Caroni Swamp is one of our natural treasures - home to the radiantly coloured Scarlet Ibis (Eudocimus ruber L.), the national bird. It is the largest mangrove swamp, but second largest wetland in Trinidad and Tobago after the Nariva Swamp; occupying approximately 21.7 km of the Gulf of Paria coastline and covering an estimated 9,648.4 hectares (ha). For years, many locals as well as visitors have traversed the mangrove lined channels within this wetland looking at a diversity of birds, reptiles and mammals, but do they know that this wetland has been changing? The Institute of Marine Affairs (IMA) recently completed a study of Caroni Swamp using aerial photographs, remote sensing technology and the geographic information system (GIS). During this study the wetland was demarcated and time-series land cover maps produced for 1942, 1957, 1986, 1994, 2003 and 2007.

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**Wayne Simon Rajkumar**

Mr. Wayne Simon Rajkumar is the Assistant Manager of the Water, Waste and GIS unit at the Environmental Management Authority (EMA) and is currently the acting Manager of the EMA’s Technical Services Department. Mr. Rajkumar holds a BSc in Chemistry and an M.Phil. in Analytical Chemistry from the University of the West Indies (UWI).

Mr. Rajkumar has over 20 years experience in environmental research and regulatory management and has led numerous environmental research projects. He was the main technocrat in the development and implementation of the Water Pollution Rules.

Mr. Rajkumar was previously employed as a Research Chemist at the IMA where his research was focused on marine environmental pollution in Trinidad and Tobago. At the EMA, Mr. Rajkumar extended his scope of research to include areas such as air quality monitoring, surface and ground water quality monitoring, hazardous waste management and remediation.

**Reenu Toodesh**

Reenu Toodesh is a returning Organization of American States (OAS) scholar now working as an Associate Professional in the Environmental Research Programme as a Physical Oceanographer. At present, she is primarily involved in investigating the physical oceanographic conditions contributing to erosion at Columbus Bay using a numerical modelling approach. After graduating with a BSc. in Surveying and Land Information from UWI in 2007, her professional career started off as a Hydrographic Surveyor in the private sector in Trinidad. She has an MScEng. from the University of New Brunswick where she graduated in Geodesy and Geomatics Engineering. She was part of the dynamic OceanMapping Group research team with the responsibility for investigating the estuarine circulation and sedimentation patterns in the Saint John Harbour, New Brunswick.

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**The IMA settles salary negotiations at 9%**

The IMA and the Seamen and Waterfront Workers Trade Union led by the President General, Mr. Michael Annisette, and members of the Branch Executive signed Collective Agreements for Bargaining Units I, II and III on Friday 16th November 2012 at the IMA in Chaguaramas. This Agreement, which covers the period August 2007 to July 2010, comes after a long phase of negotiations between the Union and Management. In the Agreement, 3% increase in salary was offered and accepted for each of the years 2007 through 2010. Increases in other allowances including Cost of Living, subsistence, meal and travelling allowances were also agreed.

The management negotiation team was led by Dr. Amoy Lum Kong, Director, who conveyed her thanks to the Union and staff on the signing of the Agreement.

*Signing of Agreement: (From L-R ) Mr. Nelson Sinnette, Mr. Herbert Constantine, Mr. Michael Annisette, Dr. Amoy Lum Kong, Ms. Naomi Slinger-Cohen, Mr. Ben Maharaj, Ms. Cheryl King, Ms. Judith Rennie, Ms. Rhonda Joseph, Ms. Charmain Fontiflette-Douglas, Ms. Maria Wyke and Mr. D’Angelo Merritt.*
IMA SPEARHEADS LIONFISH AWARENESS WORKSHOP

The IMA held a two day Lionfish Awareness and Capture workshop from 6th – 7th December 2012 at the IMA. This mirrored the previously held workshop in Tobago during 11th -13th September 2012. The Workshop was conducted by Jahson Alemu 1 Research Officer Coral reef ecology in the Environmental Research Programme.

Participants at the workshop included representatives from Emperor Valley Zoo, Fisheries Division, and Ministry of Health. At William’s Bay, Chaguaramas participants practised with pole-spears used in capturing the Lionfish.

UWI VISITS THE IMA

On 23rd November 2012, 108 students from the UWI, St Augustine visited the IMA’s Aquaculture facilities. The students were part of a Tropical Aquaculture course which focused on various disciplines of aquaculture such as hatchery design, water quality management in tropical fish ponds, fish feed technology, Environmental impacts, pond design and operation. At the IMA the students were given a tour of the Aquaculture facilities which highlighted the Intensive Re – circulating system and the aquaculture hatchery. Students indicated that the visit afforded an increased understanding of Tropical Aquaculture and they were amazed by the potential output of the intensive system.

COSTAATT STUDENTS VISIT IMA’S CHEMISTRY LABORATORIES

The IMA welcomed a group of students as they visited the Marine Chemistry Department on 26th November 2012. The 22 students from the Water quality class at COSTAATT, accompanied by their lecturer Mr. Sochan Laltoo Senior Lecturer Department of Environmental Studies were given a tour and lecture of the chemistry department which includes the Microbiology, Heavy metal and Wet chemistry labs. The visit aimed to reinforce what was learnt during the semester by students and to increase understanding of processes and techniques used in marine laboratory work. At the end of the tour, Mr. Laltoo expressed his thanks to the staff of the various labs for a highly productive day that would help prepare his students for their exams in December 2012.
Caroni Swamp has been impacted since the 1920s when the Cipriani Reclamation Scheme was implemented to facilitate rice cultivation. In 1942, a larger portion of the Caroni Swamp was covered with freshwater marsh vegetation and agriculture; primarily rice fields. In 65 years (1942-2007), mangrove coverage in the swamp increased by 1,105 ha while marshland decreased by 523 ha and agriculture decreased by 393.5 ha. Built development increased by 35 ha between 1942 and 2007 while a solid waste landfill expanded from 47.5 ha in 1986 to 73.7 ha in 2007. Generally, natural wetland communities (mangrove, marshes and open water/pond) increased between 1942 and 2003, as agriculture lands reverted to marsh and mangroves colonized new areas: mudflats and deposited dredged spoil. However, between 2003 and 2007, natural wetland coverage declined by about 346 ha as built development and agriculture lands increased.

Prior to the 1960’s, the major changes to the Caroni Swamp were hydrological in nature; channels were cut, the North-South embankment was built, water was diverted away from the wetland, and the Caroni River was dredged and widened. A freshwater marsh habitat was created on the eastern side of the North-South (N-S) embankment but as the embankment fell into disrepair in the 1950’s, the same conduits that were constructed to drain the wetland, carried saline water upstream into the freshwater environment (Fig 1). Highways (Churchill Roosevelt and Uriah Butler) were constructed and this also impeded the flow of the rivers into the wetland. These hydrological changes eventually led to saltier conditions in the eastern marshes, eastward of the N-S embankment and colonization by mangroves.

The Caroni River Basin also experienced extensive land-use/land cover changes within the past few decades and this has serious consequences for the Caroni Swamp; the receiving environment for the land-based runoff. In addition to saltwater penetration, Caroni Swamp receives sediment-laden water polluted with sewage, wastewater from industry and agriculture run-off. This has affected the quality of the habitat, and shellfish harvested in the swamp. Fish kills and mangrove “dieback” seem to be regular occurrences in the Caroni Swamp.

Frequent hydrological work in the Caroni Swamp to mitigate flooding in the associated catchment has negatively impacted the wetland, as channels are widened and dredged, mangrove trees are removed, and the dredge spoil placed on the bank inhibits the natural flushing of the system, leading to stress conditions.
In 1953 under the Forest Act Chap 66.01 a total of 3,033 ha of Caroni Swamp was designated a protected area. Part of this area is a Wildlife Sanctuary for breeding Scarlet Ibis. In spite of this the number of breeding pairs has declined and this has been attributed to the Scarlet Ibis shifting their feeding to freshwater prey during the breeding season and the freshwater habitat in the Caroni Swamp as saltwater intrudes further inland.

The designation of Caroni Swamp as a Wetland of International Importance under the Ramsar Convention in 2005 was expected to bring much needed attention and conservation intervention, yet between 2003 and 2007, built development within the wetland doubled and significant marshlands have been lost. Mangrove forest has expanded and continues to overgrow marsh vegetation as salt water intrudes further inland. This salt water intrusion results from human activities, but may be compounded by relative sea level rise associated with global climate change. Privately owned lands occur within the Ramsar Site and developments of these lands continue to negatively impact the wetland, especially along the Uriah Butler Highway. There is an urgent need for intervention in the Caroni Swamp Ramsar Site to address these issues and to protect and restore the diverse plant communities within the wetland, including the habitat of the Scarlet Ibis.

Submitted by Rahanna Juman, Institute of Marine Affairs
(shortened version of an article published in the Journal of Coastal Conservation)
IMA AT UNEP INTERNATIONAL CONFERENCE

Dr. Amoy Lum Kong, Director represented the IMA at two meetings hosted by the United Nations Environment Programme, Caribbean Regional Coordinating Unit, from 23rd—27th October 2012 at Punta Casa, Dominican Republic. These meetings included the First Meeting of Contracting Parties to the LBS Protocol as well as the Fifteenth Intergovernmental Meeting on the Action Plan for the Caribbean Environment Programme and the Twelfth meeting of the Contracting Parties to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean region.

SPATIAL TECHNOLOGIES AND IMA

Deanesh Ramsewak, Remote Sensing Officer, Information Technology Department, IMA attended the Urban and Regional Information Systems Association (URISA) Sixth Caribbean GIS Conference at the Hilton Rose Hall in Montego Bay, Jamaica from November 12-16, 2012. This year’s URISA conference was themed “Spatial Technologies - Critical Thinking for Critical Times” and addressed issues on GIS implementation and management, relationships with the vendor/consultant community and development of a Caribbean GIS network, amongst others. At the meeting, Mr. Ramsewak presented on the activities of the ongoing “High Resolution Assessment of Carbon Dynamics in Seagrass and Coral Reef Biomes” multi-agency project involving the application of (Unmanned Aerial Vehicle) UAV Technology for Coral Reef and Sea Grass Monitoring. Other agencies currently involved in the project are UAV Collaborative-NASA Ames Research Park, University of South Florida (USF), Florida Fish and Wildlife Conservation (FFWC) and the United States Geological Survey (USGS).

Regional Experts Workshop on Environmental Monitoring and Assessment

Dr. Amoy Lum Kong—Director and Dr. Darryl Banjoo—Principal Research Officer, Environmental Quality Programme attended a Workshop for the Wider Caribbean, under the United Nations, in support of the Regular Process for Global reporting and Assessment of the State of the Marine Environment, including Socioeconomics aspects from 13th—15th November 2012, Miami, Florida, USA.
IMA joins NIHERST at Siparia Community Science Week
The IMA participated in the NIHERST/NGC’s Twelfth Community Science Week in Siparia from Monday 15th October – 17th October 2012. The aim of Science Week is to promote science education in rural communities by providing children and adults with a fun science experience. Penal Secondary School was the venue for Science week. Students were educated about our marine environment and conservation. An estimated 375 students, teachers and adults visited the IMA’s booth from primary and secondary schools in the Siparia community.

IMA at Tobago Science Expo
The IMA participated in the third Tobago Science Expo held at the Katzenjammers Pan Theatre in Black Rock, Tobago from October 3-5th. The theme of the event was “From Natural Resources to Creative Enterprise”. The organizer of the event was the Tobago House of Assembly (THA) - Division of Education, Youth Affairs and Sport. Over the three day event the IMA was able to interact with approximately 700 students from primary and secondary schools in Tobago. The main objectives of the Expo were to provide an opportunity for pupils and teachers to showcase their creativity and innovation in science and technology and to foster the desire in young people to choose a career in science. At the IMA booth, students were able to learn about the marine environment through interactive games such as Environmental Jeopardy, Match the Habitat and Continents and Oceans of the World.

IMA End-of-Year Function
The IMA held its annual End of Year Function on December 14th 2012 at the Tiki Village restaurant, Kapok Hotel. Staff members shared a meal, played games, and enjoyed entertainment from a live parang band.

At the end, the Director Dr Amoy Lum Kong thanked staff for coming out and making this event a success.
THE BLUE CORNER

“We cannot command Nature except by obeying her.”

Francis Bacon

Do you know how caves, arches and stacks are formed?

• Within a cliff face there can be sections of weaker rock, which over time can erode to create caves.

• An arch starts off as two caves on a headland but erosion takes it one step further and joins them together as an arch.

• Over hundreds of years the arch becomes thinner and weaker until it comes crashing down leaving a stack in the sea.

References
http://www.bbc.co.uk/learningzone

Picture of an Arch and Stack at Paria, Trinidad