

**Edexcel GCE**

# **Geography**

**Advanced**

**Unit 3: Contested Planet**

**ADVANCE INFORMATION**

June 2010

Paper Reference

**6GE03/01**

## **Information**

Candidates must **not** take this pre-released synoptic resources into the examination as these will be reproduced in the Resource Booklet.

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## SECTION B

The following resources relate to Question 6.

### THE PACIFIC SIDS BIODIVERSITY UNDER THREAT

SIDS (Small Island Developing States) are a group of 52 **developing** island nations which share many common features:

- small, but often growing populations and high population densities
- limited natural resources and fragile environments
- isolation, but dependency on trade
- high cost of living due to communication and transport costs
- vulnerability to natural disasters.

There are 20 SIDS in the Pacific, some of which have come together under the umbrella of the Pacific Islands Forum (Figure 1). The Forum includes Australia, France and New Zealand, which administer some islands in the region.

**Figure 1: Pacific Island Forum members and the SIDS**



The islands themselves are diverse. In many cases individual nations are made up of numerous small islands, some uninhabited. These are either low (coral reefs and atolls) or high (volcanic) islands. Many contain important coral reefs, mangroves, tropical / sub-tropical forest and cloud forest areas with high levels of biodiversity.

**Figure 2: The Pacific SIDS: Key information**

Country	Population 2005	% Annual population growth	Forest area (%)	Annual change in forest area (%)	Coral reef status
American Samoa	58300	2.0	90	-0.2	High Threat
Cook islands	21000	-2.2	67	0	Medium Threat
Fiji	847000	0.6	55	0	High Threat
French Polynesia	256000	1.3	29	0	Medium Threat
Kiribati	99000	1.6	3	0	High Threat
Marshall Islands	63000	2.2	na	na	Medium Threat
Micronesia	110000	0.5	91	0	High Threat
Nauru	13000	0.3	0	0	High Threat
New Caledonia	241000	1.5	39	0	Medium Threat
Niue	1600	-1.9	54	-1.4	Medium Threat
Northern Marianas	79000	2.0	72	-0.3	High Threat
Palau	20000	0.4	88	0.4	High Threat
Papua New Guinea	5900000	2.0	65	-0.5	High Threat
Samoa	179000	0.9	60	0	High Threat
Solomon Islands	552000	2.3	78	-2	High Threat
Tokelau	1000	-0.03	0	0	Low threat
Tonga	114000	0.5	5	0	High Threat
Tuvalu	11000	0.4	33	0	Medium Threat
Vanuatu	211000	2.4	36	0	High Threat
Wallis & Futuna	16000	0.7	35	-2	Medium Threat

**GDP per capita:**  
 under \$1000  
 \$1000-2000  
 over \$2000

**Reef Status:**  
 Low threat  
 Medium Threat  
 High Threat

The Pacific Islands contain several **biodiversity hotspots**. These include:

- *New Caledonia* – two thirds of the world's araucaria tree species, all of which are **endemic**.
- *East Melanesian Islands* – contains numerous species of **endangered** flying fox.
- *Polynesia / Micronesia* – many **unique** species of birds, at least 25 of which have become **extinct** over the last 200 years.

The Pacific marine environment is a huge biological resource, including the most extensive and diverse reefs in the world and populations of many threatened species including whales, sea turtles, dugongs and saltwater crocodiles. The high islands support large tracts of intact rainforests that are hosts to unique communities of plants and animals. However, up to 50% of the region's total biodiversity is at risk. Figure 3 shows how the region's natural systems relate to human factors. Around half of all recorded extinctions have occurred on islands.

**Figure 3: The relationship between natural systems and people.**



**Figure 4: Numbers of threatened species (IUCN Red List, 2002 and 2008)**

Top 5 Pacific SIDS	Mammals & Birds	Reptiles & Amphibians	Fish & Molluscs	Plants	Total in 2008 (including 'other')	Total in 2002
Fiji	16	7	14	66	190	101
French Polynesia	33	1	42	47	149	124
New Caledonia	23	2	28	218	355	270
Papua New Guinea	77	20	40	142	446	300
Solomon Islands	37	6	14	16	211	77

On many of the SIDS, ecological resources provide a range of crucial goods and services.

Many of the Pacific SIDS are vulnerable to **tropical cyclones**, which can cause extensive property damage and damage to coral reefs. Notable recent events include:

- Cyclone Heta, which struck Niue in January 2004
- Cyclone Gene which struck Fiji in January 2008
- Super-cyclone Olaf which affected the Cook Islands and Samoa in February 2005.

In addition to cyclones, frequent **El Nino** events can cause coral bleaching and lowering of sea levels exposing fragile coral to the air. Extensive coral bleaching occurred in 1982-83, 1998 and 2002. Many low lying islands are also vulnerable to the risk of tsunamis.

Fishing is big business in the south Pacific, with the number of registered vessels increasing from 827 in 1997-98 to 1158 in 2005-06. It is estimated that 'foreign' vessels catch 900% more fish than local vessels. The number of illegal or 'pirate' fishing vessels is unknown. Legally registered vessels often exceed their allowed catch, particularly of valuable tuna.

Geographical isolation has not prevented large numbers of invasive alien species reaching the Pacific SIDS. For instance, Yellow Crazy Ant super-colonies have decimated the indigenous red crab population. These ants have spread to Vanuatu, French Polynesia and New Caledonia where there are fears they will cause widespread ecosystem disruption.

Tourism plays a major role in the economy of many Pacific SIDS. **Globalisation** has assisted the growth of tourism even in the remotest locations. On Palau tourism accounted for 67% of GDP in 2005, 50% on the Cook Islands and 18% on Samoa. Some SIDS have experienced startling levels of tourism growth (Figure 5). Palau is a particularly prized destination for snorkelling and scuba diving having some of the best reefs in the Pacific and the renowned Floating Garden Islands.

Stable government has not always been present in the Pacific SIDS. One of the largest states, Fiji, gained its independence in 1970. There were two military coups in 1987, one in 2000 and the most recent in 2006. Political instability is

a current feature of French Polynesia, with a growing pro-independence movement. Ethnic tensions between indigenous Fijians and Indo-Fijians have been a constant problem since independence. Lack of stability has led to a see-sawing economy and lack of investment. Sugar-cane growing and sugar processing is a major part of the Fijian economy, the industry contributes 7% of the country's GDP. The sugar industry directly employs some 35,000 people and about 220,000 people indirectly (farmers, cane cutters, drivers and mill workers) but changes to world trade rules (the ending of EU ACP preferential trade) have caused problems for sugar and garment exporters, and revenues have declined.

**Figure 5: Tourism growth 1990-2004 (UNWTO)**

International tourist arrivals (1000s)					
	1990	2000	2002	2003	2004
Cook Islands	34	73	73	78	83
Fiji	279	294	398	431	500
French Polynesia	132	252	189	213	212
Niue	1	2	2	3	3
Vanuatu	35	58	49	50	61
Palau	33	58	59	68	95

The limited size and fragility of many Pacific SIDS has meant that land degradation has become a serious problem. In the Solomon Islands, one of the poorest Pacific SIDS, deforestation is a major issue. Around 1.4 million cubic metres of tropical hardwood is logged annually, much of it by developed world logging corporations. Fears that this exceeded the **sustainable yield** led to attempts to restrict logging licences in the 1990s. It is widely believed that bribery and corruption have prevented this tougher policy from working. Logging has a range of impacts including:

- destruction of local water sources
- desecration of sacred and burial sites
- loss of forest resources that local people rely on for their every day living
- soil disturbance and erosion
- sedimentation of streams and reefs
- loss of biodiversity and the regenerative capacity of forests.

Other land use pressures in the Solomon Islands and elsewhere include:

- clearance of the remaining lowland forest for subsistence 'gardens' to grow taro, bananas and vegetables
- commercial palm oil plantations to meet the growing demand for palm oil, which often use freshly logged virgin forest.






Future climate change may present the Pacific SIDS with a wide range of challenges (Figure 6). At particular risk are the Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Samoa, Solomon Islands, Tuvalu and Vanuatu. Tuvalu has already made plans to evacuate its islands as sea levels rise, and Tegua island in Vanuatu is in a similarly alarming predicament. The worst case scenario is that some Pacific SIDS simply disappear beneath the rising waves.

**Figure 6: Possible climate change challenges in the Pacific SIDS**

<b>Sea level rise</b>	Direct flooding of low islands and coastal fringes.
<b>Extreme weather</b>	Possible rise in tropical cyclones and frequency and / or magnitude of El Nino events.
<b>Erosion</b>	Increased storms and higher sea levels could increase erosion and land loss.
<b>Water</b>	Saline intrusion into coastal groundwater aquifers contaminating drinking water.
<b>Drought</b>	An increase in frequency of long, dry spells.
<b>Health</b>	Rises in water borne diseases and possibly malaria.
<b>Food shortages</b>	A combined result of the above.
<b>Biodiversity</b>	Possible changes to climate norms, migration patterns, sea temperatures and storm activity.

Climate change and loss of land may push islanders into ever more marginal areas such as steeper slopes and areas of poorer soil, increasing the risk of deforestation. This could raise erosion levels, with consequences for both terrestrial and marine ecosystems.

**Figure 7: Five initiatives in the Pacific SIDS**

	Initiative	Aims	Example
1	<p><b>Convention on Biological Diversity (CBD) and Biodiversity Action Plans (BAP)</b></p> 	<p>The CBD is a treaty signed at the Rio Summit in 1992. Its goals are:</p> <ol style="list-style-type: none"> <li>1. Conservation of biological diversity.</li> <li>2. Sustainable use of its components.</li> <li>3. Fair and equitable sharing of benefits arising from genetic resources.</li> </ol>	<p>Some Pacific SIDS have completed a BAP which they are using as a framework to increase conservation and enhance biodiversity. The BAP recognises that the carrying capacity has been exceeded and seeks to make management more sustainable.</p>
2	<p><b>Islands First</b></p> 	<ul style="list-style-type: none"> <li>• SIDS represent about 25% of voting power at the United Nations.</li> <li>• Islands First NGO was established in 2008. They aim to increase their voice at the United Nations.</li> </ul>	<p>Islands First assists the small island states by:</p> <ol style="list-style-type: none"> <li>1. Providing highly trained, professional advisors to their UN missions.</li> <li>2. Creating networks of scientific, environmental and policy experts.</li> <li>3. Devising political strategies for advancing the SIDS environmental agenda.</li> </ol>
3	<p><b>Marine Protected Areas (MPAs)</b></p> 	<ul style="list-style-type: none"> <li>• MPAs are areas which have been designated as protected and have a variety of levels of protection and permitted uses.</li> <li>• Designation is relatively easy but active management requires funding to avoid the 'paper park' scenario.</li> </ul>	<p>Many areas in the Pacific SIDS have been designated as MPAs including the Phoenix Islands Protected Area (PIPA) on Kiribati. This chain of largely uninhabited islands and ocean covers an area of 185,000 km<sup>2</sup> and is the third largest MPA in the world. Funding for PIPA comes from compensating the Government of Kiribati for its lost fishing licence revenue, via Conservation International's Global Conservation Fund.</p>
4	<p><b>Ecosystem Restoration</b></p> 	<ul style="list-style-type: none"> <li>• In some cases it is possible to restore damaged coral reefs, by transplanting coral from 'donor' sites.</li> <li>• This is only likely to succeed in areas which are carefully managed and it is labour intensive, long-term and costly.</li> </ul>	<p>Funafuti Atoll on Tuvalu has been subject to a restoration project with funding support from CRISP (Coral Reef Initiative for the Pacific). Various restoration trials were carried out in 2005 / 2006 which involved transplanting and establishing new reef patches, monitoring progress and community involvement to explain the aims and processes.</p>
5	<p><b>Sustainable Development</b></p> 	<ul style="list-style-type: none"> <li>• Providing communities with alternative source of income when conservation is carried out in areas they relied on for income in the past.</li> </ul>	<p>In the Solomon Islands, WWF are working with coastal villagers to make the trade in aquarium fish more sustainable. The aim is to provide villagers with the means to 'farm' fish and coral on land, rather than undertake potentially destructive fishing at sea.</p>



## Opinions on biodiversity in the Pacific SIDS

### Opinion 1

"The future of Pacific Island peoples is inextricably linked to their coastal ecosystems. Unsurprisingly and with the exception of inland populations in Papua New Guinea, fish provides and is expected to provide the major source of protein for their rapidly growing populations for at least the next 20 years. The role played by the Pacific Island reef ecosystems extends far beyond that of sustenance or income generation and includes such vital functions as protection from extreme natural phenomena."

**People and Reefs in the Pacific, H Govan, 2007**

### Opinion 2

"The reefs attract thousands of tourists, yet the impact of tourism is one of the main threats they face. Another is chemical run-off from intensive agriculture, which is making increasing inroads in Fiji. The island gets plenty of rain, which helps to carry fertilisers and chemicals off the sugar cane fields and into the streams. Suva, the capital with 80,000 people, is the largest urban centre in the South Pacific. Many of its rivers are contaminated with sewage, which also finds its way to the sea."

**BBC web article on Fiji, 2003**

### Opinion 3

"Climate change facts:

- The Earth's surface temperature will rise between 1.1 and 2.9 degrees celcius by the end of the 21st century (*IPCC AR4, 2007*).
- A mean sea level rise of 25–58cm is projected by mid 21st century along the coastlines of Pacific island countries.
- Higher sea surface temperatures will result in bleaching of coral reefs and retreating of mangrove wetlands, which means less diversity of fish and other animals."

**SPREP Factsheet, 2008**

### Opinion 4

"The ecosystems of the Pacific islands support more rare, endangered and threatened species than anywhere else on earth."

**Pacific Islands Forum statement**

### Opinion 5

"The Pacific is one of the last moderately healthy fisheries in the world but its greatest threat is overfishing. As fishing stocks collapse in the North, fleets move en masse to the Pacific, rather than fixing the problem in their own waters."

**Greenpeace Australia Factsheet, 2006**

### Opinion 6:

"The population of the Solomon Islands, growing at approximately 2.9% per year, is expected to double in about 23-25 years. This will place increasing stress on the ability of rural areas to support the subsistence lifestyle whilst maintaining ecological integrity."

**WWF**

### Opinion 7

"Coral bleaching events appear to be the first signs that coral reefs are in trouble and the majority of opinion now suggests that frequency and mortality of bleaching events is set to increase dramatically over the next few decades."

**Greenpeace 'Pacific in Peril', 2000**

## Internet research sources

These websites represent a range of sources which will provide you with background information:

**[www.forumsec.org](http://www.forumsec.org)** The website of the Pacific Islands Forum which provides details on the Forum and its activities.

**[www.reefbase.org](http://www.reefbase.org)** A global information portal on the state of the world's coral reefs and the threats they face, including a GIS mapping tool.

**[www.biodiversityhotspots.org](http://www.biodiversityhotspots.org)** An information site on the state of biodiversity and hotspots around the globe, with interactive mapping.

**[www.sprep.org](http://www.sprep.org)** Website of the South Pacific Regional Environment Programme, it provides detailed information on all aspects of environmental threats and management.

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