7th SONEUK CONFERENCE

PROGRAMME SCHEDULE

Engineering and Technology for Sustainability

Saturday 9th July 2022

10:00 am - 5:00 pm

Venue:

Nepal Authentic Dining,
23 Boston Parade, London, W7 2DG

Register online at soneuk.org/conferences/register-2022

Programme

10:00 - 10:30	*Registration and Networking*

Inaugral / Opening Session

Session Chair : Sanyukta Shrestha, Chairperson - SONEUK

10:30 - 10:40	**Welcome and Introduction** *Dr Bidur Ghimire, General Secretary, SONEUK*
10:40 - 10:50	**Inauguration/Opening, Proceedings unveiling and speech** *HE Gyan Chandra Acharya, Nepalese Ambassador to the UK*
10:50 - 10:55	**Introduction to the Conference** *Narad Bhandari, Vice-chairperson and Coordinator, SONEUK Conference Committee*
10:55 - 11:00	**Vote of thanks** *Sanyukta Shrestha, Chairperson, SONEUK*
11:00- 11:05	**Break**

Technical Session 1

Session Chair: Prof Hom Nath Dhakal, University of Portsmouth

11:05 - 11:35	**Keynote Speech - Dynamics of Air Pollution in Kathmandu Valley and Control Measures** *Prof Ram Prasad Regmi, Tribhuvan University, Nepal*
11:35 - 12:00	**Sustainable and Integrated Transport in the Kathmandu Valley** *Krishna Kishor Shrestha, National Highways, UK*
12:00 - 12:25	**Feasibility of Underground Kathmandu Metro Rail-Patan Line** *Pawan Babu Bastola, Nepal College of Information Technology*
12:25 - 12:50	**Assessment of the Impact of Metro Rail on Improving Air Quality of the Kathmandu Valley** *Sajan Shrestha, National Atmospheric Resource and Environmental Research Laboratory, TU*
12:50 - 13:15	**Assessment of Safety Practices in Earthquake Reconstruction and Retrofitting Projects** *Gaurab Shrestha, Institute of Engineering, Nepal*
13:15 - 13:20	**Technical Session 1 wrap up and closing by Chair**

Programme
Continued

13:20 - 14:05	*Lunch Break*

Technical Session 2

Session Chair: Assoc. Prof Ramesh Marasini, Buckinghamshire New University, UK

14:05 - 14:35	**Keynote Speech – Issues and Challenges of Adopting Cloud Governance** *Prof Subarna Shakya, Institute of Engineering, Nepal*
14:35 - 15:00	**Quantitative Measurement of Safety Culture of the Nepalese Construction Industry** *Ramesh Dumaru, Institute of Engineering, Nepal Urgency of National*
15:00 - 15:25	**Status of Application of BIM in Architecture, Engineering and Construction Projects in Nepal** *Kripa Maharjan, Institute of Engineering, Nepal*
15:25 - 15:35	*Break*
15:35 - 16:00	**Collaborative Framework with Shared Responsibility for Relief Management in a Disaster Scenario** *Bhupesh Kumar Mishra, School of Computing and Engineering, University of Gloucestershire*
16:00 - 16:25	**Development of a Low-Cost Aerial Research Platform for Addressing Current Limitations of Air Monitoring in Nepal** *Prateek M. Shrestha, National Renewable Energy Laboratory, Golden, CO, USA*
16:25 - 16:50	**Urgency of National Ground Research Centre(N-GRC) in Nepal for Resilient and Sustainable Infrastructural Development** *Dr Binod L. Amatya, Greater Kathmandu Valley Metro Rail Promotion Group, London, UK*
16:50 - 16:55	**Technical Session 2 wrap up and closing by Chair**
16:55 - 17:00	*Conference Closing*

Keynote Speech

Dynamics of Air Pollution in Kathmandu Valley and Control Measures

Prof Ram Prasad Regmi, Tribhuvan University, Nepal

The unacceptable level of air pollution in the Kathmandu Valley, which accommodates a large proportion of the national population, is of serious concern. Development of air pollution control measures for this valley, located in the complex terrains of Nepal Himalaya, remained a challenge. Resolving the meteorological flow fields, air pollution emission activities, and the dynamics of pollutants down to a kilometer-scale, the present study paved the way to ensure the National Ambient Air Quality Standard (NAAQS) in the valley. Gridded emission inventories of potential pollutants have been prepared over the area covering the Greater Kathmandu Valley and its immediate surroundings. Meteorological situations and the dynamics of pollution have been numerically simulated. Desired agreement between the observations and numerical predictions has been achieved for both the meteorological and air pollutant fields.

The study reveals that the air pollution dispersion power of the valley, typically determined by the prevailing meteorological situations, is very poor, particularly, during the long dry winter season. Present emission loadings into the immediate atmosphere of the Kathmandu Valley are far beyond its carrying capacity. The NAAQS set for fine particulate matters (PM2.5) can be met by limiting the current emissions from domestic, transport, and industrial sectors, respectively, to 20, 30, and 40%. Among the emission sectors, realizing the desired emission control in the transport sector appears most challenging. A clean mass transit system such as metro rail can enormously help improve air quality, human health, and quality of life in the Kathmandu Valley.

Issues and Challenges of adopting cloud governance

Prof Subarna Shakya, Institute of Engineering, Nepal

Technical Presentations

Sustainable and Integrated Transport in the Kathmandu Valley

Krishna Kishor Shrestha, National Highways, UK

In the Kathmandu valley (KV), cities are rapidly growing (25% in 30 years 1978-2011), with more houses, peoples (population 37% will grow by 2050), vehicles (growth @ 13% and 90% more cars, 1/3 of total vehicles in KV) but with limited utilities and services. Open spaces and lands are occupied for building constructions (high rises and private houses). Public transports i.e., buses, mini/micro buses, tempos, all are competing, occupying already congested (by cars) road spaces bringing the city traffic nearly to the halt. Numbers of vehicles plying in the congested roads produced more pollutions, externalities are residents' health is deteriorated (health cost) and travel time increased (delay cost) – the economic cost is very high, and peoples are paying for all these externalities. Annual economic cost of traffic congestion in the Kathmandu Valley was above Rs 116 billion in 2018. Public transport (PT) is not coordinated with multiple uncoordinated operators. Transportation institutional commitment does not match with their objectives and policies. Motorcycles dominate urban mobility. Infrastructure provision for NMT (cycling and pedestrian transports) is not proportionate to its modal trip (42%).Since 1993, public transport studies of KV, are scoped for improvement of urban public transport, data collection, traffic survey, travel demand forecasting and new mass rapid transit (MRT) system in KV.

Two studies based MRT systems indicate the feasibility of rail transport. Recently, a new enthusiast has proposed underground and elevated metro rails in the Kathmandu Valley, which is extended up to Banepa city. New rail transport, integrated with other public transports (surface) including sustainable transports (waking/ cycling) along with travel demand management (TDM) techniques & PT routes restructuring, will improve traffic congestion and increase in urban mobility.

Technical Presentations

Feasibility of Underground Kathmandu Metro Rail-Patan Line,

Pawan Babu Bastola, Nepal College of Information Technology

Traffic congestion in the capital city, Kathmandu, has become a serious problem for the commuters and the government itself. The valley is in a need of a robust public transport system. The introduction of the Kathmandu Metro Rail will be an evolutionary change replacing the old transport system in response to the perceived socio-economic needs of the people. Especially, due to the limited right of the way of the existing road, the elevated or at-grade metro is not feasible in the core area of the valley.

Similarly, considering the historical temples, monuments, and Rato-Machindra heritage route located along the Patan line, the underground metro route is found to be the best and most sustainable solution. Moreover, the underground metro through tunnels in the seismically active Kathmandu valley is found to be more beneficial and effective. The underground Kathmandu Metro-Patan line initiating from the central station at Bhrikutimandap ends at the launching portal at Khumaltar, Satdobato. A 6.2 km long-proposed line passes through the intermediate stations located at Tripureshowr, Pulchowk, and Lagankhel. The proposed metro route is in general 15-25m below ground level. However, while crossing the Bagmati river near Thapathali/ Tripureshor, the tunnel axis depth is at a very shallow depth of 8m below the ground. Ground characterization along the line shows that the route is predominantly passing through the Kalimati formation. Prominent heritage and buildings of high importance located along the route are highlighted for an impact assessment.

Technical Presentations

Assessment of the Impact of Metro Rail on Improving Air Quality of the Kathmandu Valley

Sajan Shrestha, National Atmospheric Resource and Environmental Research Laboratory, TU, Nepal

The Kathmandu Valley suffers a disastrous level of air pollution every winter. The culturally, historically, and the aesthetically rich valley is randomly urbanized housing millions of unmanaged floating populations. Recent studies suggest that the local emission loadings of the valley, categorically from the domestic, industrial, and transportation sectors, are far greater than its carrying capacity. Managing its air pollution is a challenge. A massive reduction in emission loadings would be necessary to bring the air quality to the national ambient air quality standard.

Clean mass transit like Metro Rail could be a key to the sustainable and environment-friendly development of the Kathmandu Valley, transforming the unmanaged transportation system- a significant contributor to the valley's emission. In this paper, we present the emission status and air pollution scenario in the greater Kathmandu Valley at present and a possible reduction scenario of the same after the introduction of the proposed Metro Rail. Availability of precise and updated emission data and development-specific projected emission data would help realize the impact and sustainability of any development activity before implementation and maximize its benefit ensuring the air quality, economy, health, and environment.

Technical Presentations

Assessment of Safety Practices in Earthquake Reconstruction and Retrofitting Projects

Gaurab Shrestha, Institute of Engineering, Nepal

Construction industry has been growing in Nepal at a fast pace. This has a major contribution to the economy of Nepal providing a large number of employments in the country. Frequent occurrence of natural disasters such as earthquake, flood and landslides have increased construction works in the country significantly. The Gorkha Earthquake in 2015 in Nepal had caused tremendous damage to infrastructure and loss of lives. It caused damage to both building structures including heritage structures and lifelines like road networks, hydropower projects and water supply systems. This has added a need for large number of reconstruction and retrofitting projects in Nepal. With the increase in construction projects, the number of accidents has also increased. This indicates that the Health and Safety has become an important issue in the construction projects hence required attention.

In this context, this study focuses on investigating of safety issues practices in reconstruction and retrofitting projects in the Kathmandu Valley. This study was conducted covering seven reconstructions and retrofitting projects where primary data from the field visits was collected combining data obtained from the secondary sources. Demographic survey was carried out with the help of a questionnaire and filled the questionnaire to get the demographic details of the workers by asking them individually at the live sites. The findings of this study indicate that training, education and experience of workers had a significant role in decreasing the likelihood of occurrence of accidents at site. This is the important outcome from this study that project management can adopt to follow the safety legislation and implementation at the site of the reconstruction and retrofitting projects for improving overall safety.

Technical Presentations

Quantitative Measurement of Safety Culture of the Nepalese Construction Industry

Ramesh Dumaru, Institute of Engineering, Nepal Urgency of National

Safety culture in construction industries of developing countries has not been able to draw much attention. With the increase of construction works specially in developing countries, health and safety has become a major issue. Lack of safety culture in construction environment can pose a hazard which can lead to a main cause of accidents and injuries. Therefore, a study on safety culture in construction industries of developing countries is crucial.

This study quantifies the safety culture status in the construction industries in Nepal. A questionnaire has been designed to conduct a survey to collect data from all sectors of construction. The survey respondents (Management level staff who implement the H&S) have scored the safety performance of their organisations based on the 32 safety culture elements. The study then assessed the safety culture level of the construction companies class "A" and class "B" (constructing Buildings, Roads, Hydropower, etc.) in the context of the Nepalese construction industry as these companies have constructed large projects. Statistical analysis has been used to analyze the data collected from the industries. A t-test is used to find the significant relationship between the safety culture elements. In the study, the safety culture level of the construction company class "A" and class "B", are found to be 68.86 and 61.21 compared to very good worldwide safety performance firms with a safety culture level of 91.4 points, while the low safety performance companies with a safety culture level of 58 points respectively. This will help to understand the safety culture level of construction industry in maintaining a safety performance of the industry and to take a further action to reduce accident rates in the construction industries.

Technical Presentations

Status of Application of BIM in Architecture, Engineering and Construction Projects in Nepal

Kripa Maharjan, Institute of Engineering, Nepal

Building Information Modelling (BIM) has been gaining global popularity in the Architecture, Engineering, and Construction (AEC) industry. It has been considered as a solution for the shortcomings of traditional methods of carrying out projects and utilise in managing the assets throughout their life cycle. But Nepal still uses the conventional method for designing and construction process. The purpose of this research was to study and establish status of BIM application in Nepal. Extensive literature review was conducted by reviewing the publications in international journals. A questionnaire survey of engineers and architects working in Nepal was conducted. The responses of 113 participants were analysed by using quantitative data analysis techniques. The top barriers for adoption of BIM in Nepal were identified. The findings showed that the level of awareness of BIM in Nepal as low and the use of BIM was concluded as in Level 1 of Bew and Richards' maturity model i.e. it is in early stages. A thematic analysis carried out on the qualitative responses in the survey were in line with pattern of variables from literature. It is envisaged that the findings of the study could be used as a guidance for the future development and understanding to increase awareness and adoption of BIM in Nepal.

Technical Presentations

Collaborative Framework with Shared Responsibility for Relief Management in a Disaster Scenario

Bhupesh Kumar Mishra, School of Computing and Engineering, University of Gloucestershire

Disaster instances have been increasing both in frequency and intensity causing the tragic loss of life and making life harder for survivors. Disaster relief management plays a crucial role in enhancing the lifestyle of disaster victims by managing the impacts of disasters. Disaster relief management is a process with many collaborative sectors where different stakeholders should operate in all major phases of the disaster management progression. In the different phases of the disaster management process, many collaborative government organisations, along with non-government organisations, leadership, community, and media at different levels need to share the responsibility with disaster victims to achieve effective disaster relief management. Shared responsibility enhances disaster relief management effectiveness and reduces the disaster impact on the victims.

Considering the diverse roles of different stakeholders, there has been a need for a framework that can bind different stakeholders together during disaster management. This paper explores a framework with major stakeholders of disaster relief management and how different stakeholders can take part in an effective disaster relief management process. The framework also highlights how each stakeholder can contribute to the relief management at different phases post-disaster. The paper also explores some of the shared responsibility collaborative practices that have been implemented around the world in response to disasters as disaster relief management processes. In addition, this paper highlights the knowledge obtained from those disaster instances and how it can be applied to disaster mitigation, and how it can be helpful in preparing for future disaster scenarios.

Technical Presentations

Development of a Low-Cost Aerial Research Platform for Addressing Current Limitations of Air Monitoring in Nepal

Prateek M. Shrestha, National Renewable Energy Laboratory, Golden, CO, USA

Hyper-local mapping of atmospheric air pollution in the urban areas of Nepal has very limited available data. Present work presents our motivation and showcases our effort of developing a portable aerial research platform prototype for generating hyper-local maps of urban areas of Nepal with a custom-built air monitoring instrumentation platform based on a locally developed quadcopter drone. The air monitoring instrumentation consists of an Arduino board integrating an array of low-cost air sensors for monitoring NO2, SO2, O3, PM2.5, Temperature, Barometric Pressure, and Relative Humidity. Variants of locally developed electric quadrotor unmanned aircraft systems (UAS) are being developed which will be deployed as the aerial monitoring platform. The prototype UAS is envisioned to enable academics and researchers to collect atmospheric air pollution data by positioning the platform at any desired location for short durations, and within the limits of regulated airspace and telemetry range. Generation of vertical atmospheric profiles of air pollution variation at the measurement locations will enable the development of hyper-local three-dimensional air pollution maps of urban areas which can then guide the development of effective air pollution management and mitigation strategies. The current work discusses the background of the current air monitoring infrastructure in Nepal with associated challenges, the opportunities provided by the emerging low-cost sensor technologies, the technical aspects of the aerial platform prototype development process, and potential future avenues for its use.

Technical Presentations

Urgency of National Ground Research Centre(N-GRC) in Nepal for Resilient and Sustainable Infrastructural Development

Dr Binod L. Amatya, Greater Kathmandu Valley Metro Rail Promotion Group, London, UK

Poor infrastructure planning, design, construction, and operation due to poor management of ground risks are costing the country billions of rupees and hundreds of lives every year. Ground data collection, field and laboratory testing, data analysis, correct interpretation & design, and post construction performance monitoring/observations are key parts of engineering practice to manage the ground risks. It is often found that these various integral parts of engineering practice are seriously overlooked in Nepal. The country is lacking a ground database system, design guidelines, code of practice to deal with various types of ground (soil and rock) prevailing within the national domain to manage the geo-hazards properly. There is rare practice of doing field monitoring and observation to investigate the performance of built or natural environment. The construction industry is in a need of leadership role to understand the ground risk and develop necessary code of practice to build resilient and sustainable infrastructure. Therefore, there is an urgency of an establishment of a leading organisation at national level such as the National Ground Research Centre(N-GRC) to address the issues. Vision, mission, and objectives of N-GRC are presented. A brief discussion is also made on organisational set up, operation model and financing.

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