



Biodiversity Data Tasks:

Opwall, with the help of their scientists at their research sites worldwide, have produced biodiversity data tasks which cover a wide range of research projects. These highlight how they can be used to expand students perception of ecology beyond the standard snails and woodlice examples.

At present we have 19 WRL (Wallace Resource Library - <http://wallaceresourcelibrary.com>) datasets which are extensive and complex tasks based around actual Opwall research projects. They vary in scope and depth. Whilst teachers have found these exciting datasets to use in their teaching, the vast majority **do not have the time** or resources to incorporate them into their schemes of work. Most exam specifications worldwide have undergone considerable change and updating and they now all place a greater emphasis on mathematical skills and many test practical skills in exam questions. WRL datasets and the new 'biodiversity data tasks' have great potential value in helping with both of these areas.

Opwall has now produced 45 '**Biodiversity Data Tasks**' based around many of the WRL datasets and they adopt the style of an examination question (10+ marks worth) or a much shorter homework task (40+ mins). These are standalone, and where possible, have explanatory notes to help with the answers.

Each question, as far as possible, is indexed with the type of task involved e.g. graph drawing and the biological topic e.g. capture -mark -release- recapture. In some cases, suggested mark schemes and additional resource sheets are provided for each set of these 'mini-tasks' to help with the answers. The tasks are in WORD doc format so can be altered and adjusted easily to suit the needs of specific syllabuses and groups of students.

These tasks can also be downloaded from the WRL website.

Task Code		Title	Skills	Background	Keywords
MO1D01	A	Coral polyp density and water depth.	Calculations, graphs and analysis	This task looks at the effect of depth on the morphology of a named coral species.	adaptation; autotroph; biome; biotic; coral; ecosystem; heterotroph; limiting factor: mutualistic; photosynthesis; population; quadrat; sampling; symbiosis
	B	Coral polyp density and water depth.	Graph interpretation and analysis		
	C	Coral polyp density and water depth.	Statistics – Spearman's Correlation, follow instructions.		
	D	Coral polyp density and water depth.	Following instructions, data collection, calculations and interpretation.		
MO1D03	A	Temperature tolerance of lionfish in Indonesia	Completing a table, calculating means and experimental method.	This physiological experiment compares how 20 lionfish adapt to increasing water temperatures by being placed in specially designed water tanks. Lionfish are also significant predators and could pose a real threat by being significant invasive species.	Adaptation; abiotic; biotic; climate change; coefficient of variation; coral; environmental impact; error bars; ecosystem; homeostasis; invasive (alien) species; physiology; statistics; temperature control; sampling
	B	Temperature tolerance of lionfish in Indonesia	Graphs and analysis, means, longer answer using continuous prose.		
	C	Temperature tolerance of lionfish in Indonesia	Comprehension		
MO2D01	A	Population estimates of Hog Island Boa Constrictors	Calculations and substituting numerical values in a formula.	The population of Hog Island Boa Constrictors (located in the Caribbean Sea) are estimated using mark-recapture techniques.	Endemism; biodiversity hotspots; isolation; conservation; human impact; mark-recapture; sampling; survey techniques
	B	Population estimates of Hog Island Boa Constrictors	Calculations and substituting numerical values in a formula.		
	C	Population estimates of Hog Island Boa Constrictors	Analysis and longer prose answer.		

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MO2D04	A	Camera trapping to assess large mammal populations in Amazonia.	Graph plotting, % calculations and analysis	Camera traps are used to assess the populations of red brocket deer and ocelot over a 2 year period in the Pacaya Samiria Nature Reserve in Peru.	Ecology; habitat; rainforest; populations ; density dependent; predator prey; ecological sampling; statistical testing ; chi-squared ; climate change ; data handling
	B	Camera trapping to assess large mammal populations in Amazonia.	Statistics – chi-squared and longer prose answers.		
MO3D02	A	Interspecific differences in fiddler crab feeding rates.	Tables, means, standard deviation, comprehension.	Fiddler crabs feed at low tide on mudflats in Indonesia and they eat detritus, bacteria and algae. There are often quite a few species feeding together and there is clear niche separation due to their feeding behaviour and morphology. This study compares 3 different species feeding at 2 different heights above the low tide line.	Adaptation; behaviour; interspecific competition; error bars; ecosystem; feeding; habitat; mangroves; niche; sampling; selection; statistics; standard deviation; transects
	B	Interspecific differences in fiddler crab feeding rates.	Bar chart, error bars and continuous prose answer.		
	C	Interspecific differences in fiddler crab feeding rates.	Comprehension and experimental design.		
MO3D04	A	Surgeonfish feeding behaviour on coral reefs. – Sampela Indonesia	Standard deviation; %, mean, tables	This study compares two feeding strategies (focused and diffuse feeding) for two different species of surgeonfish. The results help biologists to understand how different species are able to co-exist on a coral reef and their role in helping to maintain their ecosystem.	Adaptation ; behaviour; interspecific competition : coral; ecosystem; niche ; herbivore ; human impact; sampling : selection; territory
	B	Surgeonfish feeding behaviour on coral reefs - Kaledupa, Indonesia	Standard deviation; %, mean, tables		
	C	Surgeonfish feeding behaviour on coral reefs: Sampela, Kaledupa in Indonesia.	Bar graphs, error bars		
MO4D01	A	Prevalence of chytrid in two critically endangered species of tree frog.	Tables, % calculation, data analysis and longer prose answer.	This data set investigates the prevalence of infections chytrid fungus amongst amphibian populations in Cusuco National Park, Honduras. Individuals of two tree frog species were collected from various sites throughout the forest, and swab samples taken for genetic analysis to identify which individuals were infected.	Amphibian; conservation; data; DNA; endangered; forest; global; habitat; invasive; IUCN; sampling; species; disease; PCR. Abiotic, biotic.
	B	Prevalence of chytrid in two critically endangered species of tree frog.	Graphs, analysis and continuous prose answer.		
	C	Prevalence of chytrid in two critically endangered species of tree frog.	Comprehension		
MO4D02	A	Quantifying forest disturbance in the cloud forests of Honduras.	Graphs, % calculation, comprehension and discussion.	In 2013 120 20mx20m cloud rainforest plots were surveyed by students and scientists in Honduras and these investigations looks at ways to analyze, compare and present the data using a wide range of graphs and tables. There are also many opportunities to use the data for a discussion on the possible causes of any disturbance and threats to rainforest. Tree height using trigonometry is considered.	Climate change; Deforestation ; Ecosystem ; Human impact ; Rainforest ; Environmental monitoring ; Field techniques ; Indicators; Sampling; Transects; Data handling ; statistics
	B	Quantifying forest disturbance in the cloud forests of Honduras.	Graphs, report writing, ICT.		
	C	Quantifying forest disturbance in the cloud forests of Honduras.	Graphs, analysis, sampling techniques, comprehension		
	D	Quantifying forest disturbance in the cloud forests of Honduras.	Graphs, unpaired t-test, significance.		
	E	Quantifying forest disturbance in the cloud forests of Honduras.	Means, Graphs, class intervals		
	F	Quantifying forest disturbance in the cloud forests of Honduras.	Comprehension and discussion.		
	G	Calculating the height of trees	Geometry, trigonometry, means and %		
	H	Calculating Carbon stored in Wallacean lowland forest.	units; decimal places; means; symbols; formulae, graphs, circumferences.		
MO4D03	A	The effect of altitude on dung beetle community structure in Honduras cloud forest.	Calculations; graphs ; discussions and	Dung beetles are important organisms in rainforest habitat maintenance and they	Biological indicators ; biodiversity; Climate change; Data handling ;

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			summary.	can also be used as sensitive biological indicators of disturbance and biodiversity change. This data task investigates the relationship between dung beetles and altitude.	Deforestation; Ecosystems; Environmental monitoring; Field techniques; Human impact; Rainforest; Sampling; Transects; Species richness, species evenness, abundance.
	B	The effect of altitude on dung beetle community structure in Honduras cloud forest.	Calculations; graphs ; discussions and summary: experimental design.		
	C	Determining the Biodiversity Index of dung beetles found at different altitudes in the cloud forest of Cusuco national Park in Honduras.	Calculations; Simpson's index for diversity; discussion; experimental design.		
	D	The effect of altitude on dung beetle diversity in Honduras cloud forest.	Statistics – Spearman's correlation coefficient.		
	E	The effect of altitude on dung beetle diversity in Honduras cloud forest.	Correlation coefficient		
MO5D01	A	Identifying overfishing on Indonesian coral reefs	graphs, means, analysis, % change.	This study examines the evidence for over-fishing by looking at data collected from traditional Indonesian fish fences around Kalepuda island.	Ecosystem; Coral Reef; Sustainable: over-fishing; statistics; case study; human impact; populations
	B	Identifying overfishing on Indonesian coral reefs	unpaired T-test, Standard deviation and means.		
	C	Identifying overfishing on Indonesian coral reefs	unpaired T-test, Standard deviation and means.		
MO5D02	A	Agricultural land use in Transylvania (Crit)	% calculations; graph presentations; GIS mapping.	Biodiversity; Conservation; Field techniques; GIS; Human effects; human activities; Sustainable Agriculture;	An EU (European Union) Natura 2000 conservation area was recently set-up in Transylvania and the role of Opwall scientists is to assist in the monitoring of Biodiversity within this area with particular reference to farming practice. Habitat data can be analyzed from GIS (Geographic Information System) maps and used to monitor change.
	B	Agricultural land use in Transylvania (Messendorf)	% calculations; graph presentations; GIS mapping.		
	C	Agricultural land use in Transylvania (Malancrav)	% calculations; graph presentations; GIS mapping.		
	D	Agricultural land use in Transylvania – 3 village areas.	Analysis, comprehension and continuous prose/		
MO5D03	A	The effects of fishing on Amazonian fish.	Graphs; size classes; interpretation.	abiotic; amazon; biotic; climate change; ecosystem; fishing; human impact; global warming; overfishing; population; sampling; sustainability;	A study carried out on a tributary of the Amazon River looks at fish stocks for 2 species of fish (an Oscar and a Piranha) over a five year period. It looks for evidence of change in population number and structure and relates these to the fishing activities of local communities and the possible effects of a severe drought in 2010.
	B	The effects of fishing on Amazonian fish.	Graphs; size classes; interpretation.		
	C	The effects of fishing on Amazonian fish.	Graphs; size classes; interpretation.		
	D	The effects of fishing on Amazonian fish.	Comprehension and discussion.		

Each task is indexed to the main WRL data sets e.g. MO1D02-A Or MO1D02-B

Biodiversity Data Tasks: Look-up table

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Task Code		Calculations/analysis	Graphs/tables	Statistics	Comprehension/ prose answers & interpretation	Follow instructions
MO1D01	A					
MO1D01	B					
MO1D01	C			Correlation		
MO1D01	D					
MO1D03	A					
MO1D03	B					
MO1D03	C					
MO2D01	A					
MO2D01	B					
MO2D01	C					
MO2D04	A					
MO2D04	B			Chi-squared		
MO3D02	A			Standard deviation		
MO3D02	B			Error bars		
MO3D02	C					
MO3D04	A			Standard deviation		
MO3D04	B			Standard deviation		
MO3D04	C		Error bars			
MO4D01	A					
MO4D01	B					
MO4D01	C					
MO4D02	A					
MO4D02	B					
MO4D02	C					
MO4D02	D			Unpaired t-test		
MO4D02	E					
MO4D02	F					
MO4D02	G					
MO4D02	H					
MO4D03	A					
MO4D03	B					
MO4D03	C	Simpson's index				
MO4D03	D			Correlation		
MO4D03	E			Correlation		
MO5D01	A					
MO5D01	B			Unpaired T-test, St. deviation		
MO5D01	C			Unpaired T-test, St. deviation		
MO5D02	A					
MO5D02	B					
MO5D02	C					
MO5D02	D					
MO5D03	A					
MO5D03	B					
MO5D03	C					
MO5D03	D					

n.b. these tasks are all under-development so we apologise for any mistakes that there are and hopefully we will correct any as we go towards the completion of the website during the coming weeks and months – Dr RHC Poland – Senior Science and Education Advisor. Roger.poland@opwall.com