



The term marine energy encompasses both wave power -- power from surface waves, and tidal power -- obtained from the kinetic energy of large bodies of moving water.

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Can we Harness Ocean Energy in T&T?

The World Energy Council estimates that the electrical energy that can be harnessed from the world's ocean is twice the amount that the world now produces. Trinidad and Tobago is still heavily dependent on non-renewable resources such as oil and gas for the generation of electricity. The largest percentage of electricity generated from oil and gas in Trinidad over the past 38 years was 99.81% in 2003, while the lowest value was 96.47% in 1971. Although the use of energy generated by the ocean is increasing across the globe, Trinidad and Tobago and other islands of the Caribbean have not as yet exploited this potential source of clean energy.

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Farewell

The IMA would like to express its appreciation to Dr. Amoy Lum Kong for her dedication and service during her tenure as Director of the IMA from 2011 to 2014. We appreciate all the support and encouragement that she extended to the Institute in realizing its goals. The IMA wishes you all the best in your future endeavors!



New Appointment



Dr. Donna-May Sakura-Lemessy has been appointed the IMA's acting Director while retaining her substantive post of Deputy Director (Research). Dr. Lemessy is a Gates Millennium Scholar who holds a PhD in Civil and Environmental Engineering, BA in Environmental Planning from the University of Miami, and an MSc in Environmental Sciences with a concentration in Geomatics from Florida International University.

Congratulations

Congratulations to Professor Indar Ramnarine, Chairman of IMA's Board of Governors on his Award for Excellence in Science and Technology in NIHERST's Trinidad and Tobago Icons in Science and Technology.



IMA EVENTS & ACTIVITIES

World Wetlands Day

Annually, February 2nd is World Wetlands Day. This marks the date of adoption of the Convention on Wetlands on 2 February 1971, in the Iranian city of Ram-sar on the shores of the Caspian Sea. To commemorate World Wetlands Day, IMA's staff embarked on an educational tour through the Nariva Swamp. The swamp is located on the east coast of Trinidad, immediately inland from the Manzanilla Bay and covers over 60 square kilometers. The area provides an important habitat for; Waterfowl, West Indian Manatees (*Trichechus manatus*), Caimans, Anacondas, Boa constrictors, Red Howler monkeys, White-fronted Capuchin monkeys, numerous species of parrots, including the Blue-and-gold Macaw and Red-bellied Macaws, as well as many wetland and savannah birds. Four major wetland vegetation types occur in the Nariva Swamp - mangrove swamp forest, palm forest, swamp wood, and freshwater marsh. The Nariva Swamp is the largest freshwater wetland in Trinidad and Tobago

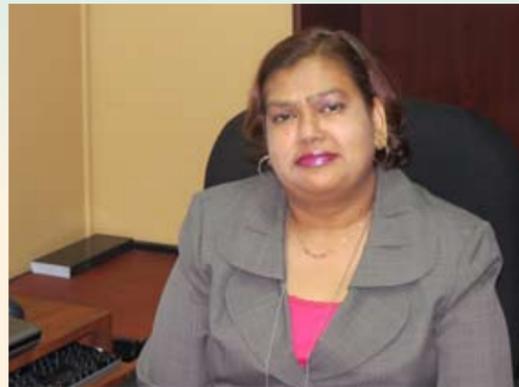


IMA staff members at the Manatee Trust, Manzanilla

Welcome to the IMA

Ms. Taramatee Boodoo joined the IMA Family in January 2014 as Finance Officer. Ms. Boodoo started her accounting career in 1997 at Omardeen School of Accountancy.

In December 1999 she graduated from the ACCA's Technician program at the top of her class. Ms. Boodoo professional experience includes lecturing and accounting experience in the construction industry. Ms. Boodoo is FCCA qualified and aims to apply her skills and knowledge as Finance Officer to the institution.



Mrs. Taramatee Boodoo
Finance Officer, Accounts



Wendy Jaggernaut
Secretary, Accounts



Malini Ramlal
Lab Technician

IMA and NALIS partnering to share knowledge

The Institute of Marine Affairs (IMA) presented copies of its books "The Construction of an Artisanal Fishing Boat from Trinidad and Tobago, West Indies" and the newly-updated "A Guide to the Beaches and Bays of Trinidad and Tobago" to NALIS on February 5, 2014 at the National Library. Both publications will be made available to the general public through NALIS' Heritage and Public Libraries, and to secondary and primary school students through their School Library Media Centers.



Dr. Beverly Foster -Hinds, right, IMA's Chief Information Officer, presents one of the books to Diane Simeon, Director, Public Libraries Division, Nalis, Marguerite Anne Moore, Director Heritage Library Division, from left, and Catherine Romain, Director, Education Library Services Division Nalis

"The Construction of an Artisanal Fishing Boat from Trinidad and Tobago, West Indies" is an historical photographic record of the construction of a wooden artisanal fishing vessel, popular in Trinidad up to the 1980s. "A Guide to Beaches and Bays of Trinidad and Tobago," generated from the IMA's research into the dynamics of our beaches, gives directions to known and not so well-known beaches and describes the facilities available to beach-goers. These books are also available at book stores in Trinidad and Tobago.

Can we Harness Ocean Energy in T&T?

Renewable energy resources are the future as they are available in significant amounts and are by far the cleanest sources of energy available on planet earth. These alternative sources of energy generally require startup capital which is a challenge for many Caribbean islands. Tidal, wave and ocean thermal energies are all within the realm of reality. The ocean can produce two types of energy: thermal energy from the sun's heat, and mechanical energy from the tides, waves and ocean currents. It is important that we understand some of the technologies that can produce ocean energy and what it could mean for us in Trinidad and Tobago.

Tidal energy is generated from the power of changing tides caused by the magnetic pull of the moon. This may be achieved by building a dam across a bay or an estuary where there is a significant difference between high and low tide. The high tides allow immense amounts of water to rush into the bay. The gates of the dam then shut when the water level is at its maximum height. When the tides fall the gates open and the water flows out and spins a turbine which creates electrical energy. The world's first Tidal Power Station, Rance opened on the 26th November 1966 in France and takes advantage of tidal water flow to produce electricity. A major drawback to tidal energy is that it is not a constant source of electricity as it relies on the rise and fall of tides to work and there are only two tides per day. For tidal energy to be considered economical a range of at least seven metres at high tide is needed. Unfortunately in Trinidad waters, the highest tides reach only two metres.



How tidal energy is harvested



Submarine turbines at work

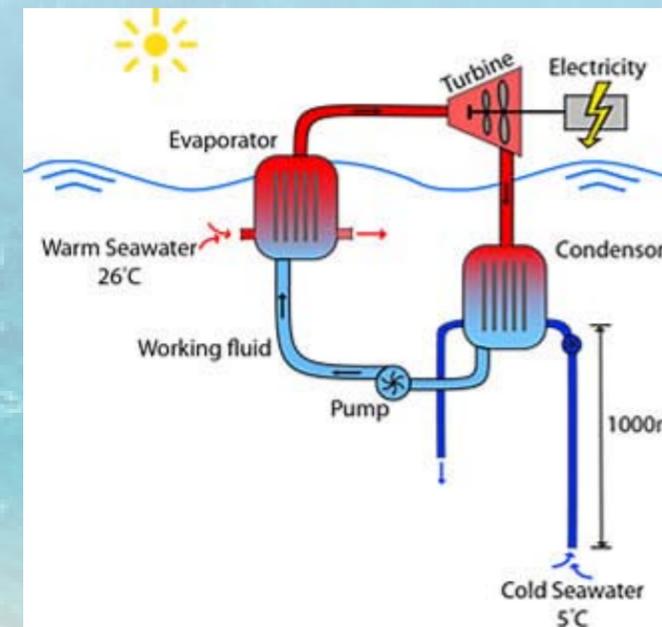
So what does that mean for our future with tidal energy? Rather than using a change in water height, offshore turbines are made to work just like wind turbines but underwater, harnessing water currents to turn the turbines and produce electricity. These Tidal Current technologies extract energy from the high tide bulge created by the gravitational pull of the Moon and Sun moving horizontally around the Earth's surface. Unless taken to extremes, it does not require blocking of any waterways, and hence does not have the adverse environmental effects associated with Tidal Barrages. Trinidad's east coast is close to the Guiana Current the second largest ocean current in the world, which has speeds between 0.2 and 4.2 knots that is sufficient to produce electricity using submarine turbines.

Currently the Institute of Marine Affairs (IMA) recognizes the potential for these ocean currents to power submarine turbines and as such has embarked on a project that entails a detailed study of ocean currents around Trinidad and Tobago especially in the Columbus Channel and the Galleons Passage. Submarine turbines can produce clean renewable energy. However, a disadvantage of underwater turbines is that they require additional maintenance as the salt water corrodes mechanical parts, also moving the electricity generated back to land is always a challenge once implemented. In 2008, the tidal current power plant SeaGen began operating off the Irish Coast using offshore turbines which produce 1.2 megawatts of clean electricity. This is enough to supply a town of 1,500 households, solely from the power of the tides.



Pelamis Wave Energy Converter

One of the possible means provided by the sea for generating electricity is to make use of the force produced by waves. The Northeast Trade Winds which contribute to the abundance of waves around Trinidad and Tobago increases the possibility of having large scale wave energy farms in our waters. So how do we harvest wave energy? Most of the wave energy technologies rely on the up-and-down motion of waves to generate electricity. In Portugal, the world's first wave farm consists of Pelamis' wave energy devices. This device, which resembles a large segmented sea snake, consists of four big cylinders strung together by hydraulic joints. As the tubes bob up and down on the waves, their movements lob the joints, moving oil through hydraulic motors. These motors drive generators to produce electricity. The Pelamis snake is 600 feet long and 13 feet wide and generates up to 0.75 megawatts, that's enough to power about 500 households for a year. It is estimated that with just 15 of these devices around our coast it is possible to generate enough electricity to power the entire Borough of Arima. However, the amount of electricity that can be generated depends largely on the frequency and height of ocean waves, also once implemented Pelamis poses a possible threat to navigation from collisions due to the low profile of the wave energy device.



How an OTEC plant works

The ocean offers the single largest opportunity for meeting our energy needs. It acts as the world's largest solar panel collecting 80% of energy the earth receives from the sun or enough to offset 250 billion barrels of oil every day. While the ocean's surface water heats up, the depths of the ocean remain cold. Ocean Thermal Energy Conversion (OTEC) turns this difference in temperature into power. The process begins when the warm surface water is used to boil a fluid producing steam. The steam turns a turbine and generates electricity; cold water in the ocean depths is used to condense the steam and turn it back into water thus completing the cycle. The Atlantic Ocean on the eastern side of Trinidad is both warm at the surface and cold enough at depths to sustain an OTEC plant. OTEC can provide a responsible way to meet growing power needs and in Trinidad and Tobago reduce the amount of electricity generated from oil and gas. For OTEC to be viable as a power source, the technology must have tax and subsidy treatment similar to competing energy sources. Because OTEC systems have not yet been widely deployed, cost estimates are uncertain. One study estimates power generation costs as low as US \$0.07 per kilowatt-hour, compared with \$0.05 - \$0.07 for subsidized wind systems. The vast ocean is full of energy potential. The Pelamis, Tidal offshore turbines submarine turbines and OTEC are just a few mechanisms used to tap into the oceans energy reserve. Through their continued research and projections, scientists believe that in order to have clean energy the world's power may need to come from the ocean. With energy security concerns on the rise the ocean is an energy source which Trinidad and Tobago can explore as we look to new ways of powering our nation with a sustainable energy source.

Glendon Glasgow
Information Officer

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- http://powershift.anetce.com/tidal_dam1.gif
- <http://www.evwind.es/wp-uploads/2012/07/Pelamis-Wave-Energy-Converter>
- <http://www.indexmundi.com/facts/trinidad-and-tobago/electricity-production>

IMA EVENTS & ACTIVITIES (con't)

Fyzabad Science Week

IMA participated in the NIHERST Community Science Week Fyzabad during 3-8 of February 2014 at the Fyzabad Secondary School. Science Week aims to promote science education in rural communities by providing children and adults with a fun science experience. Students gained an appreciation for our marine environment, the importance of conservation and the rich biodiversity our waters have to offer. About 700 students and teachers from primary and secondary schools in the south district visited the IMA's booth. Residents of the Fyzabad area also participated.



Information Officers, Krystal Chandler and Glendon Glasgow, engage students in a game of 'Environmental Jeopardy'

IMA at National Career Fair in Tobago

Secondary school students took part in a two-day district career fair organized by the Ministry of Education in collaboration with the Ministry of Tertiary Education and Skills Training and the National Training Agency. The fair was held 13 -14 of March at the Good- wood High School Tobago and was visited by Forms 3, 5 and 6 students. Among the exhibitors present were the Ministry of National Security with all of its respective arms represented including the Defence Force, the National Energy Skills Centre, UWI open campus, SITAL College and COSTAATT. Information Officers of the IMA spoke to students on careers in marine science which was greatly appreciated.



Glendon Glasgow, Information Officer, addresses students

School Outreach in Trinidad

Over the period 17 -23 of January, Form 6 students from St. Francois Girls' College, St. Anthony's College and North Eastern College received presentations on Marine Pollution and Invasive Alien Species from Lori Lee Lum, Krystal Chandler and Glendon Glasgow, of the Information Centre. These presentations were part of a new venture that focuses on various environmental topics in the CAPE syllabus. Information shared in these interactive presentations can be used for exam preparations. In the future Global Warming and other topics on the syllabus will be covered. Please give us a call at 634- 4291 Ext 2401, 15, 13 to schedule a presentation.



Krystal Chandler, Information Officer, at St. Anthony's College

ICZM Consultation

On the April 2nd 2014 an Integrated Coastal Zone Management consultation was held at Blanchisseuse. ICZM is a continuous and dynamic process that addresses all three dimensions of sustainability – socio/cultural, economic and environmental. It is a participatory and consensus-building exercise that requires a variety of skills and expertise. It unites government and the community, science and management, sectoral and public interests and promotes coordination and integration of activities across agencies, organizations, and jurisdictions, capitalizing on human, technical, and financial resources and avoiding unnecessary redundancies. It is an approach that adopts the concept of co-management, where stakeholders share aspects of governance with the state, and community participation is an essential part of the management process.



Dr. Rahanna Juman addresses Blanchisseuse Community members

IMA EVENTS & ACTIVITIES (con't)

Mangrove Monitoring workshop in Tobago

On 11-12 of March 2014, Dr Rahanna Juman facilitated a 2-day workshop on Mangrove Monitoring for Staff of the Department of Natural Resource and the Environment (DNRE), Tobago House of Assembly (THA). The purpose of the workshop was to build capacity within the THA to assist with mangrove monitoring and research in Tobago. IMA is currently developing a Memorandum of Understanding with DNRE, to improve the use of its resources and to build research capacity in Tobago.



Integrated Planning for Sustainable Coastal Area Management in the Caribbean Region



Dr. Rahanna Juman (second from right) with other National Experts

Dr. Rahanna Juman attended the Expert Group Meeting Implementing Rio+20: Integrated Planning for Sustainable Coastal Area Management in the Caribbean Region on 17-18 March 2014.

The meeting was co-organized by United Nations Department of Economic and Social Affairs (UNDESA), Economic Commission for Latin America and the Caribbean (ECLAC) Sub-regional Headquarters for the Caribbean, and UNESCO Intergovernmental Oceanographic Commission (IOC) and its Regional Secretariat for the Caribbean and Adjacent Regions Sub—Commission (IOCARIBE).

The objectives of the meeting were as follows:

1. Further enhance the awareness and capacity of national experts and decision makers in the Caribbean region to effectively integrate sustainable development priorities related to oceans and coastal areas into national planning and implementation processes that involve all stakeholders,
2. Define trans-boundary initiatives with neighboring countries.
3. Provide an opportunity to engage in discussions on how to best implement and follow-up Rio+20 decisions with regard to oceans and seas. The recommendations from this meeting will feed into the 3rd International Conference on Small Island Developing States (SIDS) to be held in Samoa on 1-4 September 2014. The United Nations has declared 2014 the year of the SIDS.

National Environmental Assessment Task Force

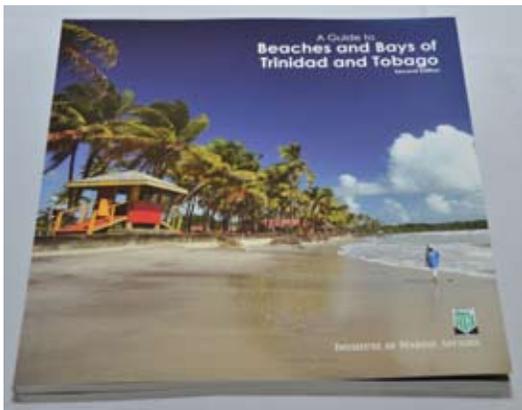
On February 7, 2014 a National Environmental Assessment Task Force was established to oversee all activities necessary to address the environmental impacts of the oil spills at Petrotrin which started on December 19, 2013.

The members of the team to date are: Dr. Allan Bachan (Chair), Professor Indar Ramnarine, Dr. Rahanna Juman, Dr. Daryl Banjoo, Christine Chan A Singh, Jalaludin Khan, Dr. Akenath Misir, Neil Alleyne, Professor John Agard, Derek Gay and Nigel Darwent.



AVAILABLE
NOW!

A Guide to Beaches and Bays of Trinidad and Tobago, 2nd Edition



Paper Based Bookstore - Normandie Hotel, St. Ann's
Ishmael M. Khan & Sons Ltd. - (all branches)
UWI Bookshop - UWI Campus, St. Augustine
R.I.K. Services Ltd. - (all branches)
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FOR MORE INFORMATION: 634 4291 ext 2406

THE BLUE CORNER

"There is no planet B so plan A is to protect our planet."

FISHES

Fish are a class of aquatic vertebrates that consist of all gill-bearing animals with craniums that lack limbs with digits. Most fish are ectothermic ("cold-blooded"), allowing their body temperatures to vary as ambient temperatures change, though some of the large active swimmers like white shark and tuna can hold a higher core temperature.

DID YOU KNOW...?

Researchers at the Massachusetts Institute of Technology (MIT) have designed Schools of robotic fish that could one day map the ocean floor, detect pollution or inspect and survey submerged boats or oil and gas pipelines.

MIT engineers are showing off the latest generation of so-called robofish 15 years after they built the first one. The latest incarnation is sleeker, more streamlined and capable of mimicking the movements of a real fish.

Pablo Valdivia Alvarado, a mechanical engineer at MIT said that "it's capable of exploring underwater terrain that submersibles can't..."

References: <http://edition.cnn.com/2009/TECH/science/08/31/robotic.fish>



MIT's Robofish



A publication of:

INSTITUTE OF MARINE AFFAIRS

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