EXPLORING SOME OCEAN ENERGY POSSIBILITIES IN LATIN AMERICA

Jassiel V. Hernández-Fontes, Instituto de Ingeniería UNAM (Jassiel.hernandez@gmail.com)
Michael Ring, Universidad Nacional Autónoma de México (Mring@iingen.unam.mx)
Rodolfo Silva, Instituto de Ingeniería UNAM (RsilvaC@iingen.unam.mx)

INTRODUCTION

Ocean renewable energy is seen as a global trend for future electricity productions. One of the most widely-investigated ocean energy source is that derived from waves. The marine regions where this type of energy is more available in close to the poles, where high waves are more persistent. However, energy conversion from waves may also be a suitable alternative to supply basic electricity necessities in developing countries, such as in Latin American countries. This paper examines the available energy resources in Latin American waters, discussing the possibilities to employ low-energy production to benefit coastal regions. Some prospective regions are identified, including possible possibilities and limitations to deploy wave energy converters in that regions.

ERA-Interim 5 simulation databases are employed for a 10-year period to make a preliminary estimation of resources. Then, a statistical analysis was done to define prospective coastal regions in each Latin American country, listing possibilities and constrains found in those regions. It is aimed that the present study serves as a basis to further technical analyses in the suitable areas.

The present study considers oceans around Latin American countries (Figure 1), where ocean energy from waves can be an alternative source of electricity, at least for minor scale production.

Figure. 1: Latin American countries.

This paper considers ocean energy possibilities in diverse marine regions in Latin-America form a general point of view, employing data simulation databases. Relevance to coasts and estuaries is limited due to the spatial resolution of the data, which covers only part of shallow water regions.

Developing countries, such as Latin-American countries, have coastal communities that does not have access to electricity. Then, it is important to know the possibilities and limitations to take advantage of this energy source. For this, a preliminary resource estimation, as well as knowledge of constraining factors in these regions are required.

Motivation: It is of relevance to know the available power possibilities in Latin American regions to perform further planning of projects, considering constrains of relevance for each region.

This paper presents a rough evaluation of wave energy resources in Latin America, aiming to discuss the possibilities to use them as alternative sources of electricity production, at least to feed basic necessities of coastal communities.

AVAILABLE BACKGROUND INFORMATION & DATA

Funded by Federal Ministry for Economic Cooperation and Development, exceed, DAAD

Evaluation of wave energy resources has been previously in Latin American countries such as Colombia, Mexico and Peru. There are several types of ecosystems in the different Latin American countries, such as mangrove forests, coral reefs, etc., that should be taking in account in the evaluation of ocean waves energy.

This study will be focused in waves. We will employ some topographic information to evaluate suitability of resources in some regions, and analytical and statistical approaches to determine the availability of ocean energy power in Latin American regions. Moreover, we will use environmental and social databases to describe limiting aspects.

BRIEF STATE OF THE ART

Early wave energy estimations around the world were performed about ten years before by Cornett (2008) and Mork et al. (2010). They suggested that the most persistent and highest power wave energy sources are located at higher and lower latitudes, where most of the developed countries are located. Conversely, regions located between the tropics present less wave power in comparison with those regions. However, this power can be persistent. Most developing degions are located between tropics, then, persistent sources of wave energy can be employed to produce electricity in at least a lower scale to supply basic requirements of some communities. This paper aims to make a preliminary discussion of the chances and limitations to do this in Latin America.

REFERENCES

Cornett (2008): A global wave energy resource assessment. In: International Offshore and Polar Engineering Conference, ISOPE-2008-TCP-579, Vancouver, Canada, pp. 1-9. https://doi.org/10.1016/j.jsg.2003.08.002

Mork, Barstow, Kabuth, Pontes, (2010): Assessing the Global Wave Energy Potential. 29th International Conference on Ocean, Offshore Mechanics and Arctic Engineering, vol. 3, pp. 447-454. https://doi.org/10.1115/OMAE2010-20473

Technische Universität Braunschweig

INSTITUTO DE INGENIERÍA UNAM

International Network on Sustainable Water Management in Developing Countries
ex|ceed SWINDON

EXCEED - SWINDON Conference 2019

THE FUTURE OF WATER RESOURCES

October 13th - 16th, Mérida, Mexico

Programme
and
Book of Abstracts

Funded by

Federal Ministry for Economic Cooperation and Development

ex|ceed EXCELLENCE CENTERS FOR EXCHANGE AND DEVELOPMENT

DAAD

PROGRAMME

Sunday, 13th			Arrival
19:00	-	21:00	Welcome cocktail

Monday, 14th			Conference Day 1
08:30	-	09:00	Registration
09:00	-	09:30	Opening Ceremony • Norbert Dichtl • Andreas Haarstrick • Rodolfo Silva • Local authority
09:30	-	10:00	Keynote speech • Norbert Dichtl
10:00	-	10:10	Break
Session 1: The impact/performance/role of SDGs Chairman: Valeria Chávez			
10:10	-	10:30	Exploring some ocean energy possibilities in Latin America (Jassiel Hernández)
10:30	-	10:50	Water energy nexus in the MENA region (Abbas Al-Omari)
10:50	-	11:10	Ocean energy and marine biodiversity affectations: a life cycle assessment review (Dora Ruiz-Méndez)
11:10	-	11:40	Coffee Break
Session 2: Water-Energy-Nexus (I) Chairman: Dwi Andreas Santosa			
11:40	-	12:00	Wastewater/waste to energy in MENA region: A review for opportunities (Zeinab Abou Elnaga)
12:00	-	12:20	Water-energy nexus in a wastewater treatment plant: Energy efficiency and recovery (Wang Hongtao)
12:20	-	12:40	From wastewater treatment plants to a resources recovery facility (Marcelo Nolasco)
12:40	-	13:00	Seasonal assessment of the energetic potential associated with salinity gradient: Champoton River, Mexico (Gregorio Posada Vanegas)
13:00	-	14:30	Lunch
Session 3: Water, ecosystem and socio-economic integrating aspects (I) Chairman: Germán Rivillas			
14:30	-	14:50	Decolourization and mineralization of acid green 25 dye through single and catalytic ozonation (Liliana Amaral Féris)

14:50	-	15:10	Adsorption of naphtholate-as dye in wastewater of batik industry using green synthesized zn layered hydroxyl salts (Sri Juari Santosa)
15:10	-	15:30	Adsorption of hexavalent chromium in coal benificiation tailing in fixed bed column (Liliana Amaral Féris)
15:30	-	15:50	Kinetics of the adsorption of anionic and cationic dyes in aqueous solution by low-cost activated carbons prepared from sea cake and cotton cake (Ibrahim Tchakala)
15:50	-	16:10	Distribution of microplastics in water and sediment in a Biosphere Reserve (Cecilia Enriquez)
16:10	-	16:30	Evaluation of microplastics contamination in the margins of the Patos Lagoon in south of Brazil (Eduardo Saldanha Vogelmann)
16:30	-	17:00	Coffee Break
Session 4: Water, ecosystem and socio-economic integrating aspects (II) Chairman: Rodolfo Silva			
17:00	-	17:20	Hydrodynamic modelling of the Huave Lagoon System, Oaxaca (María Fernanda González Amador)
17:20	-	17:40	Impact effects of hard infrastructure in Salamanca Natural Park (Juan Carlos Caez-Perez)
17:40	-	18:00	The decision-making in face to coastal squeeze, analysis between social and economic impacts: Case study of Campeche, Mexico (Debora L. Ramírez-Vargas)
18:00	-	18:30	Keynote speech • Elvis Carissimi
20:00			Dinner

Tuesday, 15th			**Conference Day 2**
Session 5: Water, ecosystem and socio-economic integrating aspects (III) Chairman: Arwa Naser Damen Hamaideh			
09:00	-	09:20	Dispersion of submarine groundwater discharges in reef lagoons and associated environmental effects (Arlett Rosado Torres)
09:20	-	09:40	Salt intrusions into a freshwater spring in a tropical coastal lagoon, Yucatán, Mexico (Xaní Malagón)
09:40	-	10:00	Variability of the saline gradient in a hypersaline coastal lagoon (Brenda Natalia Fitch Geymonat)
10:00	-	10:20	Sedimentation and water quality status of lake Tana, the headwaters of the Blue Nile, Ethiopia (Seifu A Tilahun)
10:20	-	10:40	An innovative approach to mitigate risks on the existing iron tailings dams in Brazil (Jose Araruna)

10:40	-	11:00	Urban sustainable water management and water efficiency improvement for buildings – a case study for Istanbul (Ahmet Baban)

11:00	-	11:30	Coffee Break
Session 6: Water-Energy-Nexus (II) Chairman: Eduardo Saldanha Vogelmann			
11:30	-	11:50	Reverse electrodialysis for energy and water: coupled systems based in salinity gradients (Mateo Roldan-Carvajal)
11:50	-	12:10	Development of graphene oxide membranes for its use in reverse electrodialysis systems (Eddie López Honorato)
12:10	-	12:30	Development of graphene oxide based materials for water treatment (Ana Cecilia Reynosa Martinez)
12:30	-	12:50	Laboratory experiences on marine energy conversion devices for supplying electricity demand of remote coastal communities (Jassiel Hernández)
12:50	-	13:10	Plate type obstacles used for coastal protection and power generation (Luis Eduardo Pérez Paez)
13:10	-	14:40	Lunch
Session 7: Water, ecosystem and socio-economic integrating aspects (IV) Chairman: Thi Thanh Van Ngo			
14:40	-	15:00	Evaluating combinatorial water treatment by locally available materials (Chrispin Kowenje)
15:00	-	15:20	Desalination by capacitive deionization as a tool to provide drinkable water to small communities in the Brazilian semiarid (Luis Augusto Martins Ruotolo)
15:20	-	15:40	Fluoride ions removal from groundwater by alumina adsorption (Elvis Carissimi)
15:40	-	16:00	Bio-refineries: A new concept towards green energy production from agroindustrial wastewater (Víctor Alcaraz)
16:00	-	16:20	The importance of water and nutrients management in paddy fields as an effort to increase crop yields and producing an electrical energy through microbial fuel cells (Dwi Andreas Santosa)
16:20	-	16:50	Coffee Break
16:50	-	17:20	Keynote speech • Klaus Fricke
16:50	-	18:00	Panel discussion Moderators: Edmilson Santos de Lima and Norbert Dichtl
20:00			Gala dinner