm	Open water dive 4
Tuesday evening	Lecture 6 – Mangroves and Seagrass
Wednesday am	Fun dive (spare dive in case anyone has missed one to qualify)
Wednesday pm	Fish identification practical
Wednesday evening	PADI and Species ID exams Lecture 7 – The Future of Coral Reefs

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. After completion of the four Open Water dives this group will complete training on fish identification and how to complete coral intercept surveys and to identify the main species encountered on these benthic surveys. In addition, they will receive training on identifying fish from stereo video footage so they are prepared for the second week's surveys.

Table 2 Indicative timetable for the group in week 1 who have completed their dive theory and pool training before arriving (referrals). Note there may be changes depending on fitness of students, weather conditions, group size or operational problems.

Day	Group 2 – dive referrals
Thursday evening	Dive documentation; Review theory knowledge
Friday am	Open water dive 1
Friday pm	Reef crest to mangrove snorkel
Friday evening	Lecture 1 – The Blue Planet Lecture 2 – An Introduction to Coral Reefs
Saturday am	Open water dive 2
Saturday pm	Open water dive 3
Saturday evening	Lecture 3 – Conservation of Coral Reefs
Sunday am	Open water dive 4
Sunday pm	Fun dive (spare dive in case anyone has missed one to qualify)
Sunday evening	Lecture 4 – The Diversity of Coral Reefs I
Monday am	Fish identification training dive 1
Monday pm	Fish identification training dive 2
Monday evening	Lecture 5 – The Diversity of Coral Reefs II
Tuesday am	Survey methods training dive 1
Tuesday pm	Survey methods training dive 2
Tuesday evening	Lecture 6 – Mangroves and Seagrass
Wednesday am	Fish identification training dive 3
Wednesday pm	Fish identification training dive 4
Wednesday evening	PADI and Species ID exams Lecture 7 - The Future of Coral Reefs

Coral Reef Ecology course

Table 3 shows the timetable for qualified divers and snorkelers. They will spend the week completing in-water practical's which complement the reef ecology lectures that they receive in the evening, and learning the skills needed to be able to assist with the coral intercept transect surveys and analysis of the reef fish stereo video data.

Table 3 Indicative timetable for the group in week 1 who are qualified divers or wish to only snorkel. Note: there may be changes depending on fitness of students, weather conditions or operational problems.

Day	Group 3 – qualified divers or snorkelers
Thursday evening	Dive documentation
Friday am	Check dive/snorkel
Friday pm	Reef crest to mangrove snorkel
Friday evening	Lecture 1 – The Blue Planet Lecture 2 – An Introduction to Coral Reefs
Saturday am	Invertebrate identification training dive/snorkel 1
Saturday pm	Invertebrate identification training dive/snorkel 2
Saturday evening	Lecture 3 – Conservation of Coral Reefs
Sunday am	Coral identification training dive/snorkel 1
Sunday pm	Coral identification training dive/snorkel 2
Sunday evening	Lecture 4 – The Diversity of Coral Reefs I
Monday am	Fish identification training dive/snorkel 1
Monday pm	Fish identification training dive/snorkel 2
Monday evening	Lecture 5 – The Diversity of Coral Reefs II
Tuesday am	Survey methods training dive/snorkel 1
Tuesday pm	Survey methods training dive/snorkel 2
Tuesday evening	Lecture 6 – Mangroves and Seagrass
Wednesday am	Fish identification training dive/snorkel 3
Wednesday pm	Fish identification training dive/snorkel 4
Wednesday evening	PADI and Species ID exams Lecture 7 - The Future of Coral Reefs

Reef Ecology Lectures

Lecture 1 – The Blue Planet

- Quick fire facts to excite students about the marine world
- Who would win in a fight between a great white shark and a killer whale?
- Why is the sea blue?
- Why is the sea salty?
- Why are whales so important?
- Where did life originate?

In-water activity- check dive/snorkel

Lecture 2 – An Introduction to Coral Reefs

- Coral biology; growth, development, feeding and reproduction
- Importance of the symbiotic relationship between corals and photosynthetic microalgae
- What are coral reefs and where are they found?
- Introduction to the Caribbean

In-water activity- coral ID dive

Lecture 3 – Conservation of Coral Reefs

- The value of coral reefs
- An introduction to macroalgae
- Competition between macroalgae and hard coral; phase-shifts

- Local threats to coral reefs that stimulate phase-shifts; i. Destructive fishing, ii. Coral mining, iii. Overfishing, iv. Water pollution, v. Coastal development, vi. Disease, vii. Lionfish invasion
- Potential management solutions

In-water activity- assessing levels of coral bleaching using PADI's 'Coral Watch' guideline

Lecture 4 – The Diversity of Coral Reefs I

- An introduction to taxonomy
- Classifying a green alga
- Classifying a sea cucumber
- Classifying the stoplight parrotfish

In-water activity- fish ID dive

Lecture 5 – The Diversity of Coral Reefs II

- Coral reef food webs
- Fish herbivory
- Invertebrate herbivory
- Filter feeding
- Predation

In-water activity- invertebrate ID dive

Lecture 6 – The Diversity of Coral Reefs III

- An introduction to behaviour
- Parasitism
- Commensalism
- Symbiosis
- Camouflage
- Fish sensory systems

In-water activity- ID revision dive

Lecture 7 – Mangroves and Seagrass

- Mangrove adaptations
- Seagrass adaptations
- Ecosystem services and functions
- Importance of habitat connectivity
- Threats to mangroves and seagrasses

In-water activity- seagrass practical

Lecture 8 – The Future of Coral Reefs

- Rising sea surface temperature
- Ocean acidification
- The structure of a reef in 2100
- Conservation management

In-water activity- rapid reef assessment

4. Week 2 Itinerary

In week 2 the teams will be divided into groups:

- Group One – manatee monitoring
- Group Two – coral transects, stereo video fish surveys & lionfish monitoring
- Group Three – stereo video data analysis and marine sample collection.

When they are working on the manatee monitoring programme or reef surveys they will be based at the Colony Hotel with daily trips on a research boat based out of the Colony Marina. For the two days spent helping with the analysis of the stereo video data they will be based back at the Colony Hotel. There will also be a manatee capture scheduled for one day during the second week.

In the evenings and during free time between stereo video analysis sessions the students working in small groups will be expected to complete background research on one of a given series of research questions (see section 10) and prepare a joint presentation which will be given on the Tuesday evening for groups 1 and 2 and on the Wednesday evening just before the social for group 3.

Day	Group 1	Group 2	Group 3
Thursday am	Morning off	Morning off	Morning off
Thursday pm	Documentaries and films on Cuban history and wildlife	Documentaries and films on Cuban history and wildlife	Documentaries and films on Cuban history and wildlife
Thursday evening	Research question preparation	Research question preparation	Research question preparation
Friday am	Manatee research training and monitoring	Coral transects and stereo video	Stereo video analysis in hotel, research question preparation or Sample Collection
Friday pm	Manatee monitoring	Coral transects and stereo video	Stereo video analysis in hotel, research question preparation or Sample Collection
Friday evening	Further manatee training and research question preparation	Lecture on shark ecology	Stereo video analysis in hotel and research question preparation
Saturday am	Manatee monitoring	Coral transects and stereo video/ Shark project	Stereo video analysis in hotel, research question preparation or Sample Collection
Saturday pm	Manatee monitoring	Coral transects and stereo video/ Shark project	Stereo video analysis in hotel, research question preparation or Sample Collection
Saturday evening	Manatee research summary and research question preparation	Research question preparation	Stereo video analysis in hotel and research question preparation

Sunday am	Coral transects and stereo video	Stereo video analysis in hotel, research question preparation or Sample Collection	Manatee research training and monitoring
Sunday pm	Coral transects and stereo video	Stereo video analysis in hotel, research question preparation or Sample Collection	Manatee monitoring
Sunday evening	Lecture on shark ecology	Stereo video analysis in hotel and research question preparation	Further manatee training and research question preparation
Monday am	Coral transects and stereo video	Stereo video analysis in hotel, research question preparation or Sample Collection	Manatee monitoring
Monday pm	Coral transects and stereo video	Stereo video analysis in hotel, research question preparation or Sample Collection	Manatee monitoring
Monday evening	Research question preparation	Stereo video analysis in hotel and research question preparation	Manatee research summary and research question preparation
Tuesday am	Stereo video analysis in hotel, research question preparation or Sample Collection	Manatee research training and monitoring	Coral transects and stereo video
Tuesday pm	Stereo video analysis in hotel, research question preparation or Sample Collection	Manatee monitoring	Coral transects and stereo video
Tuesday evening	Stereo video analysis in hotel and student presentations	Further manatee training and student presentations	Lecture on shark ecology
Wednesday am	Stereo video analysis in hotel or Sample Collection	Manatee monitoring	Coral transects and stereo video
Wednesday pm	Stereo video analysis in hotel or Sample Collection	Manatee monitoring	Coral transects and stereo video
Wednesday evening	Social evening	Manatee research summary and social evening	Student presentation and social evening

Group One

Manatee monitoring

The habitat use and feeding habits of manatees are being described in the study area and students working on this project will be on a separate boat from after breakfast until later afternoon. Those joining the surveys will be briefed by the scientists on the survey techniques and manatee ecology.

Data are gathered by daily transects from the research boat. In the narrow mangrove channels and lagoons, side scan sonar surveys are used to identify the position of any manatees. The GPS position of all manatee sightings over the 7-week survey period will be logged and environmental data (salinity, temperature, aquatic vegetation) will be collected at each site to determine the importance of freshwater upwellings and vegetation communities in affecting the distribution of manatees. Indirect evidence of manatees like faecal samples will be reported and collected for further analyses. These data will be combined with those collected in the previous Operation Wallacea surveys, dating back to 2009.

There are several lectures given during the manatee monitoring period covering the following:

- a. Introduction to manatees, their habitat, and the background for this project
- b. Classification and distribution of manatees
- c. General characteristics and threats to manatees
- d. How to use the side scan sonar equipment for manatee studies
- e. Manatee captures and health assessment

In 2012, funding was obtained to GPS collar 2 manatees, and several more were fitted with PIT tags and genetic samples and morphometric data were collected. Over the course of the 2014 season, one day per week will be allocated to the manatee capture to further identify new individuals, or confirm the presence of previously caught manatees through the identifying tags which have been implanted. If any manatee is satellite tagged during the season, we will be doing radio tracking to monitor behaviour.

Group Two

Coral transects

The University of Havana is completing annual transect surveys of coral cover and community structure from a series of sites on the Punta Frances reefs. These surveys are designed to calculate the percentage cover of hard corals, soft corals, sponges, macroalgae and sea grass. In addition, data are being collected on the size of hard coral species, their percentage bleached surface and evidence of disease present. The distribution of Gorgonians and percentage showing damage will also be recorded.

Stereo video fish surveys

The reef fish community surveys will be completed using a stereo-video survey methodology developed by the University of Western Australia. The surveyor swims a series of transects at 2m above the coral and records the fish species encountered using the stereo video equipment.

Lionfish monitoring

Coral reefs throughout the Caribbean are dealing with the impact of an invasive Indian Ocean fish, the volitan lionfish (*Pterois volitans*). It is believed that the founders of this invasion were aquarium trade specimens released in Florida. Owing to a lack of natural predators, voracious appetite, and prolific reproductive ability, lionfish possess the potential to have a drastic impact on the reef ecology in Punta Frances, as well as throughout much of the Caribbean.

Students will assist the biologists on transect surveys 2 days during the second week, identifying and capturing as many individuals as possible on each transect. Captured individuals will be processed on the boat to determine their size, sex, reproductive status, and stomach contents, all build a picture of exactly what sort of impact they are having on the reefs of the Punta Frances Marine Protected Area.

Group Three

Stereo video data analysis

Back at the hotel the students will be involved in analysing the footage which is displayed on a computer screen with the footage from the left and right videos synchronised. All species filmed need to be identified and the length estimated by clicking on the screen on the front and tail of each fish on the left screen and again on the right. The software then calculates the length of the fish, and this needs to be recorded in an Excel table against each species name. Only fish within the 2.5m x 2.5m x 50m cuboid are recorded.

Collecting specimens for the University of Havana's Marine Species Collection

This activity will be based at the hotel and students will help in the collection of marine specimens that will improve the actual Marine Species Collection of the University of Havana. This collection plays a key role in teaching marine biology courses at the undergraduate and graduate levels. It also is extremely useful for research purposes. The Center for Marine Research at the University of Havana is responsible for maintaining and updating this collection, and currently there is an urgent need to improve it. Students will work with marine specialists going in the field and collecting, classifying, and preserving marine vertebrates and invertebrates. In addition to this a set of fixed transects have been implemented to monitor benthic fauna along the west shore of the Isle of Youth. Students are expected to snorkel along the transects and identify and count macro invertebrates in order to assess their abundance and distribution.

8. Contribution to research

The data on benthic cover and reef fish communities within the Punta Frances Marine Reserve will be written up by the University of Havana and used as a baseline to monitor changes in the reefs and reef fish communities in future years and assess the effectiveness of the management of the marine protected area.

9. Links to A level syllabuses

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 indicate that the keywords listed are covered on our expedition (through lectures, practicals 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	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	◆		◆		◆	◆			◆		◆		◆		
	PCR; Genome sequencing; Genetic fingerprinting; DNA profile		◆	◆	◆			◆		◆			◆	◆		
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					◆									◆	
Behaviour	Environment; Environmental monitoring; Environmental impact; SSSI															
	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											
				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	◆													
	PCR; Genome sequencing; Genetic fingerprinting; DNA profile														
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. Research questions

Many students are now involved in producing **Independent Research Projects (IRP)** as part of their 2-year educational programme and many hope to carry this out whilst on an Opwall Expedition. If you are an IB school, you will be involved in the EE or Extended Essay or if in the UK an EPQ or Extended Project Qualification. Those involved in CoPE will also have a similar task in which they carry out some research. There are many similar projects in most countries.

One of the key features of all of these 'Essays' or 'Projects' is that you have to choose your own research question but it is often difficult to find out exactly what is happening at each Opwall research site. To help in this, we have produced a 'Research' lookup database on the Opwall website – <http://opwall.com/epq-research-topic/> but you can also 'download' a more detailed version as an Excel Spreadsheet. The database lets you find out what is happening at each site and there are links to pdf files and video clips. You can search the 'database' using a variety of filters such as research area and location.

This booklet also contains detailed information on the research projects you will be involved in and this may help you to locate your particular area of interest.

The type of IRP will vary but it is less suitable for individual investigations where you collect your own primary data although in some cases you might be able to get hold of raw data and you will often have the opportunity to help collect some of this data yourself. You will certainly have the opportunity 'on-site' to meet up with the scientists involved which will allow you to get a deeper insight into your research question.

Many of you will also have seen the Wallace Resource Library (WRL) which contains many datasets based around the research being carried out and it has been prepared by the actual Opwall scientists involved. It is a very valuable source of ideas with comprehensive datasets to look at and study.

Demo version – <http://wallaceresourcelibrary.com>

Do also make use of the research library on the Opwall website - <http://www.opwall.com>

How does it work?

Once you have an idea send an email to schoolresearchprojects@opwall.com with your initial ideas and contact details so that one of the academic staff working with Opwall can contact you to discuss possible research questions. We can also send you further information to help you choose a suitable title for your research site.

Once you have decided on a title you will then be asked to complete a registration form (supplied on request) which we can then forward to the appropriate country manager or scientist. This will then inform those at the research site about what you are hoping to achieve and it allows us to give you as much assistance as we can. In some cases, we will also be able to provide you with data sets from previous years which some students will find very useful.

Deadlines: Although each school will be operating their own schedule we would like registrations to be completed at least 3 months before their expedition begins, although the earlier the better.

Books

Sainsbury B (2009) Cuba. Lonely Planet Guides

Kaplan EA (1990) Field Guide to the Coral Reefs of the Caribbean and Florida. Peterson Field Guides

Silva Lee A (1997) Natural Cuba. Pangaea

Colin PL (1998) Marine Invertebrates and Plants of the Living Reef. TFH Publications Inc

Research areas and activities being carried out in Cuba:

Reef fish survey using stereo-video techniques

Lionfish capture and survey

Manatee surveys (abiotic and biotic factors) and capture in lagoons and mangrove areas

Laboratory Stereo video analysis

Coral surveys using line intercept video surveys