

THE COLLABORATION BETWEEN THE UNIVERSITY OF MISSISSIPPI AND BELIZE ENABLES OPPORTUNITIES FOR SCIENCE EDUCATION

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Abstract—The University of Mississippi and the American Universities International Program (AUIP) enjoy vast educational opportunities in Belize. Bounded by Mexico on the north, Guatemala on the west and south, and the Caribbean Sea on the east, Belize's 22,960 km² of topography range from sea level to 3,688 ft. This variation in altitude and the tropical climate support a great diversity of habitats. The relative underdevelopment and pristine ecosystems of rain forest, pine savannahs, and mangrove swamps are complemented by the longest barrier reef in the Western Hemisphere. Since 1995, the primary purpose of the AUIP study program in Belize has been to provide experiential learning courses for students, professors, and professionals from the United States and Belize. The main emphasis has been on marine biology, ecology, natural resource management, anthropology, ecotourism, and land use.

INTRODUCTION

The University of Mississippi, along with the American Universities International Program, developed an intense study-abroad program in Belize since 1995. This collaboration has seen outstanding success during the past 5 years and involved many university professors, students, professionals, and other officials from both the United States and Belize.

PROGRAM OVERVIEW

The Belize field-study program is a unique multicultural program where participants live and work together with other students from across the United States and other parts of the world. They travel throughout Belize with supervisors, instructors, guides, and local staff to various sites, which provide for affordable living opportunities to study within the natural settings and cultures of the local people. Students are given proper orientation in compliance procedures and regulations to ensure protection of ecosystems being studied while maintaining strict North American safety standards.

The actual classrooms and study sites include spectacular and pristine ecosystems, which range from the largest barrier reef in the Western World, lush rain forests, mangrove swamps, high forested mountains and plateaus, freshwater lagoons, scenic and wild rivers, extensive underground caves, Mayan ruins, and much more. The student is given a truly interactive and hands-on experience that can definitely put the fun and excitement back into science education in a most pragmatic and affordable manner. Such an opportunity can take learning well beyond the greatest expectations, broaden one's scope, and perhaps change one's overall life perspective in a most positive manner. Consequently, almost daily, students are in awe of what they experience and learn.

The current success of the Belize field-study program demonstrates the tremendous opportunities for science

education and research that American universities can utilize in collaboration with the many and varied Belizean institutions. Reliable and dependable cooperation with local institutions can be readily established that will provide good accommodations, warm atmosphere, fine food, and a complex mix of pristine subtropical ecosystems—all at a super value and within strict safety standards and regulations.

COUNTRY OVERVIEW

Belize, formerly known as British Honduras, gained independence in 1981 and remained a parliamentary democracy and member of the British Commonwealth. It continues to be a peaceful country, well insulated from the problem areas of Central America.

Belize is on the eastern coast of Central America on the Caribbean Sea. It is located between 15°53' and 18°30' N. and is bounded on the north by Mexico (the State of Quintana Roo and in the extreme northwest, Compeche) to the west and south by Guatemala (the department of Peten and in the extreme south Izabal) and to the east by the Caribbean Sea. In form, the country is roughly rectangular, extending 280 km from north to south and 109 km from east to west. The maximum extension is 180 km, including the territorial sea. Total land area, including some 1,200 cays, is 22,960 km², which is divided into 6 districts, 9 municipalities, and more than 240 villages. The territorial sea adds to a total area of 46,620 km².

In spite of its small size, Belize is composed of a diversity of landscapes. Inland, the Mayan Mountain/Mountain Pine Ridge Massif is the dominant physical feature and rises to 1,124 m at its highest point. It is surrounded by rugged karst limestone hills. Beyond that, most of the north and the entire coastal area, including the south, consists of low-lying plains. Nine land regions, each comprising a particular combination of topography, soils, and vegetation, and, thus, a distinctive landscape, have been distinguished. The

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upland of the Mayan Mountain land system constitutes the dominant topographical feature. The geology of this area comprises Carboniferous and Permian metasediments (quartzites, shales, slates) with granite intrusions. Most of this land system is characterized by steep slopes and shallow soils, which are leached, acidic, infertile, and fragile.

There are five upland regions, which are characterized by hilly terrain made up of a thick section of indurated Cretaceous limestone that has eroded into an extremely rugged scenery known as karst. These regions are: the central foothills, located on the northern flank of the Mayan Mountains Massif; the western foothills, located in the western and midwestern areas of the country that include the most extensive cave system in Central America; the eastern foothills, overlooking the coastal plains and hosting the oldest rocks in Central America; the southern foothills, located in the northwestern parts of the southernmost district; and the Bravo Hills, located in the northwest area of Belize.

The other three land systems are comprised of the coastal plains. The southern coastal plain lies in the most southerly district and is further divided into the Machaca (marginal agricultural suitability) and Temash (poorly drained acid and infertile) plains; and the northern and central coastal plains, both underlain by Tertiary limestone, marl, and calcareous clays.

The preliminary classification scheme for the coastal zone, as developed under the current Protected Areas System Plan, further distinguishes four regions that reflect differences in sediments, bathymetry, topology, and hydrology, and represent marine equivalents of the terrestrial land systems. These four coastal regions, running from north to south, are the Ambergris region, the Belize region, the Stann Creek region, and the Punta Gorda region.

The climate in Belize is subtropical with rainfall varying from < 1300 mm per year in the north (with a 4-month dry season) to over 4500 mm in the south (with a shorter dry season). This remarkable variation in rainfall over a small area (280 km in length) is incredible but true.

The climate, along with the diversity of geology, topography, and edaphic factors, maintains pristine ecosystems of rain forest, pine Savannahs, jungle mountains, rivers, deep caves, lagoons, estuaries, huge waterfalls and more. Likewise, the natural vegetation shows astonishing variation and diversity with some 49 distinct types already recognized. Together, the terrestrial ecosystems of Belize display as much habitat diversity at low altitude as any other Mesoamerican country. The exceptional inland ecosystems of Belize are home to over 500 species of birds, 107 species of reptiles, more than 120 species of mammals, 26 amphibian species, and over 700 plant species.

Seven principal habitats make up the Belizean coastal zone: coral reefs, sea grass beds, mangrove forests, littoral forests, watersheds, wetlands, and estuaries. The shallow crystal clear waters of the coastal zone of Belize are host to the

largest barrier reef of the Northern Hemisphere. This is one of the most spectacular, complex, and biologically diverse ecosystems in the world. The barrier reef complex runs from north to south and extends some 230 km along the coastline from the border with Mexico to the threshold of the border with Guatemala. Three offshore coral atolls occur east of the barrier reef and are associated with multiple sand and mangrove islands enclosing a lagoon with sparse coral formation. The southernmost atoll, however, has frequent and well-developed structures.

Some 65 coral reef species have been identified with suggestions that as many as 113 coral-associated species may occur. Indications are that apart from corals, as many as 343 species of other invertebrates may occur. In December 1996, seven locations on the barrier reef were designated World Heritage Sites under the World Heritage Convention; and in 1998, one inland wetland site was designated under the RAMSAR Convention.

Over 4,000 years ago, the Mayan Civilization took root in what is now Belize. Some 2 million Mayas may have lived there during its height. They built sophisticated cities and temples, and the record of their lives in over 900 archeological finds has survived the years. Although many temples have been excavated from the earth, many more, it is certain, remain hidden in the dense jungle. The reign of the Mayas has vanished, but direct blood ancestors still live in Belize in harmony with an unlikely mix of newcomers. They include descendants of English settlers, European pirates, African slaves, Atlantic Coast Indians, East Indians, Mennonites, Chinese, Lebanese, and some veterans of the U.S. Civil War. More recently, an influx of Central American immigrants has increased the population of Belize to some 230,000 strong.

Although multilingualism prevails in Belize, communication is not a problem because almost everyone speaks English. However, the different ethnic groups maintain their cultural traditions and dialects, thereby adding to the natural charms of Belize.

Getting to Belize from the United States is facilitated by direct flights out of the cities of Houston, New Orleans, Dallas, and Miami, each with a short duration of 2 hours. Central standard time is observed year round in Belize, and, similarly, the currency exchange is stable at \$2.00 BZE to \$1.00 U.S. Hotels, restaurants, and stores accept U.S. and Belizean currencies interchangeably.

Belize is still an outpost on the edge of the world, where all things wild live undisturbed. If the country is famous for anything, it would be for its genuinely friendly people, touring, diving along its outer cays, and ecotourism inland. The richness of the traditional medicine that preserves the value of many species of plants and animals in the unspoiled ecosystems is likewise appealing to tourists, students, professors, and researchers alike. Furthermore, the availability of modern and highly efficient telecommunications and Internet facilities throughout Belize adds irresistible appeal to the high-tech generation of today and provides exceptional delight to both students and professors.

The primary purpose of the current University of Mississippi collaborative program in Belize is to provide an experiential learning adventure whereby undergraduate students, along with their professors, can develop an understanding of living, working, and learning in a developing country where pristine ecosystems prevail. It is designed to entail field study for persons with backgrounds and interests in natural resources, biology, geology, ecology, tourism, and anthropology. It is for anyone who enjoys working and learning in remote environments and cares about further conservation of global resources, particularly in a diverse and challenging natural situation. Special emphasis is placed on natural and social sciences and how land use and ecological decisions are developed within existing socioeconomic constraints.

Some recent direct spin-off activities include: baseline environmental studies, evaluation and monitoring of environmental factors, natural product research, research and development of bioremediation systems and prototypes, and current and tide data generation within a U.S. Navy hydrographic project. Also, possibilities exist through collaboration with the Mississippi Research Consortium in the completion of a diagnostic for the World Bank's Regional Mesoamerican Reef Project. Subsequently, several new avenues for additional marine biology research activities and operations have evolved. Clearly, Belize is now being recognized as a country that affords ideal hands-on situations for field studies that can certainly provide tremendous opportunities for science education within a regional and global context.