BOOK OF ABSTRACTS

11th International Conference on Ecological Informatics

(ICEI 2020+1)

ICEI 2020+1
INTERNATIONAL CONFERENCE ON ECOLOGICAL INFORMATICS

09-13 November 2021

DIGITAL UNIVERSITY KERALA
Curating a responsible digital world

C V Raman Laboratory of Ecological Informatics,
School of Informatics, Digital University Kerala,
Thiruvananthapuram

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Book of Abstracts

This is a compilation of the original abstracts selected for oral presentation in the 11th International Conference on Ecological Informatics (ICEI 2020+1). The authors are responsible for the contents in the abstracts and the views expressed are theirs. The multi media recordings of presentations in ICEI 2020+1 will be made publicly available. Selected presentation will be brought out in a special issue of Ecological Informatics.

ISBN:

Foreword

It is a great privilege to present the Book of Abstracts of the 11th International Conference on Ecological Informatics (ICEI 2020+1). As evident from the conference acronym, the eleventh edition of ICEI was initially planned to be held as a physical event during November 2020 at the Indian Institute of Information Technology and Management- Kerala (IIITM-K). However, due to the global pandemic, it had to be rescheduled as a virtual event from 09-13 November 2021. Meanwhile, the Government of Kerala elevated and transformed IIITM-K as the Kerala University of Digital Sciences Innovation and Technology (Digital University Kerala - DUK).

ICEI 2020+1 presents a virtual-intellectualpedestal to champion the prospects of leveraging the potentials offered by emerging technologies and to position ecological informatics as a travelator to our common, sustainable future. The conference attempts to integrate ecology, technology, and society for transformative changes towards sustainability. It accommodates a diverse array of novel concepts, brilliant ideas and improved techniques for efficient utilization of ecological data and knowledge using the state of the art data collection, computing, and connecting technologies.

The response to the call for papers was good.The submissions are consolidated as oral presentations under special and regular sessions, respectively. While the former is more focused, the latter assimilates an assorted mix of papers. We believe both sessions will be vibrant and inspiring. We have narrowed down from slightly more than 100 submissions to 41 papers in four special sessions and 43 papers in five regular sessions. With the limited globally convenient timewindow available for virtual events, ICEI 2020+1 is tightly packed.

Nine plenary lectures, delivered by renowned scientists across a wide swath of topics, will be the icing on the event. ICEI 2020+1 has something for the youngsters. Two networking sessions and one consolidating session are planned to get to know each other, discuss career prospects, and deliberate upon the rising prospects of ecological informatics.

Hitherto undiscovered possibilities of applying the divergent technological advancements for Ecological studies would have a kaleidoscopic view in ICEI 2020+1. Brought to the table are variegated topics like the role of Machine and Deep Learning in environmental monitoring and protection, essentially a subset of Artificial Intelligence in Ecological studies that is evolving rapidly with

outstanding works in human-wildlife conflicts, acoustic ecology, invasion ecology, earth observation and predicting the spread of plant/animal diseases.

Ecological Data Science using AI/ ML would hoist up contemporary ecological research that attempts to solve complex and challenging issues like the anticipation of environmental threats and the construction of predictive models to evaluate possible risks, causes, and future developments, most prominently climate change prediction. It is instrumental that the transformation from knowledge discovery to applications is facilitated by relevant research and discussions. GIS and Remote Sensing-based, Genome and Phenome-based Monitoring and Data Synthesis, Uncertainty Analysis and Hybrid Modelling are a few resourceful domains in this category.

The need of the hour is for active minds that come together in ICEI 2020 +1 to saddle up and gallop towards realizing Sustainable Development Goals through environmental policy analytics and innovations. The necessary step to make substantial changes that can override temporal constraints in policymaking is harvesting a wide variety of data on biodiversity, demography, soil properties, the spread of epidemics, emission of pollutants and pressing issues of the like that can be analyzed in order to develop a better understanding of its trends and eventually to formulate policies. For instance, Blockchain technology helps in smarter farming by facilitating the use of data-driven technologies. It can track the origin of food and develop reliable food supply chains, thereby building trust between producers and customers. It finds applications in food supply chains and agricultural insurance, and transaction of agricultural products.

With diverse topics nested under three main themes, ICEI 2020+1 spearheads discussions in Ecological Informatics from data to knowledge discovery to applications and SDGs. This conference, at its best, would serve to floodlight research in the cross fields of ecology and technology in India, Asia and across the world. We envision multitudes of promising research to be set in motion in the turf of ideas sown by ICEI 2020+1. We hope ICEI 2020+1 will rekindle the fire of passion in professionals and excite and inspire youngsters into this interdisciplinary domain.

R. Jaishanker
On behalf of the Organizing Committee
Conference Chair
CV Raman Laboratory of Ecological Informatics
School of Informatics
DIGITAL UNIVERSITY KERALA

Thiruvananthapuram, India
09 November 2021

Message

World is in the cusp of a radical change. The exponential development in digital technologies is rapidly defining new contours of a post-industrial world leading to the emergence of a new knowledge economy. As digital, physical and biological world are converging, there are fundamental changes happening in various domains of science, arts, humanities and engineering. The Kerala University of Digital Sciences, Innovation and Technology (popularly known as Digital University Kerala) was formed by Government of Kerala to lead this new revolution by developing talent, conducting in-depth research and develop applications relevant for overall development of the Society. The University, formed by upgrading Indian institute of Information Technology and Management Kerala (IIITM-K), a two-decade year old Centre of excellence in information technology, has several schools focusing on various aspects of digital transformation in science, arts and humanities

The School of Informatics at DUK is focusing on applications of Digital technologies on various functional domains like ecology, agriculture, health, media, sports etc.. With the perception of informatics being a binder that can transform and levitate applied domains, which are increasingly relied upon to address emerging challenges, strong interdisciplinary approach is followed in the design of research and academic programs of the school of informatics. Research at the C V Raman Laboratory of Ecological Informatics of the School of Informatics follow the thematic areas Ecological Physics, Earth observation, Sustainable Development, Traditional Ecological Knowledge, Invasion Ecology, Floral Radiometry and Bioacoustics. I am happy to note that 11th forum of The International Conference of Ecological Informatics (ICEI2020) is organized by School of Informatics in alignment with the larger vision of the University.

It is heartening to note that the International Conference of Ecological Informatics is being hosted for the first time by an Institution from the Indian subcontinent. Given the grave challenges in the biodiversity space due to climate changes and ecological degradation, there is an imminent

need for developing innovative solutions to address issues of sustainability and growth. The topical nature of the conference has attracted over hundred instinctual contributions from researchers across the world and I am sure the conference will provide an enriching experience to all participants. The conference also has special sessions on relevant themes like Get the most out of biodiversity knowledge graphs, Machine and Deep learning in environmental monitoring and protection, Digital science for environment, Understanding and improving earth system predictions with emulator, surrogate, and hybrid modeling, Earth observation and data analytics for ecological monitoring etc., organised by leading universities and institutions from around the globe. We welcome the organizing institutes of special sessions ; Institute for Computer Science, Friedrich Schiller University Jena, Germany, Università di Napoli Parthenope, Italy and Wageningen University and Research, Netherlands, Oak Ridge National Laboratory, USA, Space Applications Centre, ISRO, India to collaborations and networking.

The keynote addresses by eminent scientists Dr Forrest M Hoffman, Prof. Almo Farina, Dr Friedrich Recknagel, Dr V B Mathur, Dr Natrajan Ishwaran, Dr K V Gururaja, Dr Trevor Dhu, Dr V K Dadhwal on a broad spectrum of topics ranging from ML in Ecology, Ecoacoustics, Earth Observation, Data sciences for environment Ai & Sustainability will provide deeper insights into the challenges and opportunities in this emerging area.

It is with great pride that DUK hosts this forum for transformative future where responsible research and timely action can save and sustain our existence. I wish all the participants an invigorating experience at ICEI 2020+1.

Dr. Saji Gopinath
Vice Chancellor
Kerala University of Digital Sciences,
Innovation and Technology (Digital University Kerala)

Thiruvananthapuram, India
09 November 2021

Message

It is with great pleasure to welcome you to the 11th International Conference on Ecological Informatics hosted by the Kerala University of Digital Sciences, Thiruvananthapuram, India. After having previous conferences in France, Italy, Australia, South Korea, Belgium, USA, Mexico, Brazil, China and Germany, this conference is the first on the Indian subcontinent and the first to be delivered on-line.

The Abstract Book is an impressive display of the current scope of Ecological Informatics as schematically represented in Fig. 1.

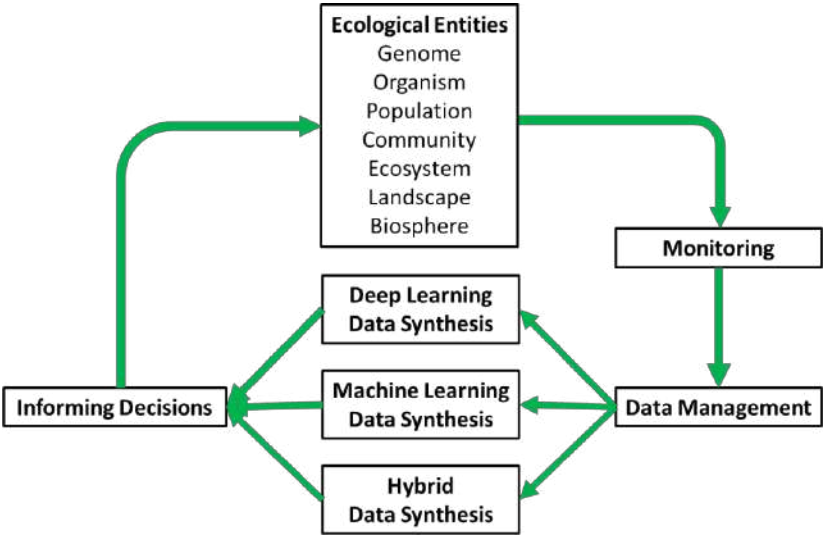

Figure 1: *Scope of Ecological Informatics*

The conference program of ICEI 2020+1 captures well current trends and challenges of Ecological Informatics towards: regional, continental and global sharing of ecological data; integration of complementary monitoring technologies; sophisticated data synthesis by deep learning, machine learning

and hybrid modelling; and informing decisions for biodiversity conservation and sustainable ecosystem management in light of global changes. The program also reflects India's impressing R&D capacity specifically in the field of computer science.

I herewith wish all delegates an inspiring conference. Adelaide, 3rd November 2021

Friedrich Recknagel
University of Adelaide, AUSTRALIA
Editor-in-Chief
Ecological Informatics, Elsevier

Ecological Niche Modelling Improvised to Predict Potential Habitats of Threatened Tree Species for Effective Management

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ABSTRACT

Prediction of potential habitats of a species is essential and the most challenging aspect in species conservation and management. This has become very crucial in the paradigm of ecosystem restoration or ecorestoration of habitats of threatened species. Precise prediction can exclude the possibility of interference to the niche of other species along with increased efficiency in ecorestoration practice. The traditional methods of defining habitat of a species are restricted to the vegetation type, elevation, rainfall or a combination of these. The concept of bioclimate has brought a new dimension and the WorldClim bioclimatic data-based ecological niche modelling provides interactive Ecological Niche Modelling (ENM) for prediction of habitat suitability. The present study used an improvised methodology, a combination of Maxent based niche modelling and QGIS based terrain mapping to cover some of the limitations of ENM for the prediction of potential habitat. It is tested here with prediction of potential habitats for two red listed tree species Prioria pinnata (Roxb. ex DC.) Breteler and Cryptocarya anamalayana Gamble endemic to Western Ghats.

The former has numerous records of occurrence throughout the Western Ghats and the latter has very restricted distribution. The results were compared both for normal ENM and for the improvised method and also with the ground level knowledge in the predicted locations. The predictions based only on ENM have provided potential distribution sites including areas which lack terrain suitability. The combined methodology provided a high degree of precision to the predictions. The procedure adopted for the modelling is provided in detail.

Keywords: IUCN Red List; Ecosystem management; Western Ghats; Ecorestoration; Niche profiling

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