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iprc 2025

CONFERENCE PROCEEDINGS

Track -Multidisciplinary Studies

25th INTERNATIONAL POSTGRADUATE RESEARCH CONFERENCE (IPRC) 2025

"DIGITAL TRANSFORMATION IN GREEN AND SUSTAINABLE INNOVATION"

25th International Postgraduate Research Conference (IPRC) - 2025

"Digital Transformation in Green and Sustainable Innovation"

Conference Proceedings

Conference Track - Multidisciplinary Studies

13th November 2025

Faculty of Graduate Studies
University of Kelaniya, Sri Lanka

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"Digital Transformation in Green and Sustainable Innovation"

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Message from the Vice-Chancellor

It is with great pleasure that I write this message of felicitation for the 25th Annual International Postgraduate Research Conference (IPRC), organized by the Faculty of Graduate Studies, University of Kelaniya. This is the flagship research conference of our University, a forum for researchers and scholars to share knowledge, information, exchange experiences, to present innovative concepts and research.

Celebrating its Silver Jubilee this year, the IPRC has consistently demonstrated our University's strong commitment to promoting research excellence. This year's theme of Digital Transformation in Green and Sustainable Innovation aims to inspire new perspectives on how digital transformation can drive environmentally responsible and inclusive growth.

As in past years, the conference will be conducted under four tracks:

1. Science, Technology, Engineering, Mathematics, and Medicine
2. Accounting and Business Management
3. Humanities and Social Sciences
4. Multidisciplinary Studies

As the University of Kelaniya expands its offering of postgraduate programs, with particular attention to multi-disciplinary studies and the promotion of interdisciplinary research, we strive to nurture the next generation of scholars who will contribute to the sustainable development of our country. Our vision of digital transformation of our University echoes the national vision of digital transformation of our country's economy. We hope that all those who participate in IPRC 2025 share our desire to embark on this promising and exciting journey, which also brings its own challenges.

I thank the Dean of the Faculty of Graduate Studies, Snr. Prof. Priyani Paranagama, the Deputy Registrar / FGS Mr. Lakmal Wijeratne, the Senior Assistant Bursar / FGS Ms. Sathishka Gonapeenuwala, and the conference Organizing Committee, for all the hard work that they have put into organizing this event. I would also like to thank the researchers, reviewers, editors, and other academics who contributed in numerous ways to ensure the success of this conference.

Senior Prof. Nilanthi Renuka de Silva
Vice-Chancellor
University of Kelaniya

Message from the Dean of the Faculty of Graduate Studies

It is with great pleasure that I welcome you to the International Postgraduate Research Conference (IPRC) 2025, hosted by the Faculty of Graduate Studies at the University of Kelaniya. This year's conference is particularly special as we commemorate the silver jubilee, marking a quarter-century of commitment to advanced research, academic excellence, and knowledge dissemination.

The theme of IPRC 2025, "Digital Transformation in Green and Sustainable Innovation," reflects our dedication to addressing contemporary global challenges through cutting-edge research and interdisciplinary collaboration. The conference provides a distinguished platform for postgraduate researchers, scholars, and practitioners from around the world to present their work, exchange ideas, and foster innovation that contributes meaningfully to sustainable development and technological advancement.

As the oldest and most pioneering research conference at the University of Kelaniya, IPRC has successfully held 25 consecutive annual conferences, and continues to serve as a flagship event in our academic calendar. This milestone is a testament to the unwavering commitment of the Faculty of Graduate Studies to encourage advanced research, support academic inquiry, and cultivate a vibrant intellectual community.

IPRC 2025 symbolizes the vision and mission of the Faculty of Graduate Studies, where knowledge is recognized as a powerful tool to affect change. Through promoting analytical skills, openness to new ideas, and research excellence, FGS empowers its graduates to make a meaningful impact in society. The conference is an opportunity to showcase innovative postgraduate research, engage in thoughtful discussions, and build collaborations that will shape the future of green and sustainable innovation.

I extend my sincere gratitude to all participants, keynote speaker, plenary speakers, presenters, and organizers for contributing to this landmark event. Let us come together to make IPRC 2025 a celebration of academic excellence, global collaboration, and transformative research.

Senior Prof. P.A. Paranagama
Dean
Faculty of Graduate Studies
University of Kelaniya

Message from the Chairman of the Research Council

It is with great pleasure I write this message to the International Postgraduate Research Conference (IPRC) 2025 organized by the Faculty of Graduate Studies, University of Kelaniya. Since the first conference in 2000, the Annual Research Symposium of the Faculty of Graduate Studies has been an important event of the University Research Calendar. The IPRC 2025 marks a significant milestone, being the silver jubilee edition of this flagship postgraduate research event.

IPRC 2025 is truly a multidisciplinary research symposium with dedicated tracks for Science, Technology, Engineering, Mathematics, and Medicine; Accounting and Business Management; Humanities and Social Sciences; and Multidisciplinary Studies. It provides an international platform for researchers to share their findings, exchange ideas, and explore innovative solutions for sustainable development.

This year's theme, 'Digital Transformation in Green and Sustainable Innovation,' reflects how research can be transformative and help to foster a sustainable ecosystem. I am confident that the Conference will generate new ideas, methodologies, and collaborations to uplift the research environment, culture, and output of the University.

I wish all the very best for the Faculty of Graduate Studies and IPRC 2025.

Professor Sachith Mettananda
Chairman
Research Council
University of Kelaniya

Profile of the Keynote Speaker – Prof. Piergiuseppe Morone

Full professor of Economic Policy, Unitelma Sapienza – University of Rome, Department of Law and Economics, Roma, Italy

Ph.D., Science and Technology Policy – University of Sussex, UK, M.A., Development Economics – University of Sussex, B.A. (cum laude), Economics – University of Bari, Italy

Piergiuseppe Morone is a Full Professor of Economic Policy at Unitelma Sapienza with a strong interest in green innovation and sustainable circular bioeconomy, pushing his research at the interface between innovation economics and sustainability transitions, an area of enquiry that has attracted growing attention over the last decade. His work regularly appears in prestigious journals in innovation and environmental economics. In 2023, published with Cambridge University Press a textbook titled "The Circular Bioeconomy: Theories and Tools for Economists and Sustainability Scientists".

He is the coordinator of the Bioeconomy in Transition Research Group (BiT-RG) and the director of the School of Sustainability Studies and Circular Economy (SUSTAIN). Moreover, he is/was involved in several European projects (including: H2020, BBI-JU, Life, Erasmus+, COST, Horizon Europe and CBE-JU) acting as scientific coordinator, vice-chair and WP Leader. He was an Economic Advisor to the Italian Minister of the Environment, Land and Sea Protection, till February 2021. Piergiuseppe is Editor in Chief of Societal Impacts (ELSEVIER) and Associate Editor of several other prestigious journals.

Since April 2022, Piergiuseppe has been the vice-chair of the Circular Bio-based Europe Joint Undertaking (CBE JU) Scientific Committee.

Plenary Speaker - Prof. Janaka Yasantha Ruwanpura

Schulich School of Engineering, Department of Civil Engineering, University of Calgary, Canada

Ph.D., Construction Engineering and Management – University of Alberta, Canada (2001)
M.Sc., Construction Management – Arizona State University, USA (1997)
B.Sc. (Hons), Quantity Surveying – University of Moratuwa, Sri Lanka (1992)

Professor Janaka Yasantha Ruwanpura is a highly respected academic, researcher, and global leader in construction engineering, project management, and international higher education. He is currently a Professor in the Department of Civil Engineering at the Schulich School of Engineering, University of Calgary. He recently concluded over 11 years of service as the Vice-Provost and Associate Vice-President Research (International), during which he significantly advanced the university's international engagement and reputation.

During his tenure as Vice-Provost International, Professor Ruwanpura played a pivotal role in shaping and implementing the University of Calgary's international strategy. His leadership led to the creation of several collaborative degree programs, research partnerships in countries like China and Mexico, and the acquisition of more than $57 million in research and infrastructure funding. He also secured over $25 million in international development grants and more than $5 million for student research internships through MITACS. Notably, he became the first Canadian and non-American to be elected Executive Chair (2019–2021) of the Commission of International Initiatives of the Association of Public and Land-Grant Universities (APLU). Professor Ruwanpura's work has earned him numerous prestigious accolades, including the Top 25 Canadian Immigrant Award (2022) and fellowships with the Canadian Academy of Engineering (FCAE), the Engineering Institute of Canada (FEIC), the Canadian Society for Civil Engineering (FCSCE), and the National Academy of Construction, USA (NAC). In 2022, he was also recognized as a Gold Seal Certified Professional by the Canadian Construction Association.

Abstract of the Plenary Session One: Igniting Research Excellence: Building the Next Generation University for Global Impact

This plenary will present an evidence-based eleven-point framework for advancing institutional research excellence, drawing on global best practices and implementation experience from leading universities. The framework emphasizes transdisciplinary research clusters, targeted funding strategies, publication culture, international collaborations, and industry-engaged innovation. It also highlights internal enablers such as performance-linked incentives, structured research support, and the role of postdoctoral and community engagement. Using this framework, the presentation proposes a tailored roadmap for developing a comprehensive Research Strategy for the University of Kelaniya. Key components include aligning research with national and global priorities, building flagship institutes, and strengthening partnerships for co-funded, high-impact research. The session will demonstrate how strategic planning and structured implementation can transform research ecosystems, improve institutional rankings, and position universities as regional leaders in innovation, knowledge creation, and sustainable development.

Plenary Speaker - Prof. Channa De Silva

Professor of Chemistry, Head of the Department, Department of Chemistry & Physics, Western Carolina University, USA

Ph.D., Chemistry - University of Arizona
B.S., Chemistry - University of Kelaniya, Sri Lanka

Dr. Channa De Silva is a Professor and Department Head of Chemistry & Physics at Western Carolina University, USA. He completed his B.S. degree in Chemistry with First-Class Honors at the University of Kelaniya, Sri Lanka, in 2000 and earned his Ph.D. in Chemistry with a GPA of 4.0 from the University of Arizona, USA, in 2007. From 2008 to 2010, he worked as a Research Associate at the Pacific Northwest National Laboratory, in Materials Science and Engineering at the University of Arizona, and the Bio5 Institute at the University of Arizona, USA. His research focuses on developing metal-based nanomaterials for biotechnological applications and conducting computational studies of materials containing lanthanide and actinide metals.

Dr. De Silva has received numerous teaching and research awards, including the University of North Carolina Board of Governors Award for Excellence in Teaching, USA (2025), the Brinson Honors College's Faculty and Staff Excellence Award, Western Carolina University (2025), the Chancellor's Distinguished Teaching Award (2025), Winner, FACULTY 3 Minute Research Talk (3MR), Western Carolina University, USA (2025), Teaching Award from the College of Arts & Sciences at Western Carolina University (2022), Visiting Faculty Program Scholar from the U.S. Department of Energy (DOE) (2021), SoCon Faculty Member of the Year Award (2019), and Innovative Scholarship Award (2017).

In his free time, he enjoys playing music, including Sri Lankan music, northern Indian music, and an American folk genre called Appalachian music.

Abstract of the Plenary Session Two: Artificial Intelligence in Chemistry Research: Transforming Discovery, Design, and Education

Artificial Intelligence (AI) is rapidly reshaping the landscape of chemical research and education, offering transformative capabilities across molecular design, reaction prediction, process optimization, and teaching. Recent advancements highlight AI's growing role in both undergraduate and graduate-level chemistry, with applications spanning drug discovery, materials science, and sustainable chemical engineering. AI-driven platforms such as ChemCopilot and IBM RXN are streamlining retrosynthesis planning, reaction yield prediction, and real-time process monitoring. Large Language Models (LLMs), including finetuned systems like GVIM, are being integrated into intelligent research assistants capable of molecular visualization, SMILES string processing, and literature retrieval.

These tools not only enhance research productivity but also democratize access to advanced computational methods. Educationally, AI's integration into chemistry curricula is gaining momentum. Workshops and teacher training programs are fostering Technological Content

Knowledge (TCK), preparing educators to bridge the gap between scientific innovation and classroom instruction. The 2025 Nobel Prize in Chemistry, awarded for AlphaFold's protein structure prediction, underscores AI's interdisciplinary impact and its relevance to future career pathways. Despite its promise, challenges remain in data quality, model interpretability, and ethical deployment. Addressing these issues is essential to ensure scientifically sound and socially beneficial outcomes. This abstract invite discussion on the strategic incorporation of AI into chemistry research and education, emphasizing its potential to accelerate discovery, enhance pedagogy, and prepare students for AI-driven scientific careers.

My own experiences in digital transformation initiatives have underscored the importance of combining technological, social, and economic insights. Gender equality is a crucial focus, especially regarding workforce participation. Through initiatives like 'She Returns,' which supports women re-entering the workforce after maternity leave, we see how multidisciplinary research can solve real-world challenges by bridging gaps in productivity and equality. Academia plays a pivotal role in encouraging cross-disciplinary innovation. However, achieving this requires shifting from specialization to integration, breaking institutional barriers, and promoting collaboration. It is only through collective effort where technologists, economists, sociologists, and policymakers join forces that we can shape a prosperous future. In conclusion, Sri Lanka's path forward embraces innovation and research that transcends boundaries. Together, we can build a resilient economy driven by inclusive growth, ensuring that research not only advances knowledge but also transforms lives and creates lasting societal impact.

Plenary Speaker - Prof. Jane E. Stewart

Associate Professor of Plant Pathology, EIC Forest Pathology, Dept of Agricultural Biology
Colorado State University, Fort Collins, Colorado, USA

Ph.D., Plant Pathology - Washington State University
MS, Forestry - University of Vermo
BS, Biology - University of Oregon

Dr. Jane E. Stewart is an Associate Professor of Plant Pathology in the Department of Agricultural Biology at Colorado State University in Fort Collins, Colorado, USA. Her research focuses on forest, shade, and fruit trees, addressing critical issues in tree health through the lens of plant pathology. Dr. Stewart brings extensive expertise in fungal biology, population genetics and genomics, molecular diagnostics, and the management of plant pathogens particularly invasive and emerging pathogens affecting trees.

Over the course of her career, Dr. Stewart has published more than 100 scholarly manuscripts spanning various forest and tree crop pathosystems. Her research emphasizes the speciation of tree pathogens and explores host-pathogen interactions at multiple levels, from the microbiome to the molecular scale. She is also actively engaged in developing practical management strategies to combat tree diseases and enhance sustainable forestry and agriculture.

In addition to her research, Dr. Stewart teaches undergraduate and graduate courses at Colorado State University. Her undergraduate course, Tree Health and Management, covers a wide array of tree diseases and insect pests along with their management practices. She also teaches a graduate-level course on Fungal Biology and Genetics, sharing her deep knowledge and research experience with the next generation of plant pathologists.

Dr. Stewart's research program has a global focus, aiming to improve understanding of the biology, ecology, genetics, and management of emerging tree pathogenic fungi. She currently serves as Editor-in-Chief of the internationally recognized journal Forest Pathology, reflecting her leadership and influence in the field.

Abstract of the Plenary Session Three: Characterizing Patterns Associated with Airborne Microbial Communities in Forest and Grassland Ecosystems

Understanding how and what types of microorganisms move through the air is important for early warning detection systems for human and ecosystem health. The atmosphere harbors a diverse and dynamic reservoir of microorganisms, yet their distribution, especially for fungi, in the atmosphere and response to environmental variation remains a subject of ongoing investigation. In this study, we compared airborne bacterial and fungal communities in subalpine forest and steppe grassland sites, over diel, vertical, and seasonal gradients. Air samples were collected at three heights over four months at the subalpine forest with concurrent sampling in the steppe grassland during two of those months. We observed that fungal communities had greater site-specific variability and sensitivity to environmental factors than bacterial

communities. This was most apparent in the subalpine forest, where vertical stratification and diel cycles significantly structured microbial diversity. In comparison, bacterial communities were temporally dynamic but showed weaker responses to local environmental conditions and minimal site-level differences. This may indicate broader dispersal and a ubiquitous set of bacterial taxa. Environmental drivers such as atmospheric moisture and air pressure influenced microbial beta-diversity in the subalpine forest, while air temperature and wind speed impacted diversity in the steppe grassland, again highlighting ecosystem-specific responses. Despite compositional differences, a group of shared bacterial and fungal taxa was consistently detected across sites. Most of these shared taxa were detected at greater heights in the subalpine forest. This, along with wind patterns moving eastward from the subalpine forest towards the steppe grassland, indicates potential atmospheric transport between sites, with taxa dispersal being filtered by height. These results underscore the role of ecosystem structure, meteorological conditions, and air mass movement in shaping the aero biome. Our data suggest that airborne microbial communities are shaped by both local emission and long-range atmospheric transport processes.

Plenary Speaker - Dr. Rajesh Shah

Professor in Sitar, Department of Instrument, Faculty of Performing Arts, Banaras Hindu University, India

Ph.D., Banaras Hindu University, Varanasi, India
M.Mus., Banaras Hindu University, Varanasi, India
B.Com., Gorakhpur University, Gorakhpur, India

Prof. Rajesh Shah is a distinguished artist and academic in the field of Indian Classical Instrumental Music, specializing in the sitar. Born on June 15, 1966, into a culturally rich Gujarati family, he inherited his passion for classical music from his father, Sri Narottam Das Shah. Over the course of his illustrious career, Dr. Shah has established himself as a leading figure in sitar performance, pedagogy, and music composition, contributing significantly to the propagation and preservation of India's classical music heritage.

Currently serving as a Professor in the Department of Instrumental Music at the Faculty of Performing Arts, Banaras Hindu University (BHU), Prof. Shah has also held key academic positions, including Dean of the Faculty and Head of the Department. A Grade 'A' artist of All India Radio and Doordarshan, he is renowned for his solo sitar recitals, jugalbandis (duets), and orchestral compositions, both in India and abroad.

Prof. Shah's musical foundation was shaped by the rigorous training he received under the guidance of Late Sri Govind Raoji Nayak and the late Dr. Ramdas Chakravarti of BHU, followed by advanced tutelage from Pt. Amarnath Mishra of the Banaras Gharana. Deeply rooted in the Saini Gharana tradition, his sitar style is noted for its clarity, creativity, and expressive depth.

An active performer, Prof. Shah has presented concerts and conducted workshops across Europe, Central Asia, the Middle East, and South Asia, including notable appearances in Germany, Austria, Azerbaijan, Kazakhstan, Mauritius, UAE, and Nepal. In addition to his international reach, he is a respected educator who has mentored over 16 Ph.D. scholars and numerous postgraduate students. Many of his disciples now serve as faculty members in reputed universities and cultural institutions worldwide.

His commitment to inclusive education is exemplified by his longstanding work with visually impaired students, whom he has trained in the intricate art of sitar performance. He has also composed and directed several orchestral works specifically for visually impaired musicians, earning recognition at international platforms such as Vienna and across Indian cities.

Prof. Shah has authored the book "Sitar Vigyan: Prayog Evam Shastra" and contributed extensively to academic journals and conference proceedings at both national and international levels. His research interests span from traditional raga interpretation to music therapy, music education, and comparative musicology.

Beyond teaching and performance, he has served on various academic and administrative bodies, including as a member of Boards of Studies and selection committees in universities such as Visva Bharati University, Dr. Ram Manohar Lohia Awadh University, and M.S. University, Baroda. He has also acted as a convener and resource person in numerous interdisciplinary workshops and seminars focused on Indian classical music.

Through his artistic excellence, academic contributions, and inclusive teaching philosophy, Prof. Rajesh Shah continues to be a guiding force in the world of Indian classical instrumental music.

Abstract of the Plenary Session Four: Rendition of Similar Ragas in North Indian Classical Music

North Indian Classical Music, or Hindustani music, is built upon the intricate and deeply aesthetic concept of the raga a melodic framework for improvisation and composition. Each raga is defined by a unique set of notes (swaras), characteristic phrases (pakad), and mood (rasa), which together create a distinct identity. However, within this rich system exists a fascinating phenomenon the presence of similar ragas, whose tonal structures and emotional colors overlap, yet whose renditions must remain distinct through nuanced expression.

Many ragas share the same or nearly identical scales but differ in their treatment, ornamentation, and emphasized notes. For instance, Raga Desh and Raga Khamaj both use the komal nishad (flat seventh) and shuddha nishad (natural seventh), yet their melodic contours and emotional intent diverge significantly. Desh evokes the freshness of monsoon and a feeling of longing, while Khamaj carries a romantic and serene flavor. Similarly, Raga Bhupali and Raga Deshkar share the pentatonic scale (using Sa Re Ga Pa Dha), but the former flows with a lyrical, devotional sweetness, while the latter projects brightness and vigor through sharper tonal emphasis and a more forceful rendition.

The distinction among similar ragas primarily depends on intonation, movement, and emphasis. The vadi (most prominent note) and samvadi (second most prominent note) play a crucial role in shaping the identity of a raga. Ornamentations such as meend (glide), kan swar (grace note), and gamak (oscillation) further add character. The choice of tempo (laya), rhythmic cycle (tala), and mood (bhava) also influences how the listener perceives one raga from another, even when the note structures are similar.

Experienced performers internalize these subtleties through years of training under the guru-shishya parampara. A successful rendition of similar ragas demands deep understanding and restraint knowing precisely how to explore the raga's potential without encroaching upon the domain of another. The artist's improvisation (vistar, alap, taan) must unfold within the grammar of the chosen raga, revealing its individuality through creativity grounded in discipline.

Thus, the rendition of similar ragas in North Indian classical music exemplifies the art's philosophical depth the coexistence of similarity and uniqueness, structure and freedom. It is this delicate balance that sustains the immense beauty and complexity of the Hindustani raga tradition, allowing it to evolve continuously while preserving its timeless essence.

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IPRC/25/21 Multidisciplinary Studies

Indicator framework for cutaneous leishmaniasis transmission risk in Sri Lanka using the Delphi-entropy weight method

N. Gunathilaka[1*] and D. Jayakody[1]

[1]Department of Parasitology, Faculty of Medicine, University of Kelaniya, Sri Lanka

Cutaneous leishmaniasis (CL) is an emerging public health concern in Sri Lanka, driven by environmental, biological, and socio-economic factors. A systematic, evidence-based approach is needed to assess and prioritize these determinants for targeted interventions. This study aimed to develop an indicator framework for assessing CL transmission risk in Sri Lanka. A three-level indicator framework was initially developed through a literature review and expert interviews. A total of 65 experts involved in leishmaniasis surveillance and research were invited to participate, of whom 17 consented. The Delphi method was used to gather expert consensus. An authority coefficient, derived from familiarity and judgment scores, was applied to weight responses by expertise. Entropy weights were calculated based on the dispersion of responses to reflect objective significance. Final comprehensive weights were computed by integrating both methods. The framework identified 4 primary, 11 secondary, and 46 tertiary indicators. The normalized weights of the primary indicators were biological factors (0.312), environmental factors (0.229), interventions (0.200), and social factors (0.188). The highest-weighted secondary indicators were climatic features (0.194), geographic features (0.105), sand flies (0.152), and dogs (0.095). At the tertiary level, the top indicators were regular monitoring of sand fly density (0.118), annual average rainfall (0.113), indoor residual spraying (0.096), and sand fly density (0.067). Three of the top five tertiary indicators were directly related to sand fly control, highlighting its critical role in CL transmission. The absence of systematic national surveillance data for leishmaniasis vectors was identified as a key gap, limiting real-time risk assessment. Furthermore, the dual impact of rainfall on sand fly habitats and the importance of mobile screening clinics in rural areas were emphasized. The study highlights the urgent need to establish comprehensive sand fly monitoring systems to support effective vector control strategies.

Keywords: Cutaneous leishmaniasis, Delphi method, entropy method, indicator framework, transmission risk

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IPRC/25/22 Multidisciplinary Studies

Spatio-temporal and climate sensitivity for typhus disease incidence in Sri Lanka from 2009-2023

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[1]Department of Parasitology, Faculty of Medicine, University of Kelaniya, Sri Lanka

Typhus fever is a significant vector-borne cause of febrile illness. It is endemic in Sri Lanka, with an average of 1,500 cases reported annually. However, only limited number of studies have been conducted on disease transmission trends and associated factors. This study investigated the spatio-temporal and climate factors influencing typhus incidence in Sri Lanka from 2009 to 2023. Annual incidence rates per 100,000 population were calculated for 25 administrative districts in Sri Lanka. Disease incidence and selected climatic parameters were analysed using Generalized Additive Model for Location, Scale and Shape (GAMLSS) with a Zero Adjusted Gamma (ZAGA) distribution. Analysis was conducted using R 4.5.0 software and gamlss, ggplot2, dplyr, readr, forcats and nasapower packages were used. A total of 18,486 typhus cases were reported island-wide, with Jaffna district alone accounting for 38.3% (7,080 cases). Incidence rates increased significantly with increasing maximum temperature (β=+0.34), minimum temperature (β=+0.22), total rainfall (β=+0.0003), latitude (β=+0.84), and longitude (β=+0.65). Conversely, overall temperature (β=−0.71) and year (β=−0.018) showed negative associations with incidence. Relative humidity (β=−0.013) and maximum temperature (β=−0.068) were significantly negatively associated with the dispersion of disease incidence over years. Furthermore, the probability of zero typhus cases increased with increasing latitude (β=+0.60) and longitude (β=+0.40), reflecting sporadic but high-count outbreaks. The model indicated a significant declining trend in incidence, particularly following a peak around 2018–2019. Despite this decline, the model also revealed strong and significant associations of incidence with climate variables. The findings of this study warrant the attention of health authorities for implementing disease control programs targeting typhus fevers in Sri Lanka. Further, the climate sensitivity of this disease highlights the possibility of increasing the disease incidence with climate change in future. Therefore, it is timely to assess the vulnerability and adaptive measures against this disease in Sri Lanka

Keywords: Climate factors, GAMLSS, Incidence rates, Sri Lanka, Typhus

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IPRC/25/26 Multidisciplinary Studies

An evaluation of the TOE model factors influencing online training adoption among wellness and fitness service trainers in Sri Lanka

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The Wellness and Fitness Services *(WFS)* industry in Sri Lanka is experiencing a significant growth due to the rapid growth of non-communicable diseases *(NCDs)* based on WHO statistics between 2022 and 2024. This study investigated the adoption of online training by Wellness and Fitness Services *(WFS)* trainers in Colombo 05 and 07, Sri Lanka, while addressing the gap between customer registration and retention at WFS centers. This study aims to overcome the issue of providing online services ~~optionally.~~ A cross-sectional design was employed and conducted ~~by~~ in the Sri Lanka Foundation Institute, and data was collected through a close-ended questionnaire using a random sampling technique from the fitness and wellness trainers (n = 100). The males (61%) have responded more than the females (39%), and the highest category of age was above 40 years, at 40.6%. The technical, organizational, and environmental framework (TOE) was used as a theoretical model. The data collection was done through an online questionnaire-based survey, and hypotheses were tested using bivariate correlation and linear regression. The hypothesis testing revealed that the environment variable had a strong positive relationship ($p<0.05$, $r=0.603$) with OTA, and it statistical significant at the 0.01 level. Organizational variable had a moderately positive relationship ($p < 0.05$, $r = 0.368$) with OTA with a statistically significant at the 0.05 level. The linear regression results showcased that only the environment variable had a significant influence on online training adoption (OTA) ($p < .05$, $\beta = 0.627$), and the model fit was $R^2 = 0.367$ revealed that how strong the independent variables represented the dependent variable. Findings suggest that the environmental context has critically determined OTA. Therefor the *WFS* strategically leverage the environmental variable related factors such as customer demand and competitor pressure in carefully addressing barriers to OTA that are connected with organisational and technological factors

Keywords: Environment, IoT, Organization, Technology

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IPRC/25/35 Multidisciplinary Studies

Genetic characterization of Phlebotomine sand flies (*Diptera: Psychodidae*) with different morphological features: Complementing morphological identification

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Phlebotomine sand flies are the principal vectors of leishmaniasis, a disease of growing public health importance in Sri Lanka. Precise identification of sand fly species in endemic regions is critical for evaluating the potential risk of disease transmission. Although morphological and morphometric taxonomic keys are valuable tools for field surveillance, they exhibit limitations, particularly in distinguishing cryptic or closely related species. This study was conducted to characterize morphologically suspicious sand flies (n=31) referred to the Department of Parasitology, Faculty of Medicine, University of Kelaniya, during January/February 2024, that were collected from areas, Mirigama in the Gampaha District and Ipalogama in the Anuradhapura District of Sri Lanka. Morphological identification was conducted using standard taxonomic keys, while molecular identification targeted the mitochondrial Cytochrome c Oxidase subunit I (COI) gene, utilizing the Sanger sequencing method. Based on morphological identification, four sand fly species belonging to the genus *Sergentomyia* and one species from the genus *Phlebotomus* were identified. Genomic sequencing analysis revealed the presence of a previously uncharacterized sand fly species, which is designated as *Sergentomyia nayanasis* (9.7%). Comparative assessment against existing sequence databases confirmed its novelty. Other species indicated as *S. babu babu* (12.9%), *S. indica* (3.2%), *S. bailyi* (6.5%), and *Phlebotomus argentipes* (67.7%). All sequences were confirmed to be the species identities, showing high similarity (>98%) with reference sequences available in the National Centre for Biotechnology Information (NCBI) GenBank database. This study reiterates that the morphological identification should be complemented with the molecular characterization when there is any discrepancy with the existing taxonomic features.

Keywords: Insect vectors, Leishmaniasis, Molecular sequencing, Sand fly

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IPRC/25/85 Multidisciplinary Studies

Investigating post-harvest losses of black pepper seeds (*Piper nigrum)* in Gampaha district due to fungal infections and mitigation strategies

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Black pepper is one of the most important crops in Sri Lanka's export industry. However, black pepper seeds are prone to post-harvest fungal contamination, which poses a serious threat to their marketability, consumer health, and safety. This study evaluated post-harvest storage, fungal contaminants, related waste, correlations with storage conditions, in-house practices, and the effectiveness of blanching in reducing fungal contamination in stored black pepper seeds. Black pepper seeds were collected in sterile containers from 45 conveniently selected stores in Gampaha District, Sri Lanka, after inspecting storage and preventive measures. The moisture content, yeast and mould counts, and fungal identification were performed using the Standard Operating Procedures. The blanching method was applied to the collected samples, and fungal counts were taken. The statistically significant p-value was <0.05. Fisher's exact test assessed associations between fungal species and storage/in-house measures. Wilcoxon test compared colony counts across time points and treatments. Kruskal-Wallis tested colony count differences by storage and precautions. Binary logistic regression analyzed the link between storage conditions and moisture levels. The shop owners do not consider the threat of fungal contamination seriously unless the seeds are visibly compromised. Therefore, basic storage and preventive methods were in practice. All 45 samples confirmed positive for fungal contaminants. *Aspergillus* species (spp) (>43.1%), *Fusarium* spp (21.5%), *Penicillium* spp (2.1%), and less than 1% of Yeast, *Rhizopus* spp, and *Curvularia* species were identified. *Aspergillus* and *Penicillium* species were correlated to the storage issues, mainly poor cleanliness ($p<0.05$, mean rank 27.2) and poor ventilation ($p<0.05$, mean rank 25.2), and had no relation to *Fusarium* species (field fungi). The hidden fungal presence in black pepper poses a serious mycotoxin-related health risk. The blanching method has been confirmed to be a successful preventive method ($p<0.05$, $z = -4.4$). More stringent regulations are needed to ensure proper storage of black pepper.

Keywords: Black pepper seeds, Correlations, Fungal contamination, In-house precautions, Storage conditions

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IPRC/25/93 Multidisciplinary Studies

Study on the diversity of microbial community in cutaneous lesions with Leishmaniasis infection

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Cutaneous leishmaniasis (CL) is a vector-borne parasitic disease transmitted by infected *Phlebotomus* sand flies. Secondary bacterial colonization of CL lesions may contribute to chronic inflammation, delayed wound healing, and suboptimal treatment responses. This study aimed to characterize the bacterial diversity within CL lesions and evaluate its association with lesion duration and treatment outcomes in affected patients from Sri Lanka. A cross-sectional study was conducted at Kurunegala Teaching Hospital (Oct–Nov 2024), enrolling 25 clinically confirmed CL cases. Lesion types included ulcerating nodules (44%), nodules (36%), papules (20%), and complete ulcers (16%). Diabetes was present in 40% of patients, prior surgeries in 32%, and immunosuppressive drug use in 44%. Swab samples collected from lesions were cultured on Blood and MacConkey agar, and bacterial isolates were identified via 16S rRNA gene sequencing. Fifteen bacterial species were identified, including *Staphylococcus aureus, S. arlettae, S. haemolyticus, S. warneri, Bacillus cereus, B. paranthracis, B. thuringiensis, B. toyonensis, Micrococcus lylae, Moraxella osloensis, Acinetobacter baylyi, A. pittii,* and *Kocuria palustris. S. aureus* was strongly associated with prolonged lesions (up to 12 months) and extended treatment (15 cycles of intralesional sodium stibogluconate plus cryotherapy), while *K. palustris* and *A. baylyi*were found in cases with shorter treatment durations (2–3 months). Multivariate analysis demonstrated that lesion type significantly predicted treatment duration ($P < 0.05$), whereas larger lesion size and the presence of diabetes showed marginal associations with extended treatment. These findings highlight the role of bacterial colonization in modulating the clinical course of CL. Frequent detection of opportunistic and potentially resistant bacteria, particularly *S. aureus*, underscores the importance of integrating microbial profiling into diagnostic and treatment strategies to improve therapeutic outcomes.

Keywords: 16S rRNA, bacterial co-infection, Cutaneous leishmaniasis, microbial diversity, treatment response

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IPRC/25/94 Multidisciplinary Studies

Cloning of Melittin Peptide coding sequence with Anti-Leishmanial Properties in *Priestia megaterium*: A Paratransgenic Approach for Leishmaniasis Transmission Control

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Leishmaniasis is a vector-borne parasitic disease transmitted by *Phlebotomus* sand flies infected with *Leishmania* spp. Conventional vector control strategies, including insecticide use, are increasingly limited by the emergence of resistance and environmental concerns. Paratransgenesis, a strategy involving the genetic modification of symbiotic or commensal microorganisms to express anti-parasitic effector molecules, offers a novel and potentially sustainable approach to interrupt parasite transmission. This study investigated the feasibility of genetically engineering *Priestia megaterium* (formerly *Bacillus megaterium*) to express melittin, a peptide with well-documented anti-leishmanial properties. The melittin gene was chemically synthesized and cloned into the shuttle vector pAD43-25. Recombinant constructs were first propagated in *Escherichia coli* DH5α and subsequently transformed into *P. megaterium* via heat shock transformation. Molecular confirmation of successful gene cloning was performed using polymerase chain reaction (PCR), agarose gel electrophoresis, and Sanger sequencing. Transformation of *P. megaterium* with the pAD43-25-melittin construct was successful, with PCR amplification confirming the presence of the melittin gene (~96 bp). The plasmid remained stable without apparent structural degradation, and the transformed *P. megaterium* strains retained both antibiotic resistance and normal growth characteristics. These findings support the suitability of *P. megaterium* as a paratransgenic host organism for future deployment in vector control applications. In conclusion, this study demonstrates the successful molecular cloning of the melittin gene in *P. megaterium*, supporting its potential as a paratransgenic tool for disrupting *Leishmania* transmission. Future work should focus on detecting melittin expression, optimizing its production, assessing its functional activity against the parasite in vivo, and evaluating biosafety implications for field application.

Keywords: Leishmaniasis, Melittin, Paratransgenesis, *Priestia megaterium*

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IPRC/25/99 Multidisciplinary Studies

Forensic entomological reveal of human cadavers colonized with insect lifecycle stages: A preliminary study from Gampaha District, Sri Lanka

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Forensic entomology is the study of insects and other arthropods in the context of legal investigations. In Sri Lanka, this field remains underdeveloped. The present study aimed to document entomological evidence from human cadavers to support the advancement of forensic science in the country. A total of 18 insect-infested cadavers were examined between January and May 2025 at Colombo North Teaching Hospital, Ragama, and Base Hospital Wathupitiwala. Among the 18 cases, 88.9% (n=16) were males. Most cadavers (66.7%; n=12) were recovered from indoor locations, primarily residential settings. Causes of death included natural causes (50%; n=9), suicide (22.2%; n=4), homicide (16.7%; n=3), and undetermined causes (11.1%; n=2). In terms of decomposition, 50% (n=9) of the cadavers were in the decaying stage, followed by the bloated stage (38.9%; n=7) and the post-decay stage (11.1%; n=2). Insect colonization sites were closely associated with injury patterns. In most bodies, the region with the highest maggot density was the facial area particularly the mouth (50%; n=9) followed by the genital (16.7%; n=3) and groin (11.1%; n=2) regions. While maggots were not limited to these areas, they were the most heavily colonized in the majority of cases. In cases involving trauma, colonization was especially prominent around wounds. Additionally, two cadavers showed evidence of rodent activity, and one had ant bites, complicating the interpretation of insect distribution. Eggs and larval stages were observed in all cases. Further research is recommended to identify species and analyze colonization patterns in relation to environmental, anatomical, and temporal factors. These preliminary findings highlight emerging trends that could contribute to more accurate postmortem interval (PMI) estimations in future forensic casework in Sri Lanka.

Keywords: Cadavers, Forensic entomology, Insect colonization, Postmortem interval, Sri Lanka

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IPRC/25/104 Multidisciplinary Studies

Eco-Digital Harmony: Integrating Digital Transformation and Green Innovation for Inclusive Music Development in Sri Lanka

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Digitalization and related sustainable innovations are reshaping the global music industry, offering tools to democratize access to music and minimize the environmental impact of the physical products in which music is presented. In Sri Lanka-a multicultural, musically diverse country-this convergence offers an opportunity to both preserve and modernize musical traditions while reducing carbon footprints. This paper examined how the integration of digital platforms and green practices can enhance the music development process across Sinhala, Tamil, and Muslim communities. It explored the role of e-learning, virtual performance, and environmentally friendly practices in promoting access, cultural equity, and eco-consciousness. Case studies from local initiatives, digital concerts, and community engagement projects were used to contextualize opportunities and challenges in the digitalization of music. The study advocated for a national strategy that combines digital infrastructure, sustainable resource use, and cultural inclusivity to build a resilient and representative music ecosystem in Sri Lanka.

Keywords: Cultural Inclusivity, Digitalization of music, Eco-consciousness, Sri Lankan music

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IPRC/25/131 Multidisciplinary Studies

Effect of roasting temperature and time on caffeine retention in Sri Lankan Robusta coffee (*Coffea canephora*) beans

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Coffee is well recognized due to its distinct taste, stimulating nature and caffeine content. Out of coffee varieties, Robusta coffee (*Coffea canephora*) plays a significant role in plantation sector. Despite having vast potential, Sri Lankan coffee industry is marred by outdated processing technology and inconsistent product quality. The goal of this study was to find out how different roasting temperatures and times affect the caffeine level in Robusta coffee. This study helps to optimize roasting conditions to obtain maximum retention of caffeine and enhance product quality. The research was conducted from January to June 2024 at the Wayamba University of Sri Lanka. The beans were roasted at 190 °C for 19 min, 200 °C for 20 min, 210 °C for 12 min 30 s, 220 °C for 10 min 20 s, 230 °C for 9 min 30 s, 240 °C for 8 min 30 s, and 250 °C for 6 min 30 s. These conditions covered a broad thermal range, from low–slow to high–fast roasting. Extraction of caffeine was carried out using chloroform-based isolation and determined by UV-VIS spectrophotometry. Data analysis was conducted by the SAS 9.4. Outcomes revealed a statistically significant ($p < 0.001$) relationship between roasting time, temperature and caffeine content. Optimum caffeine content (2.46 mg/g) was obtained at 210°C, duration of 12 min and 30 s, and minimum (1.69 mg/g) was obtained at 250°C at 6 min and 30 s. This demonstrates that although a higher temperature increases roasting, it will also increase the breakdown of caffeine. The study finds that roasting at 220°C to 230°C for 10 to 12 min achieves a maximum caffeine content level of approximately 2.11 mg/g, suitable for commercial brewing conditions. Such data is priceless in helping coffee producers to maximize processing and meet customer demands for taste and quality.

Keywords: Caffeine content, *Coffea canephora*, Roasting temperature, Robusta coffee

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IPRC/25/161 Multidisciplinary Studies

Dietary intake of Sri Lankan university athletes: A cross – sectional pilot study specific to Western province

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In the sports field, nutrition plays a key role in the well-being and optimal performance of the athletes. Total energy, carbohydrates, protein and fat, along with key micronutrients such as iron, calcium are the major components in athlete's diet. This Study aimed at assessing the intake of energy and selected nutrients among Sri Lankan University athletes. We conducted a quantitative, cross-sectional study including 40 athletes, (20 – 25 years of age; 34 male and 6 female), athletes engaging in football, netball, cricket, boxing, weightlifting and volleyball, and currently studying in universities in the Western province of Sri Lanka. Dietary intakes were assessed using 3-day diet diaries, nutrients were quantified using the Sri Lankan food composition database, and mean intakes were compared with the Recommended Dietary Allowance (RDA) values using a one-sample t-test. Mean intake of energy, carbohydrate, protein, fat, fibre, calcium and iron were 2634±241.79 kcal/day, 82.30±70.81g/day, 56.62±17.25g/day, 50.67±22.32g/day, 9.15g/day, 288.18±124.93 mg/day and 10.57±3.41 mg/day, respectively and were significantly lower than the RDA values for Sri Lankan adults (p=0.00). The percentage of energy contribution from carbohydrates, proteins and fats was 58.1±14.9%, 12.8±2.9% and 25.7±6.9%, respectively. Also, only 47.5%, 37.5% and 47.5% of the athletes consumed adequate amounts of protein, fat and carbohydrate, respectively. Furthermore, a significant number of athletes show inadequate intakes of calcium, fibre and iron. There was no significant difference in intake of the above nutrients between the sports categories. In conclusion, university athletes in the Western province of Sri Lanka consume inadequate amounts of key nutrients required for athletes. To improve the validity of the results, the study should be continued with a larger sample. The results suggest the need for interventions in nutritional awareness to improve the nutritional adequacy among university athletes.

Keywords: Dietary intakes, macronutrients, micronutrients, University athletes

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IPRC/25/180 Multidisciplinary Studies

Determinants of Ribbed Smoke Sheet Quality in Smallholder Sector: A Case Study of The Mawanella Secretariat Division, Sri Lanka

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Among 20,000 plants that used to extract latex, *Hevea brasiliensis* is one of the economically and socially important crops. It is the second most important plantation crop in Sri Lanka. Quality of Ribbed Smoke Sheets (RSS) has a high impact on market price of RSS. Quality can be affected by many reasons. This study aims to identify quality parameters of RSS rubber in *Mawanella* Secretariat Division, with a special focus on the smallholder sector. This finding is expected to support the practical recommendation to improve RSS quality. Data were collected using purposive random sampling with a structured questionnaire on pre-classified RSS quality. About 150 clearings were selected in *Mawanella* Secretariat Division according to the registry of rubber smallholders maintained by the Rubber Development Department. According to the analysis, the dominant age group that manufactured RSS was 41-50 years (over 50%). Very low representation from both males and females was recorded in the young age group. It indicated a lack of young workforce entering the manufacturing sector. According to the data majority of manufacturers had completed their secondary education. That indicated that most individuals involved in the manufacturing sector have at least a basic formal education. Multiple linear regression showed that cleaned collecting cups, filtering, froth and dust removing practices were statistically significantly different ($p<0.05$). But addition of pre-coagulation is not affected by the quality of RSS ($p=0.063$). Among all of these variables, the dust removal of final products highly contributed to the quality. It can be concluded that the quality of RSS rubber in *Mawanella* Secretariat Division in the smallholding sector was affected by the use of cleaned collecting cups, filtering of latex, froth removing during manufacturing and dust removing from final products.

Keywords: Mawanella Secretariat Division, Quality, RSS, Small Holding Sector, Survey

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IPRC/25/192 Multidisciplinary Studies

Knowledge, attitudes, and practices on Leptospirosis prevention: insights from rural farming communities in Kurunegala

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Leptospirosis, a life-threatening zoonotic disease, poses a persistent public health challenge in Sri Lanka, particularly among rural farming communities frequently exposed to contaminated water during paddy cultivation. This study investigates farmers' awareness of leptospirosis and their preferences regarding antibiotic use for prevention and treatment, focusing on the *Polgahawela* medical officer of health area in *Kurunegala* District, a historical hotspot for the disease. A purposive and convenience sampling approach was used to recruit 100 adult paddy farmers with at least one year of full-time cultivation experience, ensuring inclusion of individuals with relevant exposure to leptospirosis risk and accessibility for data collection. The study applied both descriptive and inferential statistical methods, guided by the knowledge-attitude-practice (KAP) model and health belief model, to assess how knowledge, beliefs, and demographic factors shape health-seeking behavior. Findings revealed that while 96% (n=96) of farmers were aware of leptospirosis, significant gaps persisted in symptom recognition, perceived susceptibility, and adoption of preventive practices. Only 44% (n=42) reported using personal protective equipment, and doxycycline prophylaxis uptake remained below 15% (n=14), despite widespread awareness. Although 87% (n=83) acknowledged antibiotics as a treatment, only 60% (n=50) preferred to initiate antibiotic use immediately upon symptom onset, largely influenced by perceived drug efficacy. Logistic regression analysis confirmed belief in antibiotic effectiveness as the strongest predictor of early antibiotic preference (OR ≈ 76, $p < 0.001$), while prior self-medication did not significantly influence this behaviour. The study underscores a critical KAP gap; high awareness but low compliance with preventive behaviours and emphasizes the need for targeted health education to enhance risk perception and promote timely treatment. Interventions must address practical barriers such as discomfort with protective gear and misconceptions about antibiotics. Strengthening community-based outreach and leveraging trusted sources like healthcare workers and peer networks could bridge this gap, ultimately reducing leptospirosis morbidity in agricultural settings.

Keywords: Antibiotic use preferences, Farmer health behaviour, Health belief model, Knowledge-attitude-practice model, Zoonotic disease

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IPRC/25/199 Multidisciplinary Studies

A Tech-Driven Strategy for Sustainable Sea Cucumber Fisheries Management in Sri Lanka

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Sri Lankan sea cucumber industry faces critical challenges due to high export demand and unsustainable harvesting of some species, leading to a drastic reduction in economically important species diversity, from 21-24 in 2008 to 9-12 by 2021. This multidisciplinary study aimed to develop a tech-driven strategy for sustainable fisheries management of sea cucumber species in Sri Lankan coastal waters. The study comprised two phases: 1) qualitative interviews with key informants selected using purposive sampling, conducted in Kalpitiya and Jaffna, to identify the root causes of current mismanagement issues, and 2) the development of a user-friendly mobile application built with React Native, Node.js, and MongoDB. Interviewees included fisheries society leaders, farmers' society leaders, middlemen, processors, exporters, and government representatives, ensuring diverse insights. The results of phase one highlighted a substantial lack of systematic catch data and revealed deficiencies in the current complex, time-consuming licensing and regulatory structure, hindering effective management while hindering fair earnings distribution. Sea cucumber processing centers were recognized as essential strategic data collection locations since every single sea cucumber is exported as a processed species (Beche-de-mer). Above mentioned results of phase one were addressed by a user-friendly smartphone application that was developed in phase two, which allowed for multi-user registration and GPS-verified catch documentation (species, weight, provenance, and status). This digital framework aims to enhance transparency and establish a 'single window' concept for enhanced administrative efficiency and centralized data management, offering a replicable model to counter middleman dominance and poor data flow, thereby fostering long-term sustainability. A few factors that greatly benefit fisheries management include the species type, size upon receipt, location information, purchase price, and other characteristics that can be obtained and that will provide timely sighting updates. Future research will validate its efficacy through extensive stakeholder adoption testing.

Keywords: Data Recording, Mobile Application, Sea Cucumber Fisheries, Strategic Data Capture, Sustainable Management

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IPRC/25/244 Multidisciplinary Studies

Assessing the use of organic fertilizers in Sri Lanka's paddy sector: practices, challenges, and impacts

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Environmentally sustainable farming practices have gained more attention recently as a result of the negative impacts of conventional agricultural practices. Applying organic fertilizers to paddy cultivation is one of these methods, which has become one of the best strategies to lower the usage of inorganic fertilizers, improve soil health, and guarantee agricultural sustainability. Hence, the current study attempts to assess the extent to which Sri Lankan paddy farmers use organic fertilizers and investigate their motivations, issues, and effects on the use of inorganic fertilizers in paddy cultivation. The research was conducted in nine key paddy-growing districts, representing the main irrigation methods and agro-climatic zones. Multi-stage random sampling technique was applied to select paddy farmers who used both organic and inorganic fertilizers in paddy cultivation. Data collection was done with 234 paddy farmers through a semi-structured questionnaire survey. The findings indicate that 50% of farmers adopted organic fertilizers voluntarily, while the remainder were influenced by agricultural officers and farmer organizations. Compost fertilizer was the most widely used organic input (47%), followed by liquid fertilizers, poultry manure, and organic pellets. Organic fertilizers were produced by 47% of farmers at home using raw materials such as green manure and cow dung. Inadequate availability of raw materials (83%), limited technical knowledge (28%), and insufficient space (14%) were major issues in organic fertilizer production. The majority (72%) of farmers have reduced the quantity of inorganic fertilizer application due to organic fertilizer usage. Unavailability of sufficient organic fertilizers at the market, labor-intensive application, and low quality of organic fertilizer are the key issues in using organic fertilizers in paddy cultivation. Hence, the study suggests the need for strong policy interventions and support mechanisms to increase access, awareness, and efficiency in the use of organic fertilizers in paddy cultivation in Sri Lanka.

Keywords: Compost, Organic fertilizers, Paddy cultivation

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IPRC/25/245 Multidisciplinary Studies

Spatial design approaches for analyzing archaeological site data, with special reference to the miniature water garden in *Sigiriya*

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Sigiriya is a UNESCO World Heritage historical site, and the monuments were built by King Kashyapa I in the fifth century. For more than a hundred years, archaeologists and academics have been involved in excavating and inspecting the Sigiriya royal city complex. However, there is no serious study mapping spatial design analysis tools to examine unidentified excavation sites of Sigiriya. Spatial design is the art of designing space, and a conceptual design approach that crosses multidisciplinary fields and considers factors such as human science and cultural context for constructing sites. The methodology of this study starts with archaeological excavation annual reports in the Central Cultural Fund and surveying handling with plans, sections, and measurements obtained during site visits. This site investigation includes two parts: first, analysis of excavated reports and conserved layout by applying spatial design tools like design elements, grid rules, orientation, materials use, site traffic, scenic spots and Vastu Purusha Mandal; then, development of 2*D* and *3D* computer models using Computer Aided Design (CAD) tools to fill the gap of the remaining layers. Finally, these study results have been compared with case study models from one hundred interior architecture graduates in the National Institute of Business Management. Comparative analysis of "miniature" water garden data and a hundred design samples showed seventy percent of design similarities. This study identifies welcome, functional, and service areas on the site and found an open royal building and facility zone located in the miniature water garden and all composite architecture arrangements toward the main building. This methodological framework will focus on the more undiscovered phases in Sigiriya.

Keywords: design composition, Vastu Purusha Mandala, spatial design, design elements

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IPRC/25/271 Multidisciplinary Studies

Perceptions of teachers and students on the use of SMART boards in junior secondary classrooms in Sri Lanka

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This study investigates the perceptions of teachers and students on using SMART boards in junior secondary classrooms in Sri Lanka. An analytical case study within a qualitative research framework was employed. The study focused on a purposive sample from a national school in the Sri Jayawardenepura zone of the Western Province, including 150 students and 10 teachers from five Grade 8 classrooms equipped with SMART boards. Data collected through questionnaires and interviews were thematically analyzed. The findings indicate highly positive perceptions: 99% of teachers and 100% of students viewed SMART boards favorably. These boards enhance instructional interactions and significantly support student learning. A large majority of teachers (95.7%) reported that SMART boards increase lesson engagement and interactivity, often through multimedia integration. Similarly, 88% highlighted that features such as touch interaction and digital annotation foster more interactive lessons, enabling students to participate actively and engage visually with the material. They also improve visualization, allowing teachers to present diagrams, charts, and other aids for complex concepts more effectively. In addition, SMART boards streamline lesson planning and delivery. Teachers can save and reuse digital notes, access online resources, and display materials without switching devices. The ability to annotate directly on the board and preserve these annotations makes lessons more organized and efficient. Nevertheless, challenges were noted, including technical issues, communication barriers, limited teacher training, underutilization of creative resources, and restricted availability of SMART boards. These issues highlight the need for strategic measures to fully realise the potential of SMART boards in education.

Keywords: SMART board, SMART classroom, teaching-learning process

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IPRC/25/195 Multidisciplinary Studies

A deep learning and mathematical approach for early prediction of chronic kidney disease in Sri Lanka with a secure web-based interface

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Chronic Kidney Disease (CKD) presents a formidable public health challenge in Sri Lanka, compounded by a high incidence of CKD of unknown etiology (CKDu), particularly within rural agricultural communities. Addressing the urgent need for early diagnostics, this study developed an integrated platform that leverages deep learning to deliver highly accurate, real-time CKD risk assessments. A robust dataset of clinical features was used to develop and validate four predictive models: a Deep Neural Network (DNN), XGBoost, Random Forest, and Support Vector Machines. Methodological rigour was ensured through correlation-based feature selection to identify the most salient predictors, such as serum creatinine and albumin. The superior model was subsequently deployed via a secure Flask backend API, powering a responsive web interface built with HTML and Tailwind CSS for seamless integration into clinical workflows. The DNN, architected with three dense layers and optimized via the Adam algorithm, demonstrated clear superiority, achieving a classification accuracy of 99.16%. This result significantly outperformed the alternative machine learning paradigms tested. By providing an instantaneous and reliable diagnostic aid, the platform empowers healthcare professionals especially in resource-constrained settings, to make timely, evidence-based interventions. This research demonstrates a successful application of computational intelligence to a critical national health issue, offering a scalable framework for enhancing early CKD detection. Future work will focus on local dataset expansion, mobile deployment, and externally validating the model's predictions in a separate database to further broaden its impact and ensure generalizability.

Keywords: Chronic kidney disease, deep learning, mathematical modelling, Sri Lanka

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Student Preferences in the Technology Stream: A Study on Subject Choice and Influencing Factors at G.C.E. A/Level in Sri Lanka's Western Province

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The General Certificate of Education (G.C.E) Advanced level (A/L) is the final stage of general education in Sri Lanka. Bio-Systems Technology and Engineering Technology are the two subject streams offered under the section of Technology in schools. School census data revealed that student enrollment in Engineering Technology is comparatively higher than in the Bio-Systems Technology stream in the Western province. The main objective of the research is to investigate the factors influencing students' decisions to choose between Engineering Technology and Bio-Systems Technology streams at the G.C.E. A/L in the Western province of Sri Lanka and to provide suggestions to increase student enrollment in the Technology stream. The research was conducted as a descriptive research with a quantitative approach. The sample size was 340 Technology stream students in Western Province, Sri Lanka and sampling procedure was stratified random sampling using semi-structured questionnaire. The collected data were analyzed using SPSS software. The factors associated with student enrollment into the Technology stream were investigated related to academic performance, motivational factors, and external influences such as school environment, teachers' support, parental influence, and peer influence in subject stream selection. The analysis conducted by using statistics tests such as descriptive statistics, Chi-squared tests, revealed that the factors associated with parental influence (P=0.297), peer pressure (P=0.859), teacher support (P=0.757), and school environment (P=0.757) did not influence the student enrollment decision for both subject streams. However, it was identified that gender (Male 63% & Female 37%), academic performance in Ordinary Level (O/L) science and mathematics, and personal interest in career opportunities and hands-on learning as the primary influencing factors of subject stream choice (P=<.001,<.001,<.001 respectively). Based on these findings the study provides evidence-based recommendations such as conduct Gender-focused Campaigns, improve collaborations with Industry, Career Awareness Sessions, Invest in Practical Learning for educational authorities to enhance the attractiveness of the Technology stream.

Keywords: Bio-Systems Technology stream, Engineering Technology stream, student enrolment

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