2nd NRN Global Knowledge Convention

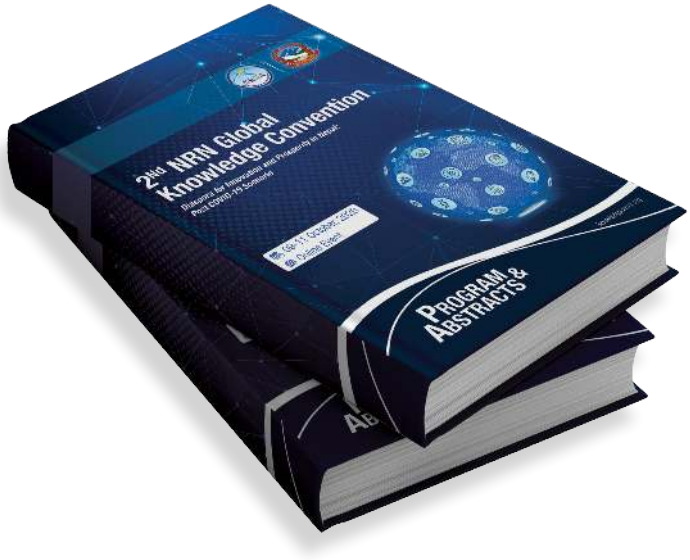
Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts



Publisher : **Non-Resident Nepali Association**
Date : **09 October 2020**

Disclaimer: *The information presented in this abstract booklet are of the abstract contributors. NRNA is not responsible for the factual basis of them.*

KATHMANDU
NEPAL

The Prime Minister

I am pleased to learn about the Second NRN Global Knowledge Convention that NRNA is organizing from October 09-11, 2020 at Kathmandu University, Dhulikhel, Nepal. Government of Nepal is proud to be a partner of this convention. I understand that the convention will be held virtually due to the ongoing pandemic.

I heartily welcome all the organizers and participants in this important convention.

Government of Nepal and NRNA have been partners in many areas right from the inception of NRNA in 2003. This is one more program in our collaboration.

Nepal wishes to graduate from the Least Developed Country status and join the ranks of middle-income country. Technically, we might have actually moved beyond the Least Developed Country status, but Nepal wishes to make the move towards sustainable prosperity and do so in an accelerated trajectory.

Close and productive partnership with the Nepali Diaspora will be a key ingredient to buttress Nepal's developmental aspirations. As the size of Nepali Diaspora increases rapidly and as many members of the diaspora continue to excel in business, academia, profession and scientific pursuits, their contributions towards Nepal's socio-economic development becomes even more valuable. Collaboration between the Nepali Diaspora and Nepali Government, businesses and institutions in the areas of knowledge; including in science and technology, related to infrastructure, energy, finance, agriculture, urban development, education and many other fields can be a catalyst for Nepal's development. The Government of Nepal considers the Nepali Diaspora as a key resource, stakeholder and partner in achieving this objective.

I am sure the Second NRN Global Knowledge Convention will produce several scientific, social and policy ideas to support a rapid socio-economic development in Nepal.

I thank NRNA, all the organizers and participants of this convention, and wish the convention a grand success.

5th. Oct., 2020.

Government of Nepal

Minister for Foreign Affairs

Ministry of Foreign Affairs
Singha Durbar
Kathmandu, Nepal

1 October 2020

Message

It gives me pleasure to know that the Non-resident Nepali Association (NRNA) is publishing an Abstract Booklet for the 2nd NRN Global Knowledge Convention scheduled to be held virtually from 9 to 11 October 2020 in partnership with the Government of Nepal and Kathmandu University. The theme for the second edition of the Convention -**"Diaspora for Innovation and Prosperity in Nepal: Post Covid-19 Scenario"** - is highly relevant at a time when the world is facing unprecedented challenges due to COVID-19 pandemic. I appreciate the NRNA for this timely effort.

While COVID-19 has brought many challenges by disrupting our normal way of life, it has brought us together to collectively explore solutions to the traditional and new challenges. Thanks to the advancement in information technology, despite physical restrictions due to the pandemic, we are able to continue our communications and dialogues through virtual means, particularly in the area of knowledge creation and sharing. In recent times, I have had multiple virtual interactions with Nepali Diaspora to assess and address the hardships and challenges faced by Nepalis across the world. I take this opportunity to appreciate and thank the NRNA for its support and partnership in taking care of fellow Nepalis abroad who were in extreme distress during the pandemic, especially those working as migrant workers.

After the recent historical political transformation has addressed the major political agenda, the Government of Nepal is now solely focused on the socio-economic transformation of the country. I believe this Convention will prove a useful platform for the Nepali scholars, researchers, experts and professionals from Nepal and around the globe to share ideas and experiences towards realizing the national aspiration of **"Prosperous Nepal, Happy Nepali"** by contributing to bridging the country's knowledge and skills gap. The Brain Gain Center- BGC at the Ministry could be a useful platform for the same purpose.

Finally, I extend my warm greetings and best wishes to all the scholars, experts, contributors, convention organizers, session coordinators, panelists and NRNA members for the success of the convention.

Pradeep Kumar Gyawali

GoN Registration No.: 01-2070/71 FOR NEPALI BY NEPALI नेपालीका लागि नेपाली

Non-Resident Nepali Association (NRNA)
गैरआवासीय नेपाली संघ

Message from the NRNA President

In the backdrop of successful completion of the 1st NRN Global Knowledge Convention, the 2nd NRN Global Knowledge with the theme **Diaspora for Innovation and Prosperity in Nepal: Post Covid-19 Scenario** is the continuation of NRNA's efforts to bringing knowledge and technology into the forefront; to enable Nepal to achieve the goal of becoming a prosperous and vibrant nation.

Importance of knowledge can be seen everywhere; whether in a society or a corporate world. Knowledge enlightens the human mind, shapes up the behaviors, molds the attitude of humans, hence, to share and gain knowledge is the foremost goal of this convention. I believe that this convention will provide a platform to share framed experiences, values, contextual information, and experts' insight that provide a framework for evaluating and incorporating new experiences and knowledge leading to innovation.

The basic objective of this convention is to create and add value for the socio-economic endeavors of Nepal. This convention facilitates in pooling personal skills of diverse experts together. Group deliberations and combined judgment of all experts on important issues leading to a more realistic and objective appraisal of the problems and solutions from different angles on various topics of national interest to help improve the value of decisions.

This collaboration between Nepal Government, Resident Nepalese and Nepali Diaspora helps in our endeavor to gather knowledge and in fulfilling the knowledge gap. I am confident that this collaboration and future such endeavors will lead to resourceful mobilization of currently underutilized knowledge and expertise bank of Nepal; especially the Nepali Diaspora, ultimately leading to knowledge-based economy that reduces the risk and cost to bring innovation in the socio-economic sectors of Nepal.

In today's competitive era; knowledge and innovation are the niche that delivers unique products and services. Innovation is also important because of the rapid change in the needs and preferences of the emerging and developing economies. I am optimistic that all knowledge sharing activities derived from the convention and the following Whitepaper will be concurrently examined to incorporate their impact on developing knowledge networking and collaboration; leading to the overall development of our nation.

I take this opportunity to thank the Nepal Government, Kathmandu University, the Nepali Diaspora and the Resident Nepalese experts, all the participants of the convention and the organizing committee for making this event happen. I trust that the outcome of this would not be limited and restricted to documentations only; but truly implemented through innovative approaches in addressing the emerging needs of Nepal's socio-economic development such that the benefits of it are rippled down to the grassroot level.

Thank you!

Kumar Panta
President
09 October 2020

Kathmandu University
Office of the Vice Chancellor

October 5, 2020

Message

NRNA stands for unity and hope among Nepalis spread all over the world. As the Vice Chancellor of Kathmandu University, which prioritizes 'Global Engagement' as one of the important initiatives for achieving the vision of a world-class institution, I emphasize that the academic engagement of Nepalese diaspora be accelerated at higher levels in the days ahead. Diaspora's reorientation to Nepal's development will be even more crucial at present in that Nepal, like many other countries, now moves to the phase of rebuilding economy, creating employments and ensuring large-scale social development.

I am glad to note that the second Global Knowledge Convention has been organized amid the discomfort caused by COVID 19. I also acknowledge the fact that Kathmandu University has been on board as one of the hosts for Nepal.

I congratulate the NRNA for being able to organize the Convention online, and wish for grand success of all the sessions taking place during the three days.

Prof. Dr. Ram Katha Makaju Shrestha
Vice Chancellor

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Message from the Convention Organizing Committee

Dear Colleagues,

Organizing Committee of the 2nd NRN Global Knowledge Convention is excited to present to you the detailed program and abstracts of the presentations for this convention. This document will help us determine what we are looking forward to, and gauge the gravity and depth of this convention. We thank the invited speakers, paper contributors, poster presenters, panel members, session chairs and moderators for your willingness to be a part of this convention, and would like to acknowledge your contribution without which the development of the convention program would have been incomplete. We are pleased to share with you that the convention will comprise of 119 invited lectures, 68 contributed talks, 16 poster presentations, and 81 panelist contributions.

We would like to take this opportunity to reiterate the vision of NRNA, the aim of this convention, and the role it can play in the aspiration of Nepal for happiness and prosperity. NRNA is a non-profit global organization of Diaspora Nepali with the core desire to be a development partner of our motherland. One of the central strategic goals of NRNA is to mobilize the skill, knowledge, expertise, experience, financial capital and other resources possessed by NRNs for the socioeconomic development of Nepal. The aim of this convention is to create a platform where the resident Nepali experts' experience meet with complementary experience of diaspora experts and international communities where by knowledge essential for the development of Nepal can be identified and offered to the Government of Nepal. The important role such platform can play in reversing the drained brain and utilize it to achieve a net brain gain for the country of origin needs no explanation and attestation. Many emerging economies around the world have utilized the diaspora's knowledge for their rapid growth, and NRNA would like to assist the Nepal government to achieve the same.

With this philosophy at heart and mind, NRNA organized the 1st NRN Global Knowledge Convention in 2018 in partnership with the Government of Nepal. The success of the first convention was witnessed by the Nepali diaspora community and the resident Nepali experts alike. On the heels of this accomplishment, and naturally encouraged by it, NRNA decided to continue organizing successive episodes of this convention in every two years. The Government of Nepal also assured continued support for similar future conventions. The 2nd Convention currently being rolled out is the manifestation of the promise kept by NRNA and support furnished by the government of Nepal.

We analyzed the shortfalls of the first convention and have tried to rectified them. We decided to move the Convention venue from the expensive five-star hotel to premises of educational institution. We received unconditional support from the Kathmandu University to organize the 2nd Convention at their facility. Although we are not able to take full advantage of this offer due to COVID-19 pandemic, our commitment to partner with educational institutions in Nepal will continue in the future. In addition to this, unlike the 1st Convention, we expanded the scope of this Convention and its horizon through added collaboration with crucial stakeholders of Nepal such as Ministry of Foreign Affairs, Ministry of Education, Science and Technology, National Planning Commission of Nepal, Nepal Academy of Science and Technology, Private

Sector and Innovators. This direct collaboration is expected to reduce the barrier for implementing the recommendation of the 2nd Convention.

Despite understanding the importance of organizing this convention, and available ample motivation to do so, in the middle of its preparation we were hit by unprecedented COVID-19 pandemic. At times we felt that we will be defeated. But due to the relentless effort and courage of the steering committee and management committee, we collective decided that we will rise to the occasion and organize the convention no matter how big the challenges are. Moreover, we use the challenges brought by COVID-19 pandemic and opportunities associated with it as one of the central themes of the Convention. We would like to thank and congratulate all advisors, coordinators and NRNA secretariat staff for investing unwavering efforts to put the program for this convention forward amid the horror of life threating corona virus. We also acknowledge the NRNA Regional Expert Conferences organized in Americas, Asia Pacific, Europe and Oceania Region,
and have appended their report in this booklet.

We look forward to a rigorous interaction among the global experts during this convention. We pray to the almighty that you and your family stay healthy and safe during the public health emergency we are facing worldwide.

Sincerely,

Dr. Hem Raj Sharma,

Chair, 2nd NRN Global Knowledge Convention
General Secretary, Non-Resident Nepali Association

On behalf of the Convention Organizing Committee

09 October 2020

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About the Convention

Following the grand success of the 1st NRN Global Knowledge Convention 2018 in Kathmandu, the Non- Resident Nepali Association (NRNA) is organizing the 2nd NRN Global Knowledge Convention on 09-11 October 2020 in Kathmandu University, Nepal. These conventions aim to bring together experts of various disciplines from Nepal, the Nepali diaspora and international scientific communities to explore Nepal's needs for expertise to help the country move towards a knowledge-based economy. Similar to the first convention, the second convention will be co-organized in partnership with the Government of Nepal (GoN), and in collaboration with Nepal's education & research institutions, private sectors and other stakeholders. In addition, the second convention has endeavored to expand its horizon in all possible dimensions along with the realization of the new context brought by the unprecedented pandemic. We openly invited all interested supporters to explore the possibility of active collaboration and participation.

The convention will use Sustainable Development Goals set by the United Nations and the 15th five-year plan of National Planning Commission of Nepal to shape its objectives and goals. In the current context of the COVID-19 pandemic, the convention will discuss its socioeconomic impact on diaspora and resident Nepalis, and the challenges and opportunities it has brought in Nepal and around the world. The convention has reached out to Nepali stakeholders (GoN, Ministry of Education, Science & Technology, National Planning Commission, Nepal Academy of Science and Technology, Universities, Alumni Association, Research Centers, International Organizations, Private Sectors, Industries, Startups and Innovators) to explore the areas of collaboration and interest.

Amid the current COVID-19 pandemic crisis, the convention will be organized all online.

The focus of the convention will be guided by four overarching themes:

- In-house Innovation for Societal Changes
- Science, Technology & Innovation Policy
- Startups and Commercialization
- Digitalized Economy

The convention will cover the following broader topical areas:

- Emerging Science and Technology (Natural Sciences, Life and Health Sciences, Bio technology, Engineering, Information Science and Technology, Big Data & Artificial Intelligence)
- Public Safety (Environment and Climate Change, Road Safety, Pandemic and Natural Disaster Risk Management)
- Education and Social Sciences (Vocational Education, Good Governance, Women Equality & Youth Empowerment)
- Knowledge-based Economy (Finance, Investment, Innovation and Startups, IP Protection

Centered around these subject areas, the conference is organized in three parts: Inauguration, Plenary & Symposium sessions. The convention is going to be inaugurated by the Honorable Prime Minister of Nepal Mr KP Sharma Oli on 09 October 2020. It will be addressed by the Foreign Minister of Nepal Honorable Foreign Minister Mr Pradeep Kumar Gyawali. It will also be addressed by the President of NRNA Mr Kumar Panta, and Past Presidents of NRNA. The inaugural session will feature keynote speeches from internationally recognized experts on science and technology (S&T) research and, policy formation and implementation. High-profile global experts who have played a key role in the field of S&T development and technology transfer, and made significant contributions to their country's economic transformation, will address plenary sessions.

The Convention will cover the following Four Plenary and Fifteen Symposium Sessions.

Plenary Session 1: COVID-19 Impact on Nepal's Economy & Path to Recovery

Plenary Session 2: Preparedness for Pandemic and Natural Disaster Risk Management

Plenary Session 3: Science, Technology & Innovation Policy Implementation

Plenary Session 4: Research, Innovation & Commercialization

Symposium Session 1: Agriculture and Food Security

Symposium Session 2: Biomedical Technologies

Symposium Session 3: Financial Investment

Symposium Session 4: Fintech for Economic Transformation

Symposium Session 5: Information and Communication Technology

Symposium Session 6: Innovation and Startups

Symposium Session 7: Intersection in Natural Sciences

Symposium Session 8: Life and Health Sciences

Symposium Session 9: Physical Infrastructure Development

Symposium Session 10: Public Health and Pandemic Mitigation

Symposium Session 11: Social Sciences

Symposium Session 12: Sustainable Energy

Symposium Session 13: Sustainable Environment

Symposium Session 14: Sustainable Urban Development

Symposium Session 15: Vocational Education

ORGANIZING COMMITTEES

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Co-Chair

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Mr Rajkumar Gumanju, Ministry of Education, Science and Technology
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Mr Himal Gurung, Youth Coordinator, NRNA, Netherlands
Mr Rajesh Rana, NRNA Secretariat, Nepal

Program Overview

9 October 2020 (09:00 -20:30, Nepal Standard Time)					
Room#	Room 1	Room 2	Room 3	Room 4	Room 5
Zoom Link (ID)	https://bit.ly/36qL5J1 (830 6622 0017)	https://bit.ly/33kL4oe (972 23247938)	https://bit.ly/3jjKz3d (975 6253 9651)	https://bit.ly/2EONfH7 (925 9086 2548)	https://bit.ly/3n6ninF (958 3508 0179)
Passcode	nrna2020	nrna2020	nrna2020	nrna2020	nrna2020
Zoom Support	zoomsupport@nrna.org				
09:00 - 13:30	S1: Agriculture and Food Security	S6: Innovation and Start-ups	S9: Physical Infrastructure Development	S10: Public Health and Pandemic Mitigation	S15: Vocational Education
13:30 - 14:30	**Break**				
14:30 - 16:30		P4: Research, Innovation and Commercialization			
16:30-18:30	Inauguration Ceremony (https://bit.ly/2Sgio9n) (846 9674 2527)				
18:30-19:00	**Break**				
19:00-20:30	SP1: Networking among Nepali and Diaspora Experts				

10 October 2020 (09:00 -19:00, Nepal Standard Time)		
Room#	**Room 1**	**Room 2**
Zoom Link (ID)	https://bit.ly/36qL5J1 (830 6622 0017)	https://bit.ly/33kL4oe (972 2324 7938)
Passcode	nrna2020	nrna2020
Zoom Support	zoomsupport@nrna.org	
09:00 - 11:00	P2: Preparedness for Pandemic and Natural Disaster Risk Management	
11:00 - 11:30	**Break**	
11:30 - 13:30		P3: Science, Technology and Innovation Policy Implementation
13:30 - 14:30	**Break**	
14:30 - 16:30	P1: COVID-19 Impact on Nepal's Economy and Path to Recovery	
16:30 - 17:00	**Break**	
17:00 - 18:00		SP2: Reports from Regional Knowledge Conference
18:00 - 19:00	Online Concert for Promotion of Blood Donation by Indira Joshi and Band	

11 October 2020 (09:00 -20:30, Nepal Standard Time)					
Room#	**Room 1**	**Room 2**	**Room 3**	**Room 4**	**Room 5**
Zoom Link (ID)	https://bit.ly/36qL5J1 (830 6622 0017)	https://bit.ly/33kL4oe (972 23247938)	https://bit.ly/3jjKz3d (975 6253 9651)	https://bit.ly/2EONfH7 (925 9086 2548)	https://bit.ly/3n6ninF (958 3508 0179)
Passcode	nrna2020	nrna2020	nrna2020	nrna2020	nrna2020
Zoom Support	zoomsupport@nrna.org				
09:00 - 13:30	S3: Financial Investment	S7: Intersection in Natural Sciences	S8: Life and Health Sciences	S12: Sustainable Energy	S14: Sustainable Urban Development
13:30 - 14:30	**Break**				
14:30 - 19:00	S4: Fintech for Economic Transformation	S5: Information and Communication Technology	S2: Biomedical Technologies	S13: Sustainable Environment	S11: Social Sciences
19:00 - 20:30	SP3: Achievements of the 1st NRN Global Knowledge Convention and Declaration of the 2nd Global Knowledge Convention				

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

P1: COVID-19 Impact on Nepal's Economy & Path to Recovery

9-11 October 2020

Online Event

knowledge.nrna.org

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PLENARY SESSIONS

P1

COVID-19 Impact on Nepal's Economy & Path to Recovery

The outbreak of Coronavirus disease in the pandemic scale has brought about global economy concerns. To break the chain of its transmission, governments around the world have imposed restrictive measures that have led to a major downturn in the global economy. It has impacted Nepal's economy especially in tourism industry, hospitality, employment, service sectors and export industry; however, it has also opened up opportunities in other sectors such as agriculture, energy, infrastructure, health and soft industries, science and technology, and innovation. In this context, we will discuss how Nepal's economic polices ought to change to reduce the economic impact of this and similar future disasters. We will focus on how to achieve economic recovery, financial stability and fiscal sustainability, and bring back business confidence to increase employment and productivity. This session will be organized in collaboration with the National Planning Commission of Nepal.

Coordinators

Dr Biswo Poudel
Senior Economist, Nepal

Mr Ranjeet Mahato
Neapolis University Pafos, Cyprus

Program

Session:	P1: COVID-19 Impact on Nepal's Economy & Path to Recovery				
Date/Time:	10 October 2020, 14:30 - 16:30 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators:	Dr Biswo Poudel and Ranjeet Mahato				
Moderator:	Dr Biswo Poudel				
Session Chair:	Dr Yuvraj Khatiwada				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 14:50	Prof Dr Pushpa Raj Kandel	Keynote Speech	Vice Chairman	National Planning Commission, Nepal	Impact of COVID-19 on Planning Target (Short- and Long-Term)
14:50 - 15:15	Prof Dr Shobhakar Dhakal	Invited Talk	Dean	Asian Institute of Technology, Thailand	Challenges and Opportunities Posed by COVID-19 to Achieve Sustainable Development Goals in Nepal
15:15 - 15:25	Nabindra Raj Joshi	Panelist	Former Minister for Industry	Government of Nepal	
15:25 - 15:35	Dr Michael Sarris	Panelist	Former Minister of Finance	Ministry of Finance, Government of Cyprus	
15:35 - 15:45	Dr Binod Chaudhary	Panelist	Member of Parliament and Industrialist	Chaudhary Group, Nepal	
15:45 - 15:55	Dr Upendra Mahato	Panelist	Founding President	Non-Resident Nepali Association (NRNA)	
15:55 - 16:05	Bhim Udas	Panelist	Ambassador of Nepal to Myanmar	Embassy of Nepal to Myanmar	
16:05 - 16:15	Yam Kumari Khatiwada (Baskota)	Panelist	Secretary	Ministry of women, children and Senior Citizen, GoN	
16:50 - 16:30	Dr Yuvraj Khatiwada	Concluding Remarks	Former Finance Minister	Government of Nepal	
ICC Representative	Kumar Panta	Vote of thanks	President	NRNA	

Abstracts

Impact of COVID-19 on Planning Target (Short- and Long-Term)

Pushpa Raj Kandel
National Planning Commission, Nepal

The Non-Resident Nepali Association has been a long-standing partner in steering the development process of Nepal. The Constitution of Nepal has the provision of Non-resident citizenship that guaranteed the economic, social and cultural rights in accordance with the Federal law. Likewise, the state's policy of the constitution relating to economy, industry and commerce as well as the 15th periodic Plan's operating policies have focused on utilizing the knowledge, skill, technology, and capital of the nonresident Nepalese in the national development.

The COVID-19 pandemic has adversely impacted the people's life and the country's economic condition. This has also increased vulnerabilities disproportionately in the informal labor market, Small and Medium Entrepreneurs (SMEs), trade, tourism and aviation sectors among others.

In order to address these challenges, the Government of Nepal has launched various relief measures to help the ones in need such as the daily wage workers, economically disadvantaged and vulnerable segments of the society through measures such as the Prime Minister's Employment Program, interest subsidy, relaxation on lending to the private sector, refinancing facility etc. In order to achieve the goals and targets set by the 15th Plan as well as the Long-Term Vision of Nepal, it is important for us to deliberate on how to mitigate the adverse impacts caused by the pandemic. It is especially crucial as we have completed 5 years of implementation of the 2030 Agenda for Sustainable Development since its inception in 2015.

I'm hopeful that this convention will be able to bring together experts of various disciplines from across the country, the Nepali diaspora and international communities to explore Nepal's needs for expertise to help the country move towards a sustainable development. The immense benefits of the diaspora's knowledge, technical knowhow and investment will aid in the revival of Nepal's economy and achievement of the high growth trajectory.

Challenges and Opportunities Posed by COVID-19 to Achieve Sustainable Development Goals in Nepal

Shobhakar Dhakal
Asian Institute of Technology, Thailand

The ongoing COVID-19 pandemic has impacted humankind worldwide and has affected multiple sectors. Developing countries like Nepal are suffering the most from this pandemic economically and otherwise, which is set to slow down and even reverse the progress made in achieving Sustainable Development Goals (SDGs). While we expect this crisis to have antagonistic relations with many SDGs, it may also have synergistic associations with a few of them. This study aims to understand these relationships through a rapid assessment of the potential impacts of COVID-19 pandemic on SDGs in short-term (now and within a year), mid-term (within the next five years), and long-term (by 2030) in the context of Nepal. We based our study on the co-creation of knowledge with local experts from sectors including academia, civil society, governments, grassroots and international organizations, and businesses. The knowledge co-creation process involved following five steps: online survey, online workshop, assessment of expert opinions, review and validation from experts, revision, and synthesis. Our findings suggest that the COVID-19 pandemic has negatively impacted achievement of most SDGs in Nepal. However, many of these impacts may subside in the mid- and long-terms. Additionally, the pandemic has also provided a window of opportunity for reflecting on past and for future sustainable transformations. The key challenges posed by the pandemic in Nepal are: slowdown of economy, increased underemployment and unemployment, diluted focus and funds of government on other issues, disturbances on existing services and supply chains, travel restrictions, and potential reduction in financial and technical support from development partner countries. The transformative opportunities provided by the pandemic are: window for economic transformation, raised awareness, reverse migration and brain gain, empowerment of local government, self-sufficiency and self-reflection, and use of information and communication technologies (ICTs) and digitalization. In summary, more research and evidence are required to identify, utilize, and implement the transformative opportunities. In context of Nepal, evidence-based policy making is crucial for sustainable transformation and thus achieving national aspiration of "Prosperous Nepal and happy Nepali". This study is based on pro bono public initiative without any formal funding by a consortium of Nepali experts.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

P2: Preparedness for Pandemic and Natural Disaster Risk Management

9-11 October 2020

Online Event

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P2

Preparedness for Pandemic and Natural Disaster Risk Management

Nepal has been facing challenges of COVID-19 global pandemic which has created one of the unique situations in our lifetime. The country has been fortunate to have reported a little over 10 thousand sporadic cases with a couple of dozen lives lost by 5 months after the first case reported (June 25), when the global confirmed cases had surpassed nine million and the loss of lives inching closer to half a million. Back then, the country had most opportune time to learn from the experiences of full-fledged pandemic crises in other countries to restructure its public health system for fighting against any potentially devastating contagion or natural disaster. The most ideal preparedness for a developing country like Nepal would be to have an integrated plan in place to form a permanent organizational structure to collate and mobilize resources, implement well planned programs and projects, and evaluate the outcomes and impacts on global Nepali community. The purpose of this plenary session is to carry out assessment of public health response to the current pandemic crisis as a case to learn the lessons from, in order to envision and put in place a fully functional structure of public health system in the face of future pandemic crises or natural disasters.

Coordinators

Dr Drona Rasali
British Columbia Provincial Health Services Authority, Canada

Dr Puru Shrestha
NRNA High Level Committee on Corona Pandemic Mitigation, USA

Program

Session:	P2: Preparedness for Pandemic and Natural Disaster Risk Management				
Date/Time:	10 October 2020, 09:00 - 11:00 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators/ Moderators:	Dr Drona Rasali and Dr Puru Shrestha				
Session Chair:	Dr Gangalal Tuladhar				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:10	Dr Gangalal Tuladhar	Session Chair	Former Member of Parliament	Parliament of Nepal	Introductory Remarks after a Welcome by the Coordinators
09:10 - 09:25	Dr Archana Shrestha	Invited Talk	Associate Professor	Kathmandu University, Nepal	Epidemiology of COVID-19 in Nepal: Opportunities and Challenges
09:25 - 09:40	Dr Sanjeev Sapkota (Presenter), Dr Drona Rasali, Dr Puru Shrestha	Invited Talk	NRNA High Level Committee on Corona Pandemic Mitigation	Non-Resident Nepali Association (NRNA)	Nepal's Response to COVID-19 Pandemic and Natural Disasters and Public Health Preparedness
09:40 - 10:00	Dr Badri KC (Presenter), Dr Kush Shrestha (Presenter), Kumar Pant, Dr Hem Raj Sharma, Dr Sanjeev Sapkota, Dr Alini Subedi, Dr Drona P. Rasali, and Dr Puru Shrestha	Invited Talk	NRNA High Level Committee on Corona Pandemic Mitigation	Non-Resident Nepali Association (NRNA)	NRNA Disaster and Risk Management and Emergency Preparedness in the Context of Nepal's Response to Pandemic COVID-19
10:00 - 10:25	Dr Sudha Sharma	Keynote Speech	Former Secretary, Ministry of Health and Population, GoN	CIWEC Hospital and Travel Medicine Center	Lessons Learned from Pandemic COVID -19 and a Way Forward for Nepal's Health Sector
10:25 - 10:40	Hon. Gagan Thapa	Distinguished Panelist	Member of Parliament	House of Representatives, Nepal	Panelist's Remarks
10:40 - 11:00	Dr Gangalal Tuladhar	Concluding Remarks	Former Member of Parliament	Parliament of Nepal	
ICC Representative	Dr Badri KC	Vote of thanks	Vice President	NRNA	

Abstracts

Epidemiology of COVID-19 in Nepal: Opportunities and Challenges

Archana Shrestha
Kathmandu University, Nepal

The first case of Coronavirus disease 2019 (COVID-19) in Nepal was reported on January 23, 2020. As of September 16, 2020, 57,787 cases and 371 deaths with an upswing trend. The gender distribution is skewed towards males - 75% of cases and 72% of death are among male. The national case fatality rate is at 0.65%, however the fatality is higher with older age groups with 19% among 85 years and older. The major strengths of Nepal Government's COVID-19 response include border closures; countrywide lockdown; activation of incidence command system; decentralized contact tracing; enforcement of isolation and quarantine system; and population-wide risk communication. The major challenges include: disconnect between local governance, health security, and social welfare; rapidly changing dynamics; and inadequate capacity of health system. As the effect of COVID-19 is expected to persist longer, the Government of Nepal should build the nation-wide capacity in addition to decentralized decision making for locally relevant response strategies.

Nepal's Response to COVID-19 Pandemic and Natural Disasters and Public Health Preparedness

Sanjeeb Sapkota, Drona Rasali and Puru Shrestha
NRNA High Level Committee on Corona Pandemic Mitigation

Disease epidemics and natural disasters can occur with hazards of large magnitude resulting in serious negative impacts on health and wellbeing of the people that calls for declaration of a public health emergency.

Nepal with one confirmed case joined nine countries in the global map spotting confirmed cases on January 25, when WHO reported a total of 1,320 confirmed cases globally for the epidemic of the disease caused by SARS-COV-2, a novel Coronavirus (then named 2019-nCoV), with the majority of the cases (1,297) reported in China. Rasali (2020) narrated the interesting situation of the country for initial two months, reporting that by March 23, when the global total for the disease surpassed 300,000 confirmed cases with the loss of over 14,000 lives in some 195 countries, Nepal was fortunate to still remain with the same lone case, which was fully recovered, and understandably, this exceptional status did not reflect the magnitude of the global crisis taking the shape of a full-blown global pandemic by that time. Lately, the disease has spread all over Nepal, with a rapid increase in the number of new cases and deaths, which gives an alarming sign in the low-income country with an inadequate healthcare system (Panthee et al., 2020). An overview of the distribution patterns and early epidemiological features of confirmed cases was provided by Dhakal and Karki (2020), reporting that the majority of the cases confirmed in Nepal were of younger age, with males 92% and only 8% as females. Subsequent to this initial development, the COVID-19 pandemic, a public health emergency of unprecedented global scale, has given us the first-hand experience how it can impact on not just health outcomes, but practically wide range of aspects of human life, communities, countries and the world. A system of coordinated, effective and resilient preparedness for responding to such public health emergencies is necessary for countries.

There are several frameworks of Public Health Emergency Preparedness (PHEP) reported globally and especially from Americas and Europe. We reviewed two such frameworks relevant in the context of Nepal- i) a Strategic Framework for Emergency Preparedness from World Health Organization (WHO, 2017) that encompasses elements of governance, capacities and resources, and ii) a resilience promoting PHEP from Canada (Khan et al., 2018, BMC Public Health, 18:1344) the latter comprising one cross-cutting element (governance & leadership) and 10 elements (planning process, collaborative networks, community engagement, risk analysis, surveillance & monitoring, practice & experience, resources, workforce capacity, communication, and learning & evaluation), with ethics and values placed as its core principles. In this paper, we discuss assessing the current COVID-19 pandemic response and propose a framework adapted for the preparedness future health emergencies. We are proposing to develop a framework that can be effectively operational in Nepal, adapting elements from the literature framework as well as their relevance to, and usefulness in the context of Nepal's response to current COVID-19 pandemic and future health emergencies. While all of the foundational elements are common to both frameworks, a clear distinction between governance and leadership and an emphasis of ethical values as the core principles, which are additional characteristics of the former, are much needed for improvement from the current state in Nepal. Accordingly, we are proposing a framework for Nepal, adapted from Khan et al. (2018), making some recommendations for further discussion in the development an effective and operational PHEP in the country for mitigating public health emergency both during epidemics/pandemic and natural disasters.

NRNA Disaster and Risk Management and Emergency Preparedness in the Context of Nepal's Response to Pandemic Covid-19

Badri KC, Kush Shrestha, Kumar Pant, Hem Raj Sharma, Sanjeev Sapkota, Alini Subedi, Drona P. Rasali, and Puru Shrestha

High Level Committee on Corona Pandemic Mitigation, Non-Resident Nepali Association (NRNA)

The Novel "Global Pandemic" COVID-19 has created an enormous impact on public health, global economy, nervousness in global and local communities and social activities. Nepali diaspora community especially migrant workers and students in India, Middle East, Malaysia are badly affected by the pandemic.

Non-Resident Nepali Association (NRNA) as the sole organization which brings the global Nepali Diaspora together, being deeply concerned about the health, well-being and livelihoods of all Nepali people living both in Nepal and abroad, is responding to mitigate the pandemic crisis at various levels. In order to integrate all its efforts made at various levels and also to align them with the nation-wide responses made by the Government of Nepal and other levels of governments as well as all other sectors through a well-thought out strategic plan, the NRNA-ICC has formed a High-Level Committee on Coronavirus Pandemic Mitigation Response. The Global Health Team of the NRNA High-Level Committee swiftly initiated public health awareness and education programs on pandemic across the world followed by fund raising and Relief, Repatriation and Rehabilitation (RRR) mainly focusing on migrant workers, students and temporary visitors. The presentation will include success, hurdles and way forward.

The strategic plan foresees a situation where health emergencies of various forms will be happening continuously over time, such as during large devastating earthquake, disease epidemic, floods, landslides, and other natural as well as anthropogenic calamities, which are not uncommon in Nepal. Therefore, the Committee proposes to form **a more permanent organisational structure** to collate and mobilize resources, plan and implement programs and projects, and evaluate the outcomes and impacts on global Nepali community both in Nepal and abroad. An organisational structure and its function are proposed to support and execute the strategic plan.

The purpose of this this presentation is to carry out assessment of public health response to the current pandemic crisis as a case to learn the lessons from, in order to envision and put in place a fully functional structure of public health system in the face of future pandemic crises or natual disasters.

In addition, the presentation will review role of GoN, Disaster Management Council and other international agencies and recommend NRNA to create a 'Disaster and Risk Management Committee' to coordinate with GON, WHO, Disaster Management Council, and other international organization like National Critical Care and Trauma Response Centre (NCCTRC), Australia; Nepalese International Rapid Health Assistance Team, NIRHAT and other relevant organizations.

Lessons Learned from Pandemic COVID-19 and Way Forward for Nepal's Health Sector

Sudha Sharma
Former Secretary, Ministry of Health and Population. Government of Nepal

The Context

Nepal has been hugely affected by the Covid-19 pandemic which, in an unprecedented manner, has highlighted various health vulnerabilities. By October 1, 77,817 positive cases for infection have been identified in Nepal, with 498 deaths.

Nepal has continued to strengthen the primary health care system over the last few decades, with significant progress in health status of its people. Average life expectancy has increased significantly, from about 41 years in 1971 to over 70 in 2015. Nepal achieved the Millennium Development Goal (MDGs) 4 of reducing child mortality, and nearly attained all the other health MDGs.

The government provides primary health care free to all the citizens, and has scaled up the social health insurance programme for higher levels care to nearly 50% of the 77 districts. Despite this, out of pocket expenses for health care remains high, reaching more than 55% of total health expenditure.

Nepali laws provide the Federal government responsibility for policy making, monitoring and quality control, and management of specialized hospitals.

The Provincial levels are responsible for first referral facilities like district hospital and sub regional hospitals, for supervision and monitoring and training of local level staff. Local level is most important for service delivery from its over 7000 outlets and their direct accountability to people.

While Nepal moves towards achieving the sustainable development goals, prioritizing maternal, newborn and child health issues, infectious diseases, non- communicable diseases, mental health issues and malnutrition, it also needs health services that are robust enough to deal with natural disasters and other emerging and reemerging diseases that pose serious threats to sustainability and quality of services.

During the midst of Covid 19, the government released its plan and budget for the fiscal year 2020/21 (2077/78). Health sector budget, NPR 9.6 Billion (6.5% of total) has increased significantly compared to last f/y, NPR 6.8 Billion (4.48% of total). There are a few good initiatives such as the formation of Department for Disease Control, but the programme and budget have not been specifically allocated addressing the gaps noted in the health care system.

Covid-19 has highlighted various gaps in the health care system, especially regarding surveillance, quarantine, contact tracing, coordination and capacity of healthcare facilities.

This paper will specifically focus on issues that are relevant to equitable and resilient health systems that can rise to effectively address challenges posed by various vulnerabilities and emergencies to which the country is prone, including disasters and pandemics of the scale that Nepal witnessed in 2015 earthquake and currently in the Covid-19 Pandemic.

Successes and Challenges Identified During Covid-19 in Nepal

During the Pandemic Covid-19, Nepal has demonstrated that successes can be achieved when the local government is more accountable and able to coordinate better, and where health facility infrastructures are relatively better. Many good examples of the Federal and Provincial governments were noted in terms of mobilizing resources and seeking cooperation from partners.

Challenges were noted primarily in disease prevention activities, provision of equipment including personal protective equipment, health workforce management and their capacity, physical infrastructure, private sector engagement, and sustaining the provision of non-Covid-19 related health services, among others. Inadequate leadership at various levels, allegation of corruption and misinformation to people compounded the problems in many areas.

Way forward

The paper recognizes many successes Nepal has achieved in the health sector, and recommends further strengthening them in the future as well.

Effective Public health leadership is key to identifying the problems and managing them timely, equitably and in a cost-effective manner. The paper proposes restructuring of the health care system with the formation of Public Health Department (PHD) at the Federal and Provincial levels, with highly qualified epidemiologists equipped with state-of-the-art technologies. It will be important to further strengthen health governance at the 753 local government levels.

The Nepal Health Sector Strategy for the next five years (2021-2026) should continue to focus on Equity, Quality, Health System strengthening, but must also strengthen disease prevention , with epidemiological investigations, both on communicable and non-communicable diseases.

The grass roots level health facilities must be further strengthened with adequate staffing and infrastructure so that the overloaded referral facilities are decongested and better able to maintain and enhance service quality.

Strengthening manufacturing of medicines and supplies in the country must receive due priority, and private sector partnerships must be further strengthened, with more effective monitoring, among others.

Covid-19 has posed an unprecedented challenge, not just for Nepal but for the whole world. But it has also vividly highlighted the need for more robust systems and taught us how those can be achieved. We must utilize every opportunity to learn from the past and move effectively into the future.

2Nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

P3: Science, Technology & Innovation Policy Implementation

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

P3

Science, Technology & Innovation Policy Implementation

Discussions in this plenary session comprise three key aspects: Nepal's Science, Technology and Innovation (STI) policy, existing environment of doing scientific research in Nepal and excellence in Science. The plenary speakers will not only highlight the current policies and practices in STI in Nepal but also provide insights on fostering excellence in science. Government of Nepal promulgated STI policy in 2019. It has incorporated many aspects for mainstreaming STI for national capacity building and overall prosperity. The proposed plenary will present the audience a comprehensive picture of the opportunities explored in the policy document, possible challenges of its implementation, and collaborative role of Non-Resident Nepalese diaspora for knowledge sharing, technology transfer, and overall capacity building of Nepali STI sector. In recent times, there is a small trend of returning of Nepalese scientists in Nepal from overseas and these returnees are conducting research through startups. Speakers will share their knowledge and experience on the barriers and enablers of doing science and research existed in Nepal. Like socioeconomic sectors, Nepal's STI is also lagging behind while Nepalese scientific diaspora communities are doing excellent world-class science. In this context, the plenary session will discuss on fostering best practices and excellence in science in Nepal and the role of diaspora communities in enhancing science excellence in Nepal.

Coordinators

Dr Uttam Babu Shrestha
Global Institute for Interdisciplinary Studies, Nepal

Dr Suresh Kumar Dhungel
Nepal Academy of Science and Technology, Nepal

Program

Session:	P3: Science, Technology & Innovation Policy Implementation				
Date/Time:	10 October 2020, 11:30 - 13:30 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 2324 7938)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators/ Moderators:	Dr Uttam Babu Shrestha and Dr Suresh Kumar Dhungel				
Session Chair:	Dr Sanjay Sharma				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
11:30 - 12:00	Dr Dinesh Raj Bhuju	Key Note Speech	Academician	Nepal Academy of Science and Technology	Nepal's Science Policy Implementation No Wait at a Crossroads
12:00 - 12:15	Dr Ram Chandra Poudel	Invited Talk	Senior Scientist	Nepal Academy of Science and Technology (NAST)	Implementation of Science, Technology and Innovation Policy 2019: A Preliminary Assessment of Challenges in Government Organizations
12:15 - 12:30	Dr Basant Giri	Invited Talk	Senior Scientist	Kathmandu Institute of Applied Science	Non-governmental and Non-academic Research Institutions in Nepal: Challenges and Possible Solutions
12:30 - 13:30	Dr Ambika Adhikari	Panelist	Principal Planner	City of Tempe, Arizona, USA	
	Prof Dr Binil Aryal	Panelist	Head/Central Dept. of Physics	Tribhuvan University, Nepal	
	Prof Dr Bal Chandra Luitel	Panelist	Professor/Department of STEAM Education/ School of Education	Kathmandu University, Nepal	
	Dr Prativa Pandey	Panelist	Founder and CEO	Catalyst Technology Pvt. Ltd.	
	Dr Anindita Bhadra	Panelist	Co-Chair	Global Young Academy, Indian Institute of Science Education and Research Kolkata Department of Biological Sciences	
	Dr Sanjay Sharma	Concluding Remarks	Secretary	Ministry of Education Science and Technology, Government of Nepal	
ICC Representative	Dr Hem Raj Sharma	Vote of thanks	General Secretary	NRNA	

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Nepal's Science Policy Implementation No Wait at a Crossroads

Dinesh Raj Bhuju
Nepal Academy of Science and Technology

The world is passing through the peril of the Covid-19 pandemic and Nepal is never an exception. As the infection cases surge in the region, its economic growth is estimated to contract sharply to 2.1% in the FY 2020-21. The health inequalities, educational disparities, and *social* disruption have already surfaced with three in five have lost their jobs that are dominated by an informal economy. Rather than waiting for normality under uncertainties, Nepal should bank on its science mass that has already reached the critical number of making change, and rapidly strengthen the existing structure under provincial networks. A belief in science is the only solution to today's paranoia and looming impacts on poverty levels.

Nepal unveiled the National Science, Technology, and Innovation Policy 2019 amid a celebration of national science day last year. Formulated in tune with the nation's new constitution, the policy highlights the role of science and technology as a powerhouse in social transformation and economic prosperity. Nepal's NSTI Policy is seen as a parasol that strategically links and highlights the various sectors such as agriculture, forests, environment, health, energy, infrastructure, communication, etc. towards fulfilling the sustainable development goals. The policy aims at fulfilling two-pronged objectives: development of science and technology and its utilization towards national development by sustainable use of natural resources and contributions to disaster risk reduction, industrialization and national security.

The NSTI Policy 2019 has proposed the development of 1) international research center for high altitude sciences, 2) science learning and innovation centers in each municipality, 3) multidisciplinary reference laboratory, and 4) national science fund. The policy has proposed special projects to retain talents, post-doc programs, development of linkages between industries and academia involving private organizations. It has called for putting the scientific research and technological innovation on top priority and proposed to attain 1% GERD (gross domestic expenditure on research and development) in two years of its implementation. The policy has also stressed on the need to create a conducive environment to make the talents of this sector more proactive and inspiring.

In general understanding, a policy is a statement of intent and is implemented as a protocol. The NSTI Policy 2019 of Nepal is the third such policy since the first was adopted in 1989 and the second in 2005. The two earlier policies could not fulfill their promises as they were sidelined by political turmoil and the government's fluctuating priorities. Not a single meeting of the council, envisioned by the policy, was convened let alone there was a review of the policy. In the case of the NSTI Policy 2019, a council has been formed and its meeting has directed to constitute an implementing taskforce. The activation of the policy has become more important to boost research and innovation in combating the pandemic at present and reinvigorating the economy in the long run.

Implementation of Science, Technology and Innovation Policy 2019: A Preliminary Assessment of Challenges in Government Organizations

Ram Chandra Poudel
Nepal Academy of Science and Technology (NAST)

Nepal has formulated three policies on science and technology in the past 32 years. In the latest policy of 2019, innovation has also been incorporated following an approach taken globally by other least income countries. Sixth five-year plan (1980-1985) was the first to recognize the importance of science and technology for national development. Both the first and second science and technology policies were hardly implemented. National Science, Technology and Innovation Policy, 2019 is at the initial stage of implementation. The policy has envisioned scientific and technological interventions necessary in different sectors viz. agriculture, education, forestry and environment, health, communication, e-governance, security etc. Ministry of Education, Science and Technology (MoEST), in this regard, should have ability to lead all of these cross-cutting sectors, which does not seem possible because of government's priority to S&T sector of this ministry, fund it receives and its role in decision making process. Scientists and technologists in Government Research Institutions (GRIs) are guided by civil service rules, financial regulations and procurement guidelines. These rules and regulations are focused to regulate and manage general administration and provide quality service to people. Such regulatory instruments do not have clear mechanisms to promote, boost and encourage scientific researches and innovations in the organization. Moreover, Public Service Commission, responsible for promotion and recruitment of new staff; is adopting traditional evaluation methods through, which dedicated researcher having specific knowledge in advertised subject could not get through the test. Nevertheless, inability to place competent and passionate leadership, limited budget provided to research institutions and academia, and their poor institutional framework for science, technology and innovations are additional challenges in the implementation of STI policy 2019.

Non-governmental and Non-academic Research Institutions in Nepal: Challenges and Possible Solutions

Basant Giri
Kathmandu Institute of Applied Science

Non-governmental and non-academic research institutions play an important role in expanding the scope of research and innovation. The number of research and innovation-based organizations that represent active and productive group of researchers, are increasing in Nepal in recent years. These organizations contribute by strengthening the research capacity, creating jobs, engaging with industry and partnering with other similar institutions globally, among others. However, proper policies and implementation of existing policies to create appropriate ecosystem for such research organizations are lacking. Many other issues including lack of legal framework to accommodate and recognize non-governmental and non-academic research organizations, infrastructure, research funding, patent filing system, lack of expert workforce and collaboration culture, either individually or synergistically aggravate the research and innovation ecosystem situation in Nepal. The 2019 Science, Technology and Innovation (STI) Policy of Nepal has recognized several these existing problems and challenges in this sector. However, we still yet have to see the implementation of the STI policy 2019. In my talk, I will discuss the challenges of establishing a well-functioning research organization in Nepal and will also provide few major suggestions to make the research and innovation ecosystem better.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

P4: Research, Innovation & Commercialization

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

P4

Research, Innovation & Commercialization

Research, Innovation & Commercialization plenary session will cover a range of topics aligned with to the federal government's strategic policies and programs on Science and Technology for knowledge-based economy, and their implementation in the current three levels of government structure. The session aims to cover areas on research, innovations, startups, technology transfer, product development and commercialization. The presentations and deliberations will also focus on federal funding and grants to research enterprises and startups, intellectual property, strategic partnership between public research institutions, universities, and industries, inter disciplinary collaborative approach and linkages locally and globally. The session will put emphasis on innovations of the indigenous technologies and products.

Coordinators

Dr Raju Adhikari
Royal Melbourne Institute of Technology University, Australia

Dr Rameshwar Adhikari
Research Centre for Applied Science and Technology, Nepal

Program

Session:	P4: Research, Innovation & Commercialization				
Date/Time:	09 October 2020, 14:30 - 16:30 (Nepal Standard Time)				
Room 2	https://bit.ly/33kL4oe (972 23247938)			Passcode:	nrna2020
Coordinators/ Moderators:	Dr Raju Adhikari and Dr Rameshwar Adhikari				
Session Chair:	Dr Sunil Babu Shrestha				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 14:50	Dipak Gyawali	Keynote Speech	Former Minister	Ministry of Water Resources	Reflecting on the Context of Innovation and the Conditions that Allow Its Flowering
14:50 - 15:05	Dr Pramod Paudel	Invited Talk	Research Director	University Grants Commission	Higher Education and Research in Nepal: An Overview
15:05 - 15:20	Ram/Lakxman Rimal	Invited Talk	CEO	RamLaxman Innovation	Commercialization of Intellectual Property in Nepal
15:20 - 15:35	Dr Raju Adhikari & Dr Rameshwar Adhikari	Invited Talk	NSFT Coordinator /Executive Director	NRNA-NSFT/ Research Centre for Applied Science and Technology (RECAST)	Knowledge Investment through Collaboration and Start-up
15:35 - 16:20	Mahabir Pun	Panelist	Chairperson	National Innovation Center	
	Dr Bijaya Pant	Panelist	Professor	Central Dept of Botany, Tribhuvan University	
	Dr Tshering Lama	Panelist	CEO	Idea Studio Nepal	
	Dr. Dovan Rai	Panelist	Research Fellow	Global Institute of Interdisciplinary Studies (GIIS)	
16:20 - 16:30	Dr Sunil Babu Shrestha	Closing Remarks	Vice Chancellor	Nepal Academy of Science and Technology (NAST)	
ICC Representative	Sonam Lama	Vote of thanks	Vice President	NRNA	

Abstracts

Reflecting on the Context of Innovation and the Conditions that Allow Its Flowering

Dipak Gyawali
Pragya (Academician) Nepal Academy of Science and Technology (NAST)

While innovations result from the genius of dedicated and hard-working individuals, equally important is a conducive social climate. Drawing on insights from Philosophy of Science and also the Sociology of Technology as well as from Cultural Theory (i.e. the neo-Durkheimian Theory of Plural Rationalities), this presentation will first examine the broader global context of research and innovation, including small "garage" science versus big "national lab" science. It will then see what that means, both in policy and practice, for science and innovation promotion in Nepal, including in the education sector.

Higher Education and Research in Nepal: An Overview

Pramod Poudel
Research Division, University Grants Commission (UGC), Sanothimi, Bhaktapur, Nepal

Higher Education is a very important sector for development of the country. One of the major goals of Government of Nepal's National Education Policy (NEP)-2076 is to develop internationally competent, scientific, innovative human resource by providing access to higher education and promoting quality leadership for building knowledge-based society and economy. As an apex body of higher education, University Grants Commission (UGC), is responsible for implementing national policies and priorities in Higher Education through allocating funding and promoting research. It also monitors the activities of Higher Education Institutions (HEIs) in the country. National Planning Commission in its 15th Development Plan has identified ten priority areas (energy, transportation, tourism, forest, health, environment, agriculture, urban development and foreign employment and social development) for research and development. NEP has emphasized making research and innovation relevant to the national priority needs and at par with international trends and practices. Based on the innovation driven growth listed by Global Innovation Index, Nepal is at the 95th position as of 2020. This ranking indicates that the research and innovations are still lagging behind and thus need upgrading. Nepal is ranked at the 17th position compared to other Asian countries and the 91st position worldwide, in terms of number of research documents published for the period of 1996-2019. According to Times Higher Education World University Ranking (2021), Tribhuvan University is ranked between 801-1000. The research outputs of Nepal is just 28 (the highest i.e. 57.2% in Earth and Environmental science) between the 1st November 2018-31st October 2019 tracked by Nature index. This suggest that Nepali HEIs need to improve the quality of research for the publication in high-ranked journals and increase efforts for further commercialisation of research outputs. According to World Intellectual Property Organisation (WIPO) country's statistical profile, Nepal has registered just 108 patents (data from 2011 to 2017 AD), which is very low compared to developed countries. It is noted that scientific innovations should be associated with patenting for securing commercial and other benefits. Some hindering factors in conducting research in Nepal could be due to lack of funding, lack of research mind-set and culture and lack of attraction and research trainings among the University teachers.

Commercialization of Intellectual property in Nepal

Ram Prasad Rimal
Ramlaxman Innovation and Technology Sales Pvt Ltd., Kathmandu, Nepal

The societal development in the current era, including developed and developing nations alike, is innovation-driven powered by creativity, knowledge, and technology which need to be protection as assets. Intellectual property rights (IPR) can help to secure such innovations as property and also can be beneficial as in in case of other tangible assets. Thus, it is one of the pillars of the modern economy at the national level and an important catalyst for development. It is a very important tool for sustainable development especially for least developed countries like Nepal. In Nepal, even though the policy was formulated long ago, it is still not established well in the industrial/ academic field. We are far behind talking to the registration of IPR and for the implementation, there are no noticeable cases of commercialization of intellectual properties. When talking to the patent right there is no single case of trading. Specifically, more empirical evidence is required to better understand the impact of IPR and its commercialization. Our universities and different educational academies should have the priority to harness new technology, help to implement them in the Nepalese market. In the given context, Ramlaxman Innovations is trying to make a milestone by the commercialization of different intellectual properties, for example through patent rights and copyrights which aims to drive the young entrepreneur into IP commercialization platform.

Diaspora R & D Collaboration

Raju Adhikari

Nepal Science Foundation Trust (NSFT), Science Knowledge and Technology Transfer (SK&TT) Department, NRNA

Rameshwar Adhikari

RECAST, Tribhuvan University

Nepal slow progression and adaptation to science and technology (S & T) in the last six decades has been one of the major causes of the country's current S & T status quo.

Lately Nepal's Government policy and coordinated efforts by establishing the Nepal Academy of Science and Technology (NAST,). Nepal Agricultural Research Council (NARC) and the National Planning Commission Science Department, Ministry of Environmental Science and Technology (MoEST) is commendable but due to lack of resources, funds, and collaborations S&T future is still in the struggling phase.

NRNA knowledge investment initiative since 2009 through flagship project like Open University of Nepal (OUN)[1], Nepal Science Foundation Trust (NSF) and MoUs with NAST and RECAST to promote bilateral technical cooperation were welcome steps in this direction. Lately, several diaspora scientists have returned from overseas and setup start-up companies and looking for opportunities to work closely with the S&T organization and industry sectors to commercialize their invention. The Government S&T policy is not very clear on such start-up ventures and protection of invention through IP management. There is a strong need that Government establishes a separate innovation funds jointly with NRNA to support and promote knowledge investment initiatives.

We will present an overview of NRNA initiatives and examples of start-ups and discuss measures needed to promote and safeguard such investment.

Reference

1. https://en.wikipedia.org/wiki/Nepal_Open_University

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S1: Agriculture and Food Security

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S1

Agriculture and Food Security

Challenges of providing adequate, safe and nutritious food to everyone is a global issue. Over 50% of households in Nepal are reported as food insecure and one-in-three households were either mildly or severely food insecure in 2017. Nepalese agriculture has several issues, such as soil nutrient losses by erosion and nutrient mining, scarcity of water for irrigation, mismanagement of natural resources, loss of biodiversity, inadequate supply of agrifood seeds and animal genetic materials, and lack of improved technology-based farming. Further, agriculture is marred by shortage of labor force due to out-migration, resulting in feminization of agriculture and land abandonment. Despite these challenges, agriculture has a major role to play to solve food and nutrition problems. The planned symposium will bring together agricultural and allied experts from Nepal and globally to share their experiences, and discuss possible policy initiatives to reduce food and nutrition insecurity problems in the country.

Coordinator

Dr Jagadish Timsina
University of Melbourne, Australia

Program

Session:	S1: Agriculture and Food Security				
Date/Time:	09 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)		Passcode:	nrna2020	
Zoom Support	zoomsupport@nrna.org				
Coordinators:	Dr Jagadish Timsina				
Moderator:	Dr Kedar Adhikari, Senior Plant Breeder, University of Sydney; Kiran Ojha, Lutheran World Relief, Nepal				
Session Chair:	Dr Dil Bahadur Gurung				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:03	Dr Jagadish Timsina	Coordinator	Honorary Professor	University of Melbourne/ NEPAFE President	Symposium Introduction & Background
09:04 - 09:06	Dr Dil Bahadur Gurung	Session Chair	Member-Agriculture, National Planning Commission	National Planning Commission, Nepal	Introduction to Session 1
09:07 - 09:21	Dr Bimala Rai Paudyal	Invited Talk	Member of National Assembly	Federal Parliament, Upper House, Nepal	Impact of COVID-19 on Agriculture and Food Security in Nepal: Lessons and Implications
09:22 - 09:36	Dr Hari B. KC	Invited Talk	Joint Secretary	Federal Ministry of Agriculture and Livestock Development	Federal Government's Policies, Priorities and Strategies for Food and Nutrition Security: Opportunities and Challenges for Implementation
09:37 - 09:51	Dr Peetambar Dahal	Invited Talk	Seed Scientist (Retd.)	University of California, Davis, USA	Anti-nutrient Minimizing IPM and Dry Chain Technologies Complement Disaster Preparedness, Agrobiodiversity, Food, Nutrition and Health Security and Hunger and Poverty Alleviation
09:52 - 10:06	Dr Devendra Gauchan	Invited Talk	National Project Manager	Bioversity International, Nepal	Mainstreaming Agrobiodiversity for Sustainable and Nutrition Sensitive Agriculture Development in Nepal
10:07 - 10:17	Dr Megha N. Parajulee	Invited Talk	Professor	Texas A&M University, USA	Role of Association of Nepalese Agricultural Professionals of Americas on Agricultural Transformation in Nepal
10:18 - 10:28	Dr Drona Rasali/ Dr Prem Bhandari	Contributed Talk	Director/Professor	Population Health Surveillance & Epidemiology at the British Columbia Centre for Disease Control/University of Michigan, USA	NAPA Book Launch
10:29 - 10:55	Panel Discussion on MUNAA Agriculture Market: Scope and Potential From Home to Abroad				

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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
	Yubaraj Gurung	Panel Discussion Facilitator	Chair	MUNAA Project, Nepal	
	Dr Yogendra Karki	Panelist	Joint Secretary	Federal Ministry of Agriculture and Livestock Development	
	Dr Govinda Rizal	Panelist	Market Expert	Genetic Engineering Seed, Plant, Agri-Tourism & Market	
	Jiwan Prabha Lama	Panelist	Ex DG	Department of Food Technology & Quality Control	
10:55 - 11:00	Dr Dil Bahadur Gurung	Concluding remarks		National Planning Commission, Nepal	General Discussions and Conclusions
11:05 - 11:30	**Break**				
Moderators:	Dr Prem Bhandari, Adjunct Professor- Agriculture & Forestry University (NAPA-USA/Nepal); Dr Purna Kandel, Director-Liam International Corporation (Canada); Tilak Bhandari, Executive Director-Institute of Rubber & Jatropha Research (Nepal/USA)				
Session Chair:	Dr Jagadish Timsina, Dr Bimala Rai Paudyal				
11:30 - 11:32	Dr Jagadish Timsina	Coordinator			Overall introduction
11:33 - 11:36	Dr Bimala Rai Paudyal	Session Chair	Member of National Assembly	Federal Parliament, Upper House, Nepal	
11:37 - 11:50	Prof Dr Madhav Shrestha	Invited Talk	Professor, Aquaculture and Chairman	AFU (Retired) & Center for Aquaculture-Agriculture Research and Production	Fisheries Versus Aquaculture for Aquatic Food Production in Nepal
11:51 - 12:04	Dr Banshi Sharma	Invited Talk	Director General	Department of Livestock	Animal Protein Production and Livestock Development: Issues and Solutions after Pandemic 2020
12:05 - 12:18	Dr Yamuna Ghale	Invited Talk	Independent Consultant	Nepal	Culture and Gender Roles in Promoting Food and Nutrition Security
12:19 - 12:30	Bhola Man Singh Basnet	Invited Talk	Retired Rice Scientist	Nepal Agricultural Research Council (NARC)	Strategies to Stop Rice Import in Nepal

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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
12:31 - 12:41	Tilak Bhandari	Contributed Talk	Rubber Scientist	Institute of Rubber and Jatropha Research-Nepal-Texas, USA	Rubber Farming in Nepal: Current Challenges and Opportunities
12:42 - 12:52	Dr Surya Poudel	Contributed Talk	Research Scientist	University of Veterinary Medicine Vienna, Austria	Current State and Future of Poultry Production with Emphasis on Food Security
12:53 - 13:00	Dr Sita Ram Ghimire	Contributed Talk	Research Scientist	CSIRO, Australia	Introduction to Nepalese Association of Agriculture, Forestry and Environment in Australia (NEPAFE)
13:01 - 13:25	Panel Discussion: Leveraging Export/Import on Industry and Business of High Value Agricultural Products for Economic Prosperity and Food Security				
	Dr Purna Kandel	Panel Discussion Facilitator	Director	Canada-Nepal Business Council and Liam International Corporation, Canada	
	Dr Dinesh Gautam	Panelist	Executive Director	Nimbus Group, Nepal	
	Shanta Baskota Koirala	Panelist	Director	Kanchanjangha Organics	
	Samjhana Dahal	Panelist	Food Scientist	Wilbur Company, USA	
	Pawan Golyan	Panelist		Golyan Group, Nepal	
13:26 - 13:33	Vernon Byrd	Contributed Talk		Kathmandu University	Aquaponics: A New Technology to Help Grow Food in Urban Nepal
13:34 - 13:41	Bishnu Maya K.C.	Contributed Talk		Kathmandu University	Isolation and Characterization of Plant Growth Promoting Rhizobacteria from Bamboo Rhizosphere and their Role on Plant Growth Promotion
13:42 - 13:49	Yadav KC	Contributed Talk		Central Campus of Technology, Tribhuvan University, Dharan	Preparation and Quality Evaluation of Amala (Phyllanthus Emblica L.) Chutney

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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
13:50 - 14:00	Dr Bimala Rai Paudyal	Concluding Remarks			General Discussion and Conclusions
ICC Representative	Rabina Thapa	Vote of thanks	Vice President	NRNA	

Abstracts

Impact of Covid-19 on Agriculture and Food Security in Nepal: Lessons and Implications

Bimala Rai Paudyal
Member National Assembly, Federal Parliament (Upper House) and Former Member, National Planning Commission

The world is observing the impacts of COVID-19 on various sectors in human life, including in agriculture and food security. The risk of food insecurity and malnourishment is growing especially among the poor, women, children and other marginalized groups. The primary risks are at country level where the pandemic has hit hard and stronger measures are taken to combat the spread of COVID-19. Loss of agricultural production, disrupted demand and supply chain, loss of income and affordability to rising food prices will escalate food insecurity, even in the post-pandemic period. Countries, including Nepal, are taking special measures to continue agriculture production and supply chain safely as an essential business to protect the vulnerable from the growing risks of food insecurity.

Although affected and disrupted, the agriculture sector can also be seen as one of the solutions to the crisis. The sector, if backed up by proper government policy, infrastructure and monetary stimulus, can boost up domestic production, generate employment and absorb people displaced from other sectors including those returned from foreign employment. With an analysis of policies, plans and budget of fiscal year 2020-21 as a reference, this paper (presentation) aims to explore the impact of COVID-19 on agriculture and food security in Nepal, identify hot-spots and protection measures to protect the vulnerable. It further explores opportunities brought by COVID-19 in the sector and identifies measures to capitalize them to move towards a sustainable and self-reliant agriculture and equitable food security situation in the country.

Federal Government's Policies, Priorities and Strategies for Food and Nutrition Security: Opportunities and Challenges for Implementation

Hari Bahadur K.C. and Bishnu Hari Devkota
Food Security and Food Technology Division, Ministry of Agriculture and Livestock Development

Nepal has made remarkable progress in the field of food and nutrition security with a noticeable increase in the production of the food grains, strengthened supply and distribution system. The increased production and supply of vegetables, fruits, livestock and poultry products contributed lowering down an alarming food and nutrition crisis in the recent five years. The increased nutritional awareness and increased income of the households has resulted in positive impact on food and nutritional security of the country. However, there are still about 21% households with food insecurity and poverty of which 7.8% are in chronic stage. Natural disasters and climatic factors result in fluctuations in supply of food production. The soaring prices of food items exerts a pressure to invest a huge chunk of consumers' income on purchase of food items. The prevalence of unsafe and unhealthy food is estimated at above 10% in the market. The Constitution of Nepal, the Fifteenth Plan and other periodic plans, the National Agricultural Policy 2003, and the Agricultural Development Strategy (2015-2035) along with the Supply Policy 2069 B.S. are committed to achieve food and nutrition security through increased livelihood and enhanced food sovereignty. The Food Safety Policy 2019 and the Food Sovereignty and Right to Food Act 2018 have been endorsed and implemented in the country. The food Security and Food Quality policy, the Food Safety Bill and the Food Sovereignty and Right to Food rule are now drafted and are in the process of approval in the Parliament. As a solidarity with Sustainable Development Goals, the action plan against Zero Hunger (2016-2025) is now under implementation. The government is further shouldering the international communities to fight against food and nutrition insecurity. Nepal has been involved with SUN (Scaling up Nutrition) Movement to overcome all sorts of malnutrition. It has developed the Multi-Sector Nutrition Plan in 2013, which is under implementation in phase-wise under the leadership of National Planning Commission. Several projects were and are under implementation in the country by the MOALD by the support of development partners for enhancing food and nutrition security. Many bilateral and multilateral partners, donors and international non-governmental organizations including FAO, USAID, etc. are also implementing various projects to enhance food, nutrition and livelihood security in different parts of the country.

Implementation of Toxin Minimizing Dry Chain and Integrated Pest Management Food Technologies Complement Nutrition and Health Security

Sundar Tiwari[1], Ganga Acharya[2], Kshitij Shrestha[2], Suroj Pokhrel[2]; Subodh Pyakurel[3], Meghnath Dhimal[4], Durga Poudel[5], Krishna Belbase[6], Manish Neupane[7], Sunil Aryal[8], Yuga Nath Ghimire[9], Rosina Poudel[10], Gokarna Gharti-Chhetri[11], Santosh Dhakal[12], Meghnath Parajulee[13], Khusi Ram Tiwari[14], Jagadish Timsina[15], and Peetambar Dahal[16]

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[2]Ministry of Agriculture and Livestock Development, Government of Nepal, Kathmandu, Nepal
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[5]Environmental Science Program; University of Louisiana at Lafayette; Louisiana, USA
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[11]Division of Natural Sciences, Palm Beach State University, Florida, USA
[12]Department of Molecular Microbiology and Immunology, The Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA
[13]Cotton Entomology Program, Texas A&M AgriLife Research and Extension Center, Lubbock, Texas, USA
[14]Bayer Crop Science, Mississippi, USA
[15]Global Evergreening Alliance, Melbourne, Australia
[16]Department of Plant Sciences, University of California, Davis, CA, USA

Innocent people in low-and-middle-income countries (LMICs) face silent health crises due to ingestion of natural and artificial toxins through both high and low-moisture nutritious foods impeding efforts to alleviate malnutrition. Nepal Health Research Council reports increasing prevalence of non-communicable diseases illustrating urgency to minimize food toxin exposure. Natural carcinogenic mold toxins (mycotoxins) develop in traditionally stored low moisture foods/feeds along with insect damage and nutrient losses. Such toxins are also transferred to meat and dairy products through feeds affecting human health. Mycotoxins mitigation measures are not being employed by governments and donors as exemplified by annual food losses to floods and partial poor quality of donated foods following disasters. Implementation of Dry Chain protective measures would minimize ongoing 25-30% food losses and improve trade balance. Such technology would minimize natural toxins and improve food/feed and nutrition security during normal and disaster periods.

Artificial toxins are also ingested daily by most people in LMICs due to improper pesticide use in high moisture fruits and vegetables. Despite efforts of health and food sectors to minimize pesticide residues, a drawn standoff occurred at the Nepal-India border in 2019 fearing excess pesticides in imported foods. Implementing Integrated Pest Management (IPM) and use of improved crop varieties provide options to reduce pesticide residues. IPM uses cultural, mechanical, biological and physical methods and soft chemicals to minimize economic, health and environmental risks to the producers and consumers. Independent Agency should monitor several toxins simultaneously in domestic and imported food products to conform to CODEX standards and improve consumer confidence in nutritional products.

The Covid-19 pandemic has further highlighted the role of nutrition to improve immunity and also exemplified that health outcome is crucial in food systems. This is a wakeup call to invest in quality food systems that complement SDG on malnutrition, hunger and poverty alleviation.

Mainstreaming Agrobiodiversity for Inclusive, Resilient and Sustainable Agri-food System Development

Devendra Gauchan
The Alliance of Bioversity International and CIAT, Kathmandu, Nepal

Agriculture and food system policies, programs and projects currently implemented and promoted in Nepal and globally focus on increasing productivity with limited consideration given for holistic, inclusive and sustainable agri-food system development. Consequently, with increasing population and climate change, there is no improvement in the rate of malnutrition, land degradation, environmental pollution and biodiversity loss. Agrobiodiversity – a sub-set of biodiversity, is one of the potential strategies to address these multiple challenges for the development of sustainable agri-food system. This paper aims to present potential options and some experiences of promoting and mainstreaming agrobiodiversity for inclusive, resilient and sustainable agri-food system development by supporting diversified, nutrient rich diets of the people while adapting changing climate and maintaining the health of ecosystems. The data and information source for this study are mainly from the available literatures and data sets with recent experiences and case studies from Nepal and abroad. Diversity of crops, food trees, farm animals and fishery and their traditional varieties and breeds cultivated and raised by small farmers and consumed by people over generations are important components of agrobiodiversity that support dietary diversity, productivity and livelihoods of people in addition to improving ecosystem services. However, the current food system does not reflect the value of external benefits of safeguarding agrobiodiversity created by large number of smallholder farmers in marginal farming systems. Recently markets for agrobiodiversity are expanding rapidly as a result of increasing consumer awareness on healthy and nutritious foods, rising incomes and urbanization. But lack of adequate focus on suitable policy, R&D investment, institutions and infrastructure is limiting the development of biodiverse agri-food system development that meets the needs of food security, nutrition and income needs of rural poor, women and marginalized people in remote and risk-prone environments. Available evidences show that identification, integration and mainstreaming agrobiodiversity in agricultural and rural development programs are critical for developing pro poor holistic and inclusive value chains in sub-comonents of production, processing, marketing and consumption systems. Reorientation of policies, programs, institutions and investment priorities towards biodiverse foods and farming systems can help in mainstreaming agrobiodiversity in different sub-components of value chains to promote resilient, inclusive and sustainable agri-food system development.

Role of Association of Nepalese Agricultural Professionals of Americas on Agricultural Transformation in Nepal

Megha N. Parajulee[1], Lila B. Karki[2], Pradeep Wagle[3], and Ramjee Ghimire[4]

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Association of Nepalese Agricultural Professionals of Americas (NAPA) is a non-profit, non-governmental, non-religious, and non-political professional organization of agricultural and allied sciences. It was founded in 2016 with the mission to foster human welfare and environmental health through scientific and socio-economic innovations, developmental initiatives, capacity building, knowledge sharing, and charitable activities. With the great support and participation from members and well-wishers, NAPA has, within four years of its establishment, evolved as a vibrant and impactful professional organization. NAPA's current programs in Nepal include, but not limited to, research mini-grants for strengthening research knowledge and skills in students and scholars, scholarships for academic excellence, distance teaching/in-person guest lectures at agricultural universities/colleges, expert's roster to facilitate networking and collaboration in research projects, and expert service (teaching, research, policy, extension, and curriculum development) as needed. Current scientific endeavors aim to serve Nepal's agricultural stakeholders, including students, researchers, professionals, policymakers, and producers, through scientific resources such as publication of book, scientific journal, Research and Policy Briefs, and online quarterly newsletter Agri-Connection. NAPA has now published a seminal book on food security - *Principles and Practices of Food Security: Sustainable, Sufficient and Safe Food for Healthy Living in Nepal* - and a scientific refereed journal *Global Journal of Agricultural and Allied Sciences (GJAAS)* is on its second volume. Additionally, NAPA has conducted numerous national and international seminar sessions/webinars and several bilateral discussions mostly in the United States and Nepal to identify the potential areas and possible strategies for cooperation and collaboration. NAPA envisions providing the leadership and scientific resource for Nepal's agricultural growth and sustainability. Therefore, NAPA seeks collaboration and commitment from all relevant institutions and stakeholders to utilize collective strength of expatriates for agricultural transformation in Nepal.

Association of Nepalese Agricultural Professionals in Americas (NAPA) Book- Principles and Practices of Food Security: Sustainable, Sufficient and Safe Food for Healthy Living in Nepal

Drona P. Rasali[1], Prem B. Bhandari[2], Uma Karki[3], Meghan N. Parajulee[4], Ram N. Acharya[5], and Raju Adhikari[6]

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The sustainability, sufficiency, safety, and affordability of healthy foods, rights to access them, and making choices for healthy eating are essential aspects of food security in the 21st century, constituting the critical components of a complex food system in Nepal. Underpinning these principles, the Association of Nepalese Agricultural Professionals of Americas (NAPA) has published its first book, ***Principles and Practices of Food Security: Sustainable, Sufficient and Safe Food for Healthy Living in Nepal***. The 424-page book, launched on August 1, 2020, contains eighteen chapters, including one comprehensive introductory chapter that sets the stage for the scope of this book. The remaining 17 chapters are divided into four broad sections: i) general and socio-economic issues of food security; ii) sustainable agricultural production for food security; iii) food safety regulations, healthy eating, and climate change impacts; and iv) technologies of specialty. Book chapters have been written by 49 authors and co-authors, who have been working for numerous years in areas relevant to food security across the globe. The book is expected to be an excellent resource for everyone with some stake in agricultural and allied disciplines. It is also expected to serve as a food-security compendium for planners, policymakers, decision-makers, implementers, and field-level professionals engaged in governmental, non-governmental, and private-sector organizations. Moreover, farmers; private industries engaged in agricultural and allied sciences; food industries, retailers, and suppliers; faculty and students of food security, food systems, and allied disciplines; and civic leaders, intellectuals, and the society at large will be tremendously benefitted from this book. Further details about the book can be obtained from NAPA's website (http://napaamericas.org/foodsecuritybook.php).

Fisheries Versus Aquaculture for Aquatic Food Production in Nepal

Madhav K Shrestha
Professor, Aquaculture Agriculture and Forestry University and Chairman, Center for Aquaculture-Agriculture Research and Production

Inland fisheries and aquaculture are the resources for aquatic food productions in Nepal. Harvesting and capturing aquatic animals like finfishes, prawns, snails, mussels and crabs are the age-old traditional practices for people living near and around fisheries resources like rivers, lakes, reservoirs, swamps, irrigation canals, irrigated rice-fields, seasonal flood plains. Aquaculture is a relatively new practice, initiated 40-50 years back, in Nepal. Current aquaculture practices are pond culture, cage and pen culture, raceway culture, and the newly initiated aquaponics and biofloc technology. Pond culture technologies are: semi-intensive carp polyculture; intensive culture of chhari culture of naini and rohu; semi-intensive culture of Nile tilapia and polyculture; intensive monoculture of striped catfish; and intensive culture of African walking catfish. The current cage culture technology is extensively used for silver and bighead carps. Raceways culture, an intensive system, is limited to cold water region for Rainbow trout. Aquaponics and biofloc production systems are relatively recent and involve common carp, striped catfish, walking catfish, and lately with mono-sex tilapia.

Captured fisheries data show that they are almost levelled off since last 20 years at around 20,000 to 21,500 mt each year with currently at 21,000 mt, whereas aquaculture production has increased tremendously from about 18,000 mt to 70,800 mt over the same period. Thus, total fish production in the country is estimated at 91800 mt, with share of fisheries and aquaculture of about 23% and 77%, respectively. Estimated fresh fish import is about 9,300 mt besides the import of processed frozen fish. Thus, domestic and imported total available fresh fish is 110,000 mt, making per capita fish availability of 3.4 kg/year. However, fisheries might not have included products like snails, mussels and crabs which are important items of aquatic food products, and supporting the livelihoods of about 420,000 community in aquatic food production.

Animal Protein Production and Livestock Development: Post Pandemic Issues and Solutions

Banshi Sharma
Director General, Department of Livestock Services

Livestock and fishery sectors currently contribute 11% of GDP in Nepal. There is annual production of 2.2 Million MT of milk, 0.38 million MT meat, and 1,760 million eggs in Nepal. There is 95,000 MT of fish production and the country imports 9,000 MT of fish from India and abroad. Though Covid-19 does not affect livestock production directly, it has simultaneous effect on production of meat, milk and eggs, and can break their distribution chain. Their production does not suffer greatly at the beginning, but their marketing becomes difficult leading to decrease in consumption and farmers' income.

About 25% of the country's milk production comes from a formal dairy sector, 30% from an informal sector and 45% from the rural households. Pasteurization of milk and product diversification can be carried out by the formal sector. In the lockdown period, collection of milk by the formal sector increased dramatically even though it was dry period for milk production in Nepal. It led to pile up of skimmed milk powder (SMP) and butter in dairy industries. In terms of meat production, buffalo contributes 55%, pork 10%, chicken 20%, with goat contributing the remaining. Nepal is self-reliant in buffalo, goat, pig and chicken meat production, but chicken price is in a decreasing trend due to reduced consumption. Goat and buffalo production have, however, remained stable though their consumption is reduced due to economic reasons. The goat production is doing well even in these adverse situations. Egg production has been maintained with satisfactory prices even in prolonged lockdown period. On contrary, farmers have been facing big problem in the movement of chicks, birds and live animals, and in getting animal feed and selling their products on time.

There is an urgent need for uninterrupted animal protein supply to each municipality of the country. For this, the government has initiated good animal husbandry practices and value chain mapping for each municipality and supply chain shall be maintained even in pandemic situation with the help of three tier government. To strengthen keeping quality of the products, there should be different capacities of cold storages for butter, SMP, frozen fish and frozen meat products.

Culture and Gender Roles in Promoting Food and Nutrition Security

Yamuna Ghale, Aruna Uprety, and Basudev Kaphle
PhD Scholar on Food Security Governance, AFU; Public Health Expert; and Joint Secretary, MoALD

Nepal is a place of abundant diversity in terms of caste/ethnicity, culture and genetic resources. Food is directly associated with socio-cultural aspects of different communities of Nepal. Food thus resembles different identities. In this respect, women are the repositories of knowledge and skills associated with genetic resource management and ethnicity specific foods. Moreover, food availability and intake practice are associated with the climatic condition in the particular geographical region where they reside. Therefore, food production, management, and consumption practices are shaped by cultural and geography specific practices. Additionally, there are many different food plants that are still not fully uncultivated or under-utilized but have high amount of nutrition. Often these foods are associated with various traditions in diverse communities. It is, therefore, important to understand local culture and festivals, and foods that are used in different functions, which are mainly prepared and served by women. Likewise, there is an importance in documenting the local practices, cooking skills, serving patterns, eating habits, and protection and promotion of such practices. In the market-led economy, it is highly important to understand and consider the role of culture in promoting diversified and nutritious food for marketing, employment, and income generation, especially for women, and assess its overall impact on household food and nutrition security and livelihoods improvement. This paper (presentation) discusses these issues in both research and policy context of Nepal.

Strategies to Stop Rice Import in Nepal

Bhola Man Singh Basnet
Principal Scientist (Agronomy)/Senior Rice Expert
Nepal Agricultural Research Council's (NARC) – Retd.

Rice is the paramount crop in Nepal due to country's dependence on it for national economy. Its share to the AGDP and GDP is about 21% and 7% respectively and contributes more than 50% to total food production. In 2020-2021, rice was grown in 1.46 MHa with 5.55 MT production and average yield of 3.80 t/ha. Achieving food self-sufficiency and food and nutrition security, profitability and sustainability are the major issues facing the country today. Since no extra lands are available, we need to increase crop productivity per ha per day by increasing cropping intensity, adopting new knowledge, and using innovative technology in farming.

Nepal was rice exporter in 1980s; now it imports more than NPR 2.5 billion worth of rice per month. Some issues in rice production are: deceasing land, deteriorating soil quality, changing climate, decreasing investment in agriculture, non- or untimely availability of quality seed, fertilizers, organic manures, irrigation, credit, technical know-how and field-level do how, and dissemination of technologies, etc. Some matured, proven, and successful technologies that can be used to increase rice production are: hybrid/improved rice varieties, quality seed production and improved seed storage, pre-rice green manures, early/chaite and boro rice utilizing high solar radiation, fine and aromatic rice, climate-smart technology, water-saving technology, system of rice intensification (SRI), and plant growth regulators. The Government of Nepal should form a high-level national rice security mission, involving rice experts with proven track-record to cope with decreasing rice production. 'Small farmers, large field' (group, contract, cooperative) concept with successful technological interventions are must. To get success "research push and market pull" or marketing intelligence is must. Let's ask ourselves: Should we depend on others even to live? Or, should we increase rice production and stop importing it?

Rubber Farming in Nepal: Current Challenges and Opportunities

Tilak Bhandari
Institute of Rubber and Jatropha Research-Nepal-Texas, USA

Natural rubber (Hevea brasiliensis) is used in many ways: as raw materials for making vehicle tyres, industries, defence, households, medical fields, and green industry. Nepal is the 44th rubber growing country in the world. Rubber farming in Nepal began with planting in six hectares in Jhapa, Morang, Sunsari and Ilam districts by Gorakhkali Rubber Industry Ltd (GRUL) in collaboration with the Jhapa-based M/S Sudha Falrus Pvt. Ltd. GRUL also initiated rubber farming feasibility studies in collaboration with Ministry of Forests and Soil Conservation, Ministry of Agriculture Development, and Rubber Board of India. In the initial evaluation, farmer's income from modern natural rubber farming increased from 100 to 300%. Consequently, it has received great attention from farmers, forestry users' groups, cooperatives, local and national NGOs, local, national and international rubber-related industries and organizations, FNCCI, NRNA, Munaa Krishi ltd, universities, etc. Nepal government has established Rubber PMAMP Zone in Jhapa.

Current bottlenecks are lack of appropriate regulation, lack of technical manpower, funds and government rubber institution, unavailability of Agri loan program for rubber farmers, and lack of proper marketing agencies and channels, etc. Texas-based Institute of Rubber and Jatropha Research-Nepal (IRJR-N)was established in 2010 to coordinate and provide technical support to relevant agencies and advise the government on commercial rubber farming. Nepal annually imports rubber and rubber related products worth $105 million. Domestic rubber plantation is limited to estimated 555 hectares with annual production of 400 tons of dry rubber valued at $10,00,000. Nepal demonstrates a great potential for increasing rubber farming to 20,400 hectares andproducing37,000 tons of dry rubber with current value of about $100 million annually up to 25-27 years in its crop cycle plus additional income from inter cropping, bee-keeping, rubber seed oil, rubber wood, and curb global warming. If Nepal Government, NRNA and concerned stakeholders advance to commercial rubber farming, the country can be self-reliant in rubber by creating 25,000 new jobs plus thousands of indirect jobs along with multiple benefits including huge export potential.

Current State and Future of Poultry Production with Emphasis on Food Security

Surya Poudel
University of Veterinary Medicine Vienna, Austria

Poultry production has tripled in the past twenty years and represents a lion's share in the global food supply chain. The demand of poultry products to feed the increasing human population is projected to rise in coming decades. However, large scale poultry production should always be coupled with measures to reduce antibiotics use and control of zoonotic pathogens in order to provide safer foods to humans, which are unfortunately often neglected in developing countries. Consequently, several pathogens such as Salmonella and Campylobactor as well as multiresistant bacteria from poultry origin have been posing threat to human population. In this context, Austria, a member state of the European Union (EU) has set an example to rest of the world to provide secured food to consumers. Currently, three types of production system exist in Austria viz. organic, free range and barn, collectively called as alternative housing system. In response to animal ethical issues, Austria banned traditional cage farming since 2009 which was later banned in EU in 2012. Although enriched cage system is still allowed in EU, it does not exist anymore in Austria since the beginning of 2020. Likewise, the government has launched Salmonella monitoring and control program, which has gained much success. Each of the eggs produced and sold in Austria are numbered with specific pattern which allows consumers to track the source. Likewise, all the activities in each commercial farms are monotored from the first day of life until the day of slaughter. Consequently, the use of antibiotics has dropped down in recent years and the industry has built a trust among consumers in order to provide healthy foods.

The paper will discuss the current global situation of poultry production, challenges and future outlooks, with particular focus on food security. A success story from Austria to provide safe food to human kind will be presented as a lesson learning thoughts for the future in countries like Nepal.

Nepalese Association of Agriculture, Forestry and Environment (NEPAFE) in Australia: Context, vision, and evolving strategies for knowledge sharing

Sita Ram Ghimire, Jagadish Timsina, Hemant Ojha, and Yakindra Timilsena
Nepalese Association of Agriculture, Forestry and Environment (NEPAFE) in Australia

Established and registered in New South Wales, Australia in 2019 Nepalese Association of Agriculture, Forestry, and Environment (NEPAFE) in Australia has a mission to promote scientific exchange between Australia and Nepal for economic well-being and environmental sustainability in both countries. The Association has been assisting Nepalese scholars by sharing knowledge & experience gained from Australian and global science and technology. With presence of more than 200 highly experienced Nepalese professionals working in academia, policy, research, and industries, NEPAFE has a strong expert base to contribute to any program and future projects. Australian Universities & research institutions remain preferred destination to Nepalese students and professionals giving scope of ever-increasing number of Nepalese experts in Australia. Having strong working relationship with Nepalese policy makers, researchers, academics and development practitioners in those disciplines, NEPAFE has been organising webinars with Nepalese counterparts and collaborating in a book publication on "Agriculture and natural resources management for food and nutritional security: Lessons from Nepal" specifically aimed for researchers, policy makers, post-graduate students, and development practitioners in Nepal and South Asia. The Association is also publishing blogs and journal articles, conducting webinars, and establishing collaborations with Australian professional bodies. Within one and a half year of its inception, NEPAFE has established its own website (www.nepafe.org.au), and reached out to more than 3000 academics, researchers, and professionals worldwide. The Association aims to develop itself as a role model among Nepalese community organisations across Australia and envisages significantly contributing to scientific research and development and to quality improvement of technical education in Nepal.

Aquaponics: A New Technology to Help Grow Food in Urban Nepal

Vernon Byrd
Kathmandu University

Aquaponics is a combination of aquaculture (growing fish in pens, ponds, or tanks) and hydroponics (growing plants without soil) in a closed system where the water is recirculated. Fish food is the primary input to the system, and naturally occurring beneficial bacteria convert fish waste to plant food while plants "clean" the water for the fish. This relatively new technology is beginning to be used around the world where soils are poor or unavailable, or where water is scarce (at least seasonally). High densities of plants and fish may be grown in small spaces, making aquaponics a potential contributor to urban food security where space for growing is often limited to unconventional sites like roof tops. As cities grow in Nepal, like in the Kathmandu Valley, agricultural land is being converted to other uses, and space for even kitchen gardens in yards is declining in some areas. The government of the metropolitan city of Kathmandu has recently provided incentives and training to increase family food production with roof top gardening. Short transport distance (for instance roof top to kitchen) is a major advantage of families growing easily accessible food. Transport of food to cities from distant locations is subject to disruptions as has been demonstrated recently with reduced transport of goods during border blockades, road closures due to earthquake damage or mud slides during monsoon conditions, and most recently from Covid lockdowns. Advantages of aquaponics over soil-based growing include: less water use (only 10% as much as soil irrigation), ability to grow in unconventional places like roof tops, no need to add expensive fertilizers, no problems with contamination from surface water runoff or soil borne disease, and no discharge of pollutants to the environment. Challenges for aquaponics include the need for reliable electricity to power water circulation and aeration of fish tank water, initial construction costs, and the need for knowledge of both plant and fish production. There is a need to evaluate costs and benefits of family size aquaponics units more fully, and this research is starting at Kathmandu University.

Isolation and Characterization of Plant Growth Promoting Rhizobacteria from Bamboo Rhizosphere and their Role on Plant Growth Promotion

Bishnu Maya K.C.[1], Dhurva Prasad Gauchan[1], Sanjay Nath Khanal[2] and Janardan Lamichhane[1]

[1]Department of Biotechnology, School of Science, Kathmandu University, Nepal

[2]Department of Environmental Science and Engineering, School of Science, Kathmandu University, Nepal

Plant growth promoting rhizobacteria (PGPR) such as phosphate solubilizing bacteria (PSB) and auxin producing bacteria (APB) are group of root associated bacteria which intimately interact with the plant roots and consequently enhance growth by extemporizing nutrient retrieval or phytohormone production. We isolated and screened indigenous phosphate solubilizing and auxin producing PGPR from bamboo rhizospheric soil, and assessed their growth promoting activity in seedlings of B. nutans subsp. cupulata. Altogether 66 soil samples were collected depth wise (5, 10 and 15 cm) from four species of bamboo (Bambusa nutans subsp. cupulata, B. balcooa, B. tulda and B. nepalensis) from Dhanusha, Mahottari and Sarlahi districts of Siwalik Region of Nepal. 120 isolates of PGPR were obtained by serial dilution method in Pikovskaya's (PVK) agar and Luria Bertani (LB) agar. 92 out of 120 isolates of PGPR with the ability to solubilize phosphate were selected based on the halo colony ratio in PVK medium and auxin production in LB agar. Among them six isolates having high ability to solubilize phosphate and high amount of IAA production capacity were further screened. Biochemical analysis revealed that these isolates belonged to the genus Pseudomonas. PSI and IAA production by six isolates were calculated ranging from 4.19±0.8 to 7.65±1.3 and IAA production ranged from 72.93± 0.2 to 82.48±0.9 µg/ml respectively. Seed germination experiment using surface sterilized seeds of B. nutans subsp. cupulata revealed that six isolates significantly increased shoot length (13.26±0.56cm), shoot fresh weight (16.26±1.02mg), shoot dry weight (10.56±0.09mg), root length (4.9±0.5cm), root fresh weight (7.56±1.05mg), root dry weight (3.21±0.01mg), and Chl 'a' and chl 'b' and carotenoid content (2.16±0.01mg/g, 1.19±0.06mg/g and 0.92±0.01mg/g respectively). Statistical analysis revealed that a positive correlation existed between isolates and plant growth promotion. This study suggests that PGPR isolated from bamboo rhizosphere could be a potential source for bio-fertilizer as they have demonstrated outstanding contribution for effective plant growth.

Key words: Auxin, Bamboo, Biofertilizer, Nepal, Phosphate solubilizing index, Rhizosphere, Siwalik

Preparation and Quality Evaluation of Amala (Phyllanthus Emblica L.) Chutney

[1]Yadav KC, Samikshya Rayamajhi[2], Anish Dangal[2], and Lila Devi Shiwakoti[3]

[1]*Central Campus of Technology, Tribhuvan University, Dharan*

[2]*Nilgiri College, Tribhuvan University, Itahari*

[3]*National Tea and Coffee Development Board, Hile, Dhankuta*

The amalas (*Phyllanthus emblica* L.) were collected from collected from Pakhribas, Dhankuta. The amala chutney was prepared and its phytochemicals content, nutritional compositions, antioxidant activity and sensorial properties were determined. The amala pulp and jaggery were mixed separately at the proportion of 70:30, 60:40, 50:50, 40:60 and 30:70 and labeled as samples X_1, X_2, X_3, X_4 and X_5 respectively. Sample X_1 exhibited highest ascorbic acid, tannins, phenolics, flavonoids contents and percent DPPH inhibition (297.9 mg/100 g, 198.9 mg GAE/g, 606 mg GAE/g, 153.47 mg QE/g and 61.67 % respectively). The crude proteins, crude fat, crude fiber, total ash and moisture content were higher (2.1%, 0.328%, 5.03%, 1.73% and 51.17% respectively) in sample X_1. The carbohydrate amounts and energy value were higher (66.16% and 267.9 Kcal/100 g respectively) in sample X_5. Total sugar, TSS and pH (75.93%, 60.3 °Bx and 4.56 respectively) were higher in sample X_5 while acidity (1.21 % as citric acid) was high in sample X_1. However, most of the sensory attributes were ranked high for sample X_3, signifying to use the equal proportion of pulp and jaggery for the preparation of amala chutney.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S2: Biomedical Technologies

9-11 October 2020

Online Event

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Program & Abstracts

S2

Biomedical Technologies

Biomedical technology has advanced markedly over the past few decades that supported the development of therapeutics, processes, and services enabling the delivery of high-quality healthcare, mostly to richer communities of the developed countries. Developing countries, on the other hand, are facing severe resource limitations including sophisticated infrastructures and technical expertise and therefore, they are compelled either to seek medical treatments abroad or import the advanced technologies that often lack experts. Nevertheless, developing countries are also trying to build modern biomedical technologies and services that would improve the quality of healthcare of their communities.

Among several reasons, gaps in knowledge and skills for effective research and innovation represent the biggest hurdle that limit the biomedical research and development in developing countries. This symposium aims to provide a platform for updating and exchanging state-of-the-art knowledge on biomedical science and technology and link them to the development of therapeutics, medical devices and diagnostics in the field of neuroscience, immunology, immunotherapy and tumor biology, etc. Cost effective technologies based on innovative ideas and suitable for developing economies will be given high priority.

Many technologies have been developed to make the healthcare better; however, these technologies are cherished based on their utility, the potential impact to community and the wide accessibility by wider populations. This symposium will bring together experts in oncology, immunology, biomedical engineering, genetics and computational biology to discuss the current scientific discoveries, and the challenges public health and medical services delivery of developing countries face in accessing these progresses.

Coordinator

Dr Devi Basnet
Meditox Inc, South Korea

Program

Session:	S2: Biomedical Technologies				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 3:	https://bit.ly/3jjKz3d (975 6253 9651)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinator/chair:	Dr Devi B. Basnet				
Moderator:	Dr Rosan Lal Shrestha				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 16:10	S2A: Modern Approach to Biomedicine				
Moderators:	Dr Roshan Lal Shrestha, Research Fellow, National Cancer Institute, National Institutes of Health, USA				
14:30 - 14:35	Dr Devi B. Basnet	Session Chair	Sr Research Scientist	Medytox, Inc, Korea	
14:35 - 15:00	Dr Ramesh Giri	Invited Talk	Professor	The Pennsylvania State University	Sustainable Chemical Approach to Pharmaceuticals
15:00 - 15:25	Dr Deepak Upreti	Invited Talk	Senior Scientist	The Century therapeutic/ McMaster University	Application of Chimeric Antigen Receptor T (CART) Cells in Cancer
15:25 - 15:50	Dr Ashim Dhakal	Invited Talk	Chief Scientist	Phutung Research Institute	Nanophotonic Technologies being Developed in Nepal
15:50 - 16:10	Dr Indira Tiwari	Contribution	Post Doc Fellow	Department of Infection Biology, Wonkwang University School of Medicine	Toxoplasma Gondii: Advances, Challenges, Current Status and Public Health Significance
16:10 - 16:20	**Break**				
Session II	S2B: Modern Technologies in Biomedicine				
Moderators:	Dr Sushila Maharjan, Post Doctoral Fellow, Harvard Medical School, Cambridge, USA Dr Nitesh Aryal, Physician, Kantipur Medical Center, Doha				
16:20 - 16:45	Dr Wang Di	Invited Talk	Visiting Professor	Harvard Medical School, Cambridge, USA	External Ear Reconstruction and Tissue Engineering
16:45 - 17:10	Dr Bishesh Khanal	Invited Talk	Chairperson	Nepal Applied Mathematics and Informatics Institute for Research (NAAMII)	Artificial Intelligence and Medical Imaging: An Opportunity to Democratize Innovation in Medicine
17:10 - 17:30	Dr Sagar Regmi	Contributed Talk	Post Doc Fellow	Technology (RECAST), Tribhuvan University	Nanotechnology in Medical Science
17:30 - 17:50	Shrishtee Kandoi	Contributed Talk	Researcher	Department of Biotechnology, Thapar Institute of engineering and Technology, Patiala	Application of Deep Learning Algorithms in Classifying Skin Lesions Using ISIC Image Dataset
17:50 - 18:00	Break				

Session:	S2: Biomedical Technologies				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 3:	https://bit.ly/3jjKz3d (975 6253 9651)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinator/chair:	Dr Devi B. Basnet				
Moderator:	Dr Rosan Lal Shrestha				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
18:00 - 18:50:	S2C: Biomedical Technologies in COVID-19 diagnostics				
Moderators:	Dr Sushila Maharjan, Post Doctoral Fellow, Harvard Medical School, Cambridge, USA Dr Nitesh Aryal, Physician, Kantipur Medical Center, Doha				
	Jyoti Acharya	Panelist	Chief of Microbiology Department	National Public Health Laboratory	
	Dr Ajit karna	Panelist	Scientist	Center for Health and Disease Studies-Nepal	
	Dr Sunita Gautam	Panelist	R & D Scientist	Shikhar Biotech	
	Dr Bishesh Khanal	Panelist			
18:50-19:00	Dr Devi Basnet	Concluding Remarks			
ICC Representative	Rajan Tripathi	Vote of thanks	Americas Regional Coordinator	NRNA	

Abstracts

Sustainable Chemical Approach to Pharmaceuticals

Ramesh Giri
The Pennsylvania State University

Chemical synthesis is key to the development of and global access to pharmaceutical drugs. With 95% of drugs tested in Phase I not reaching approval, the development of a final drug requires several iterations of modifying a chemical synthetically and making its library with anticipation to incorporate design features to address observed side reactions to its use. From first identification to final delivery to the market, the development of a drug takes about 10 years on average and costs over 10 billion. The majority of the cost is spent on research and development (R&D), which relies heavily on the convenience of access to chemical libraries and the ability to modify them rapidly. Even after final development, the production of a drug in bulk quantity to meet global demands depends on the efficiency of synthetic chemical processes. Regrettably, the current synthetic chemical technology is very slow and tedious to modify drug candidates, create libraries, and manufacture drugs in bulk quantity. With the ever-growing global population and demand for drugs, the current chemical technology will not be sustainable in the long-run. Our research group is working at the forefront of developing new and sustainable chemical technologies that will transform a multi-step chemical process to a few-step synthesis to enable rapid and convenient access to drug candidates and drugs, and eventually expedite the manufacturing of drugs in bulk quantity. In this talk, we will examine the ins and outs of the drug development process from a synthetic standpoint, and discuss new directions in drug synthesis and future perspectives.

Application of Chimeric Antigen Receptor T (CART) Cells in Cancer

Deepak Upreti
The Century Therapeutic/McMaster University

Background: Recent witnessed in chemo refractory B-cell derived malignancies suggested the transformative changes in extending patients survival using chimeric antigen receptor (CAR)-engineered T cells targeting CD19 antigen. Autologous CART therapy is the process in which patient's T cells are taken from the blood and T cells are reprogram with CAR hybrid protein. CAR hybrid protein consists of antigen binding domain that specifically binds to cancer antigen. This antigen binding domain of CAR is fused to transmembrane, costimulatory and signaling domain. Together this is called CAR. The CART cells prepared in GMP manufacturing site are grown to a desired number before infusing back to patients. Thus, reprogramed T will destroy the cancer cells specifically throughout the body. Due to the encouraging results in blood related malignancies, CART therapy is also gaining momentum in treating solid cancers.

Focus: Our group is focusing on developing this innovative immunotherapy for Glioblastoma (GBM). GBM is the most common primary adult malignant brain tumor. In our recently published article, we have shown that CART133 cell presents a therapeutically tractable strategy to target self-renewing, chemo-radioresistant, and functionally critical CD133+ brain tumor initiating cells that drive many cases of glioblastoma recurrence and therapeutic resistance. Using patient-derived xenograft model of GBM, our group is actively conducting preclinical testing of CART therapy targeting the glioblastoma tumor initiating CD133+ cells. Mice treated with CAR133 not only showed significant tumor reduction but also significantly increased overall survival of xenografted mice treated with CART133.

In summary: In my presentation, I will talk about CART therapy, design, application of CART in cancer mainly focusing in brain cancer and future directions.

Nanophotonic Technologies being Developed in Nepal

Ashim Dhakal
Phutung Research Institute

In this talk I will discuss about our efforts to develop cutting-edge biomedical technologies in Nepal. I will also discuss the challenges and opportunities for conducting such research in Nepal. Specifically, I will discuss a device based on Silicon-on-Insulator technology to generate a non-diffracting beam of ~850 μm length from an axicon-like lens etched using a low resolution (200 nm feature size, 250 nm gap) deep-ultraviolet lithographic fabrication. Such a lens will be useful to implement miniaturized and low-cost on-chip optical coherence tomography imaging technology for endoscopy. I will also discuss about an spectroscopic system that we have developed in Nepal to identify bacteria and pesticides in biological samples. With our spectroscopic system, we have detected tryptophan-like-fluorescence down to 20 parts per trillion in tryptophan concentration.

Toxoplasma gondii: Advances, Challenges, Current status and Public Health Significance

Indira Tiwari
KRF (Korea Research Fellowship) Postdoctoral Research Fellow Zoonosis Research Center, Department of Infection Biology, Wonkwang University School of Medicine, 460 Iksandae-ro, Iksan 570-749, Jeonbuk, Republic of Korea

Globally, toxoplasmosis remains a significant cause of morbidity and mortality, and outbreaks of infection with *Toxoplasma gondii* represent a significant, emerging public health burden, especially in the developing world including Nepal. *Toxoplasma gondii* is a ubiquitous parasite protest found in a wide variety of host, including a large proportion of human population. *Toxoplasma gondii* exhibits a complex, multi-stage life cycle in which the need for parasite expansion is balanced with the production of transmissible forms. The ability of the parasite to persist as a dormant stage, is an important aspect of toxoplasmosis. For human disease the key developmental switch is from the tachyzoite to the mature bradyzoite, which is not well understood at the molecular level. It has been well documented that toxoplasmosis is of crucial importance especially for pregnant women and immunocompromised patients. In addition to the risks of gestation complications and congenital infections, it has been suggested that toxoplasmosis has some unfavorable effects on reproductive capacity in both men and women. Rise in the socio-economic status, increasing pet ownership, and high prevalence of AIDS trend in the incidence of *Toxoplasma gondii* is likely to continue in near future. Adequately managed public health infrastructure, education, screening, appropriate treatment, and the development of novel modalities apart from identifying and developing new compounds for the treatment of toxoplasmosis will be required to intervene it successfully.

External Ear Reconstruction and Tissue Engineering

Wang Di

Division of Engineering in Medicine, Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Cambridge, USAPlastic Surgery Hospital (Institute) of Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, China

Microtia is a congenital malformation of the external ear, with a varied regional prevalence rate of 0.83 to 17.4 per 10,000 births worldwide, and higher prevalence rates in Hispanics and Asians. Currently, autologous costal cartilage graft, a multi-staged and complicated reconstructive surgery, is the golden standard therapy for patients who suffer from auricular malformation. Unsuitable mechanical properties, donor site deformities, and other surgical complications make the elastic cartilage-related diseases still be great challenges. Auricular cartilage tissue-engineering has emerged as a potential alternative strategy and evolved rapidly during the past decades. In the past decades, we performed more than 30,000 ear reconstruction surgeries and achieved some exciting results from tissue-engineering researches. In addition, 3D bioprinting has advanced as a promising technology to fabricate tissue scaffolds including external ears and vascular tissues.

Artificial Intelligence and Medical Imaging: An opportunity to Democratize Innovation in Medicine

Bishesh Khanal

Nepal Applied Mathematics and Informatics Institute for Research (NAAMII)

The talk will highlight how the recent advances in Artificial Intelligence (AI) and medical imaging provide an opportunity to address unmet clinical needs of the low and middle income countries. I will present the context with the potential of how AI can transform healthcare in the world, particularly in radiology. Then, the talk will shed some light and provide insights on how even with relatively small investment for new infrastructure, computational science and machine learning can contribute to fundamental research and innovation in biomedicine, effectively democratizing innovation in medicine.Enter description here.

Nanotechnology in Medical Science

Sagar Regmi
Research Centre of Applied Science and Technology (RECAST)

Nanotechnology is one of the emerging areas of science and technology developed in the last few decades and has a potential application in medical science. It interacts with the biological molecules at the atomic and molecular levels of nanoscale-sized between 0.1 and 100 nm, opening a wide area of research and development. Several pharmaceutical companies around the globe use nanomedicine which involves the application of nanotechnology using nanoelectronics, biosensors, nanomaterials to improve the healthiness care, quality of medical devices as well as treatment strategies. The small size of nanoparticles alters the physical and chemical properties compared to its macromolecule. This property of nanoparticles allows wide application in medicine like better drug delivery, targeted treatment with the reduced adverse effects, improvement of non-invasive diagnostics, etc. On the other side, this property has serious and unpredictable side effects like inflammatory, mutagenic, and oncogenic potential. I will discuss the uses, benefits, demerits, and risks of nanotechnology in medicine. I will discuss the application of nanotechnology especially in tissue engineering, implant technology, cancer diagnosis, and molecular imaging. Furthermore, I will focus on cancer nanotechnology with extensive applications for early diagnosis, prediction, prevention, target-specific drug therapy in the advancement of cancer therapy.

Keywords: Nanotechnology, molecular imaging, cancer diagnostics, diagnostics drugs, nanomedicine, nanoscience

Application of Deep Learning Algorithms in Classifying Skin Lesions using Isic Image Dataset

Shrishtee kandoi[1], Kashish Khatkar[2], and Muskan Thapar[2]
[1]Department of Biotechnology, Thapar Institute of engineering and Technology, Patiala, India
[2]Biotechnology Society of Nepal (BSN) Kausaltar-3, Bhaktapur, Nepal

Computer-aided diagnosis (CAD) has become an important part of the medical field. Skin cancer is a common and deadly disease that a CAD system could potentially detect. It is clearly visible on the skin and therefore only images of skin lesions could be used in order to provide a diagnosis. In 2017, a research group developed a deep convolutional neural network (CNN) that performed better than dermatologists during classification of skin lesions. This capstone project makes an attempt at implementing the method provided in the report and evaluate the performance of the CNN during classification of skin lesion comparisons not tested in their study. The previously unseen binary classification use cases are melanoma versus solar lentigo and melanoma versus seborrheic keratosis. Using transfer learning, Inception v3 was trained for various skin lesions. The CNN was trained with 16 training classes. During validation of the CNN, an accuracy of 68.3% was achieved during a 3-way classification. Testing the same comparisons as the study an accuracy of 71% was achieved for melanoma versus nevus and 91% for seborrheic keratosis versus basal and squamous cell carcinoma. The accuracy results for the new comparisons were 84% for seborrheic keratosis versus melanoma and 83% for solar lentigo versus melanoma. The results suggest that out of the binary classifications performed in this study, nevus versus melanoma is the most difficult for the CNN. It should be noted that our results were different from the previous study and that more statistical methods should have been used when obtaining the results.

Keywords: CAD (Computer aided diagnosis), Skin Cancer, CNN (Convolutional Neural Network), Transfer Learning, melanoma, seborrheic

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S3: Financial Investment

9-11 October 2020

Online Event

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Program & Abstracts

S3

Financial Investment

Domestic investment alone is not enough to realize double-digit growth rate that is needed to achieve Nepal's target of becoming a middle-income economy by 2030. To attain such unprecedented growth, we will need both Foreign Direct and Domestic investments. In this context, the symposium will discuss investment prospects and challenges in Nepal, explore incentives and facilities given to investors by the Government of Nepal, and aim to recommend a number of changes needed in investment laws, especially in Foreign Investment and Technology Transfer Act - 2019, to attract enough investments. It will also investigate existing financial laws and suggest necessary improvements that can facilitate economic growth of Nepal.

Coordinators

Mr Ranjeet Mahato
Neapolis University Pafos, Cyprus

Mr Analraj Bhattarai
Senior Banker, Nepal

Program

Session:	S3: Financial Investment				
Date/Time:	11 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators:	Analraj Bhattarai and Ranjeet Mahato				
Moderator:	Dr Bindu Nath Lohani				
Session Chair:	Maha Prasad Adhikari				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:10	Bhisma Raj Dhungana	Invited Talk	Chairman	Securities Board of Nepal (SEBON)	Nepalese Capital Market
09:10 - 09:20	Sushil Bhatta	Invited Talk	CEO	Investment Board, Nepal	
09:20 - 9:30	Urmila Shrestha	Invited Talk	CEO	Salt Trading Corporation, Nepal	
09:30 - 09:40	Abhishek Basnyat	Invited Talk		US Embassy (This talk is personal opinion of the presenter)	Importance of Foreign Investment and Grant on Least Develop Economy
09:40 - 09:50	Sandeep Kumar Mohanty	Invited Talk	Director	Pricewaterhouse Coopers Pvt. Ltd, Management, India	Quick Wins – Review of Investment Laws and Policies in Nepal
09:50 - 10:00	Eknath Khatiwada	Contributed Talk	Chair	NRNA Foundation Committee	COVID-19 impact on Nepal' s economic and path of recovery and Roles of NRNA Global Diaspora Community
10:00 - 10:10	Dilla Kharel	Contributed Talk	Co-chair	Social Entrepreneurship Development Committee, NRNA	One NCC - One Investment - One Employment
10:10 - 10:20	Pramila Shrestha	Contributed Talk		Carbon Management System and Corporate Financial Performance	University of Newcastle, UK
10:20 - 10:30	Anup Raj Upreti	Panelist	Managing Partner	Pioneer Law Associates	
10:30 - 10:40	Jiba Lamichane	Panelist	Patron and Past President	Non-Resident Nepali Association (NRNA)	
10:40 - 10:50	Vishnu Agrawal	Panelist	Senior VP	Confederation of Nepalese Industries (CNI), Nepal	
10:50 - 11:00	Bhuvan Dahal	Panelist	CEO	Sanima Bank Ltd.	
11:00 - 11:30	All	Q&A			

Session:	S3: Financial Investment				
Date/Time:	11 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators:	Analraj Bhattarai and Ranjeet Mahato				
Moderator:	Dr Bindu Nath Lohani				
Session Chair:	Maha Prasad Adhikari				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
11:30 - 11:50	Maha Prasad Adhikari	Concluding Remarks	Governor	Central Bank of Nepal	Direction of Foreign Investment and NRB Supportive Role
ICC Representative	Arjun Shrestha/ Gobinda Shrestha	Vote of thanks	Vice President/ Regional Coordinator	NRNA	

Abstracts

Nepalese Capital Market

Bhisma Raj Dhungana
Securities Board of Nepal

Efficient financial system plays a crucial role to accelerate the economic growth of the nation. Capital market always discharges a pivotal role in an efficient financial system. It provides financial intermediation facility for debt and equity transaction, ensure greater competition among financing resources and thereby greater efficiency in capital market. Capital market functions as a crucial mechanism for fund mobilizations, risk diversification, information flows, promoting transparency, and corporate governances and also facilitates the privatization program of government. Further, it is also instrumental for the transmission and implementation of macroeconomic policies.

In recent periods, primary market of securities has been expanded throughout the nation. Investors can participate in public offering of securities through ASBA, C-ASBA, Mero Share from anywhere. Similarly, online trading system has been functional in secondary market. With this, it is clear that Nepalese capital market is fetching towards the tech friend environment. Book building directives has been issued for efficient price discovery of securities in primary market. Margin trading procedure and other many regulations have also been amended for the development of securities market. During lock down period, various technological improvements have been made in trading system to ease the secondary market transaction through online mechanism. These days, NEPSE index, turnover, market capitalization is in uptrend. Lower interest rates, liquidity surplus, shrinkage of other investment opportunities in the economy are fueling this increment.

Some policy and legal infrastructure has been developed for NRN to enter into Nepalese capital market. SEBON has issued Specialized Investment Fund Regulations to promote the alternative investment vehicle such as private equity fund, venture capital and hedge fund. Regulations have defined NRN as eligible investors to be engaged in such funds. Under the provisions of Portfolio Management Directives 2067, investment managers are allowed to provide PMS to NRN with complying prevailing legal framework. With this, NRN can directly/ indirectly enter in Nepalese capital market. For direct involvement, NRN (Nepalese citizen residing in any foreign countries) may trade in the secondary securities market since the introduction of online trading system in Nepal Stock Exchange Ltd. Those NRN can mobilize their capital in the primary issue of securities since SEBON introduced the ASBA and C-ASBA system in primary securities markets. Currently, all NRN who do not need repatriation and want to keep money in domestic market, can invest, earn and accumulate assets in Nepal. It will be further liberalized in coming days.

These days, SEBON has prioritized to restructure the market infrastructure along with NEPSE, CDSC and SEBON itself; to introduce commodities derivatives market and specialized investment vehicles; to develop government bond market; to make the market more tech friend; and to make facilitative legal framework that can be supportive to induce NRN and Foreign investment in Nepalese capital market so that capital market could be instrumental to achieve the target of becoming a middle-income economy by 2030 AD and to achieve the aspiration of long term vision 2100 BS.

Importance of Foreign Investment and Grant on Least Develop Economy

Abhishek Basnyat (Personal Opinion)
US Embassy in Nepal, Kathmandu

US Embassy The presentation will cover why a developing country like Nepal requires foreign investment to fuel its economy (funding gap versus growth aspirations); the legal and regulatory framework for foreign investment (e.g. the pros and cons of the 2019 Foreign Investment and Technology Transfer Act); the practical aspects of policy implementation; and potential areas for improvement.

COVID-19 Impact on Nepal' s Economic and Path of Recovery and Roles of NRNA Global Diaspora Community

Eka Nath Khatiwada
NRNA Foundation Committee

The Nepalese diaspora in the globe has become lifeline as Nepal recovers and rebuilds from the devastating earthquake disaster 2015 as well as economic blockades. During the recent unprecedented COVID 19 pandemic, Nepali global diaspora communities are greatly contributing to the Nepalese community within the host countries and as well in Nepal in many folds. This paper provides some outlines of the Nepalese diaspora Association (NRNA) roles to Nepal's economic and some of the strategic road maps to achieving Nepal's resilient recovery. These include global perspectives and the contribution of the Nepalese Diaspora community in general. This paper also outlines some strategic views on the added advantage from the global Nepalese diaspora community to Nepal's economic and path of recovery, mobilizing diaspora remittance into the formal financial sector, recent Initiatives Nepal Government's Brain Gain center and NRNA Collaboration, benefits of return initiatives. The perspective of NRNA vision 2020 beyond and provision of NRNA Global foundation and contribution to Nepal's, development work and Diaspora community enrichment initiatives to bring back to Nepal economic beyond COVID 19 pandemic.

Furthermore, NRNA Vision 2020 and Beyond (2018) provided a clear strategic road map to "incorporate NRNA Foundation as a global entity outside Nepal that will also work on disaster preparedness and coordinating relief projects. By doing so NRNA could gain a growing global appreciation for the unique and potent roles of both the nonprofit sector and private giving. The Foundation can work with the Brain Gain center (BGC) to develop a database. Besides leveraging donors' resources, the foundation will be able to raise tax-deductible funds to channel to Nepal.

Keywords(COVID 19 pandemic, diaspora economic and path of recovery, remittance, NRNA vision 2020 beyond, Global foundation, Brin Grain, tex deductible)

One NCC - One Investment - One Employment: A Clear Approach for NRN'S Investment in Nepal

Dilla Kharel
Social Entrepreneurship Development Committee, NRNA

Background:

Nepal, Landlocked country with the world biggest mountain "Mount Everest", The Birthplace of Buddha,the real pride of our nation and very first intro to foreigners or to the world at large. Nepal has many resources and potentiality, needless to mention about its water, human, forest, mineral and herbal resources Despite of having all these Nepal has yet to do a lot to attract foreign investment from globe.

A country with many attributes is really lacking with the foreign direct investment and the current investment is not sufficient to the needs of Nepal and Nepali.

Nepal itself now can offer several business opportunities that the global investors are unaware of.

The Improving political scenario within the country is highly motivating to all of us. We all NNR now must consider this situation and need to brainstorm how we can be of assistance to Nepal for bringing the foreign investment from an entrepreneur to multinational companies. By default, NRN'S are the global advocates of our countryman's. We did talk a lot but the real time came now to serve.

Foreign Direct Investment and it's Scenario in Nepal The concept of FDI originally introduced in the late Nineteenth century, FDI is simply an investment made by an individual or company in another country with their interest, complying the countries rules regulation and guideline. Once introduced, FDI becomes a really burning topic and controversial issue in international economics.

What NRN'S Can do:

Global NRN's in 83 Countries can educate the interested Individual, group or institution about investment in Nepal from every corner. NRN can facilitate on, how to operate, how implement how to make it sustainable and how to repatriate the return on investment.

Problem and Challenges:

- Political Disputes
- Bureaucratic hurdles
- Legal hassles – lack of clear plan, policy and guideline
- Geographical distribution
- Infrastructure

Suggestions:

No doubt Nepal is moving forward for the economic development with political stability soon, considering such scenario many investors from the different parts of the world are observing this land as a better place for investment with greater opportunity. If we all As NRN's as well as the Government of Nepal consider the below factors, we can achieve better results.

- Innovative way of marketing our different areas of investment to the global investors.
- Creating a peaceful and investment friendly environment
- Creating political stability.
- Vocational training and skilled labor /manpower
- Development of basic infrastructure Government of Nepal
- Ministry of Foreign Affairs
- Ministry of Industry / Nepal Investment Board
- Ministry of Finance / Nepal Rastra Bank
- NRNA ICC Permanent Committee
- NCC NRNA as Investment Ambassador
- Signing More bilateral and multilateral trade agreement

This is just the concept and idea, let us brainstorm more for the FDI in Nepal and Specially the Investment of NRN'S.

Carbon Management System and Corporate Financial Performance

Pramila Shrestha

University of Newcastle, UK

Using international firm-level data from 2010 to 2017 obtained from the CDP, we examine the effects of a carbon management system (CMS) on corporate financial performance. We find that a firm's quality of CMS is positively associated with its financial performance measured by return on assets (ROA). This result holds when we adopt alternative performance measures and model specifications and control for sample-selection bias. Our further analyses show that a better-quality CMS is especially associated with higher revenues, greater margin and higher R&D expenditures. In addition, individual components of CMS exhibit heterogeneous influences on financial performances. The positive association between CMS and financial performance is stronger for firms operating in carbon intensive sectors and firms with a higher level of carbon emissions. The carbon regulation affects differently the sensitivity of financial performance in intensive and non-intensive sectors in response to the quality CMS.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S4: Fintech for Economic Transformation

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S4

Fintech for Economic Transformation

Financial technology (Fintech) seeks to improve delivery of financial services by utilizing advanced algorithms in electronic platforms such as cloud computing, personal computers and smartphones. Due to rapid growth of FinTech, government policies and users quick adoption, FinTech is penetrating deep into the financial markets of both developing and developed economies. Due to the lack of prompt regulatory initiatives from the government, the existence of large section of unbanked population and the predominantly cash-driven economy, Nepal is not catching up with the pace of FinTech adoption compared to other economies. This session will discuss the advantages and necessity of FinTech and digitization in multiple economic sectors, especially in the current context of economic slow-down brought by COVID-19 pandemic, and advise the Government to make swift upgrading in digital policies so as to create an attractive business environment for both domestic and foreign investors.

Coordinators

Dr Gyanendra Prasad Joshi
Sejong University, South Korea

Lok Raj Sharma
NRNA Social Entrepreneurship Committee, Denmark

Program

Session:	S4: Fintech for Economic Transformation				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators:	Lok Raj Sharma and Dr Gyanendra Prasad Joshi				
Moderator:	Lok Raj Sharma				
Session Chair:	Sishir Dhungana				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 14:35	Lok Raj Sharma	Opening	Chair, SED Committee	NRNA	Introduction to session
14:35 - 14:50	Bhuban Kandel	Invited Talk	ED	Nepal Rastra Bank	Fintech in Regulatory Perspective
14:50 - 15:05	Hem Raj Dhakal	Invited Talk	Founder and Managing Director	IME Group	Fintech Adaptation is the Key to Transform Nepal Economy
15:05 - 15:20	Lowell Campbell	Invited Talk	Senior Digital Financial Services Specialist	International Finance Corporation	Partnership Opportunity Between Fintech Startup and International Corporations
15:20 - 15:40	Keshav Acharya and Pratistha Swar	Invited Talk	Senior Program Advisor,	Economic Policy Incubator	Policy Intervention in Fintech for Economic Transformation
15:40 - 15:55	Dibyswory Dali	Invited Talk	General Secretary	Women In Information Technology' (WIIT)	Fintech in Women Prospective
15:55 - 16:10	Srijan Malla	Invited Talk	CTO	Siddhartha Bank	Fintech Industry Status in Nepal and Issues to Address
16:10 - 16:25	Shambhu Pokharel	Invited Talk	Chairman	World Trade Group	Opportunities and Challenges of Fintech Startups
16:25 - 16:40	Dibas Neupane	Invited Talk	President	TrustBiz Private Limited	Fintech in Comparative View in International Level
16:40 - 16:50	Jagannath Kafle	Contributed Talk	Presenter	अष्ट ज अभियान नेपाल	विद्युतीय सुशासनः ई डाटा बैंकको स्थापना र प्रयोग
16:50 - 17:10	**Break**				
17:10 - 17.50	Panel discussion and Q&A				
	All presenters	Panel discussion			
17:50 - 18.00	Sishir Dhungana	Concluding Remarks	Secretary	Ministry of Finance	
ICC Representative	Mahesh Shrestha	Vote of thanks	Treasurer	NRNA	

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Fintech Adaptation is the Key to Transform Nepal Economy

Hem Raj Dhakal
IME Group, Nepal

Fintech adaptation is a major journey for any economy, one that has tremendous potential to transform financial inclusion and support digital economic development. Nepal currently has a historically high working age population with 136% mobile and 72% broadband penetration which promises the availability of digital access to financial services via mobile phones.

The full potential of Fintech for financial inclusion may be realized with a strategic framework of underlying infrastructure (digital identification and e-KYC systems) and an enabling policy and regulatory environment from the government to support digital financial transformation.

This paper shares learnings from the remittance ecosystem which have been successful in providing affordable financial services to the unbanked and underbanked population of Nepal contributing 1/3rd of the national GDP.

विद्युतीय सुशासनः ई डाटा बैंकको स्थापना र प्रयोग

Jagannath Kafle
अष्ट ज अभियान नेपाल

समयको गतिसंगै विज्ञान प्रविधिले, विज्ञान प्रविधिको उन्नतिसंगै विकास र विश्व समाजले पनि बेग हानिरहेको छ। हाम्रो देशले पनि विश्व समाज संगसंगै विज्ञान प्रविधि एवं विज्ञानको वरदानलाई आत्मसात गरेर अगाडी बढ्न नसक्नु पनि विश्व समुदाय सामु निम्छरो मुलुकको रुपमा सुचीकृत हुनु परेको तिक्त अनुभव हामीले गरिरहेका छौं। हामीले पनि विज्ञान र अत्याधुनिक प्रविधिको प्रयोग गरेर ईडाटा बैंक स्थापना गर्नु पर्दछ र विश्व समुदायको प्रगतिको बेगको मुलप्रवाहिकरणमा प्रतिस्पर्धी बन्नु पर्दछ। समाजको हरेक पक्षको तथ्याङ्कलाई आफ्नै सर्वर, अत्याधुनिक सफ्टवेर तथा अन्य प्रविधिको प्रयोग गरी सङ्कलन र आवश्कता अनुसार सामाजिक, आर्थिक, राजनैतिक, प्रशासनिक तथा वातावरणीय क्षेत्रहरूमा प्रयोग गरेर प्रभावकारिता बढाउनु पर्दछ। यो काम कास्ले, किन, कसरी, कुन कुन क्षेत्रमा कस्तो प्रभाव पार्न सकिन्छ भन्ने तथ्य यस प्रस्तुतिले दिने छ।

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S5: Information and Communication Technology

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S5

Information and Communication Technology

S5: Information and Communication Technology

It is essential to take advantage of the opportunities offered by Information and Communication Technology (ICT) to foster development of Nepal. For the purposes of this symposium, the term ICT refers to electronic technologies for information processing and communication systems, including use of big data, and platforms built on such technologies. The ICT symposium is a forum that brings together interdisciplinary interaction and multidimensional collaboration among different stakeholders to address development challenges of Nepal with the aid of information and communication technology applications. This symposium will focus on developing strategic plans for a balanced and inclusive growth of economy through the use of ICT. The symposium will reflect the multidisciplinary nature of ICT research and innovation, with anticipated contributions from fields including, but not limited to, ICT4D, blockchain-based digital government, ICT policy, smart cities, e-education, e-business, telemedicine, Industry 4.0, digital divide, application of augmented reality, application of artificial intelligence and digital convergence.

Coordinators

Dr Gyanendra Prasad Joshi
Sejong University, South Korea

Program

Session:	S5: Information and Communication Technology				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 23247938)			Passcode:	nrna2020
Zoom Report:	zoomsupport@nrna.org				
Coordinator:	Dr Gyanendra Prasad Joshi				
Moderators:	Dr Gyanendra Prasad Joshi, Prof Devinder Thapa, and Prof Manish Pokharel				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 16:30	S5A: Recent Advances in ICT Infrastructures and Cybersecurity				
14:30 - 14:32	Dr Gyanendra Prasad Joshi	Coordinator	Assistant Professor	Sejong University, Korea	
14:32 - 14:40	Dr Ganesh Shah	Opening Remarks	Former Minister	Ministry of Environment, Science & Technology, Nepal	ICT Infrastructure as a Basis for Digital Economy
14:40 - 14:48	Prof. Danda B Rawat	Invited Talk	Professor	Howard University, USA	Cybersecurity Infrastructures and Challenges
14:48 - 14:56	Dr Rajeev Kanth	Invited Talk	Adjunct Professor	University of Turku, Finland	ICT Infrastructure for Smart Cities
14:56 - 15:04	Dr Ved P. Kafle	Invited Talk	Research Manager	NICT, Tokyo, Japan	ICT Infrastructure Recent Advances and Future Trend
15:04 - 15:12	Dr Rajib Subba	Invited Talk	Former Deputy Inspector General of Police	Kathmandu, Nepal	Cybersecurity for National Security
15:12 - 15:20	Dilliram Adhikari	Panelist	Managing Director	NTC	Current state of ICT Infrastructure in Nepal and Future Perspectives
15:20 - 15:28	Min Prasad Aryal	Panelist	Director	Nepal Telecommunications Authority (NTA)	ICT infrastructure in Nepal
15:28 - 15:36	Samit Jana	Panelist	Chief Technical Officer	WorldLink Communications	Contributions of Private sectors in ICT Infrastructure and Security (TBU)
15:36 - 16:30	Q&A and Panel Discussion				
16:30 - 17:00	**Break**				
17:00 - 19:00	S5B: Information and Communication Technology for Development (ICT4D)				
17:00 - 17:03	Dr Gyanendra Prasad Joshi	Coordinator			
17:03 - 17:10	Prof Manish Pokharel	Moderator	Professor	Kathmandu University, Nepal	Information and Communication Technology for Development (ICT4D)

Session:	S5: Information and Communication Technology				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 23247938)			Passcode:	nrna2020
Zoom Report:	zoomsupport@nrna.org				
Coordinator:	Dr Gyanendra Prasad Joshi				
Moderators:	Dr Gyanendra Prasad Joshi, Prof Devinder Thapa, and Prof Manish Pokharel				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
17:10 - 17:20	Prof Devinder Thapa	Moderator	Professor	Agder University, Norway	Information and Communication Technology for Development (ICT4D)
17:20 - 17:40	Prof Oystein Sabo	Invited Talk	Professor	Agder University, Norway	What ICT can do for Sustainable Development?
17:40 - 18:00	Dr Pranita Updhayaya	Invited Talk	CEO	Meddsoft Nepal Pvt. Ltd.	ICT to Better Health (I2H)
18:00 - 18:10	Dhiraj Thapa	Contributed Talk	PhD Candidate	University of Bolton, UK	The Use of Computers in the Context of Rural Schools in Nepal
18:10 - 18:20	Yashoda Karki	Contributed Talk	PhD Candidate	University of South-Eastern, Norway	Digitalization Ecosystem in SMEs
18:20 - 18:30	Pragyan Thapa	Contributed Talk	Masters Student	Kathmandu University School of Arts (KUSoA)	Digital Entrepreneurship and Middle Class Youth Subjectivities: A Qualitative Study of Kathmandu's Highly Educated Youth Digital Entrepreneurs
18:30 - 18:40	Arbindra Shrestha, Yadav and Shristi Tandukar	Contributed Talk	Presenter	Tribhuvan University	Evolution of Digital Economy and its Sustainability: A Case Study of Nepal
18:40 - 18:50	Bikash Pokhrel	Contributed Talk	Presenter	Auckland University of Technology	Investigating a Business Case Framework for the Nepalese Government Agencies to Understand the Significance of Cloud Computing for Improved E-Government Services
18:50 - 19:00		Closing Remarks			
19:00 - 19:20	**Poster (Video) Presentation**				
	Deepak Upreti	Poster Presentation	Student	REVA University, India	Mitigating Road Accidents Using AI-based Fatigue Detection
	Sujan Shrestha	Poster Presentation	Student	Macquarie University, Australia	Need of Antenna Design Technology in Nepal
ICC Representative	Gouri Joshi	Vote of thanks	Secretary	NRNA	

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Cybersecurity: Challenges and Perspectives for Developing World

Danda B. Rawat
Department of Electrical Engineering & Computer Science,
Howard University, USA

Cybersecurity involves protecting all networked resources including computers, wireless and wired networks, devices, data (in motion and storage), infrastructure, services, applications and Internet from cyber attacks or unauthorized access. This talk will present a personal perspective of a long-time researcher on cybersecurity trends, challenges, and perspectives in the Internet of Things (IoT)-era. The talk will also cover specific cybersecurity challenges and perspectives for developing nations like Nepal. Finally, the talk will cover some speculations on cybersecurity research and developments in the years to come.

ICT Infrastructures for Smart Cities

Rajeev Kanth
Department of Electrical Engineering,
Savonia University of Applied Sciences, Finland

In my short talk, I will be discussing mainly on the overview and landscape of information and communication technology (ICT) infrastructures required for smart and sustainable cities. With the current digital transformation, the *internet of things* ecosystem connects billion, and billions of devices are connecting to the Internet, shaping a new digital economy. The wireless technology *5G and forthcoming 6G along with edge computing and artificial intelligence* are becoming the most transformative technology to accelerate and enhance the current digital city infrastructures. We are now in an era where businesses, factories, and cities are now becoming *autonomous* by the use of multiple technologies where controls are being carried out by deploying *software-defined* methodologies and *virtual computation*. I will also be discussing the layered architecture that introduces the concepts of layers within the networks serving a smart city of the community. Especially, *sensing, communication, data application layer* with the full watchdog of safety and security of your data is needed in the state-of-the-art smart and sustainable cities. The robust *cybersecurity, data protection, and cyber-resilience* in intelligent and sustainable cities are the presents and future add-ons that ensures the foundation of a safe society. Smart and *sustainable buildings*, *hotels,* and *smart water management* are also briefly discussed during the talk.

ICT Infrastructure Recent Advances and Future Trend

Ved P. Kafle
Research Manager, NICT, Tokyo

Advanced ICT infrastructure is constructed by merging the traditional telecommunication and computing systems together. The newly developed technologies of network function virtualization (NFV), software-defined networking (SDN), network slicing, service function chaining, high-speed optical links and switches, millimeter-wave communications, cloud computing, and edge computing have allowed us to flexibly configure network and computing platforms over sharable ICT infrastructures. These technologies have facilitated the sharing common ICT infrastructure for various types of application services (e.g., telephony, data, video, smart metering, surveillance, intelligent transportation system, and smart health) among multiple network operators and application service providers. In this presentation, we talk about the recent advancement in 5G network systems, their features, services as well as the prospect of the Internet of Things (IoT) and artificial intelligence applications and business. The common ICT infrastructure can be virtually sliced by software into various isolated networks, each with enough computing, storage, and bandwidth. An individual entrepreneur possessing innovative ICT service ideas can lease a network slice and deploy the service for starting a new business at any time. Since ICT infrastructure can be shared among various services to be provided by the government and private sectors, new ICT infrastructure can be developed through the PPP funding model. Thus, NRN can play a significant role in ICT infrastructure development in Nepal.

Cybersecurity for National Security

Rajib Subba
Former Deputy Inspector General of Police, Kathmandu, Nepal

The rapid convergence of information and communication technologies and societies is not only creating ample opportunities for growth and development but also creating a realm of "dark side of innovation"! Today, cyberthreats mean not only DDOS or phishing emails but also a digital weapon having a zero-day exploit attribute, which heightens critical infrastructure vulnerabilities. Recent incidents across the globe indicate that historical and ethnic conflicts, information and communication technology critical infrastructure, and cyberattacks are all interrelated. All conflict from now on will have some degree of cyberspace flavor. The use of citizen hackers and other non-state actors are changing traditional warfare. Moreover, cyberthreats become more apparent during times of crisis. For example, the border dispute between Nepal and India paralleled in cyberspace as well. Hackers of both countries got engaged in hacking into each others' information systems. These incidents exposed Nepal's lack of commitment to network security despite growing investment in ICTs. Policymakers and professionals must understand the intricacies between crisis and cybersecurity, and cybersecurity is no longer an exclusive domain of computing. According to a report published by the Center for Strategic and International Studies in 2011, thirty-three states (ten in the Asia Pacific region) include cyber warfare in their military planning and organization. More and more countries are building cyberattack capabilities in the region. The question is, "are we ready?"

The Current State of ICT Infrastructure in Nepal and Future Perspectives

Dilli Ram Adhikari
Nepal Telecom

One of the impediments of socio-economic transformation and development in Nepal is due to inadequate ICT infrastructure. Establishing and maintaining ICT Infrastructure is often crippled by difficult geographical terrain, high maintenance costs and less economic returns. Incumbent operators like Nepal Telecom often play a pivotal role in closing this digital divide. Digital Divide is only confined to an economical issue but is also a social issue. The digital divide is also an infrastructure divide. It is also against the right to equality as laid out so eloquently in the constitution of Nepal.

The indices related to ICT readiness has been promising in the past years and is continuing to improve with every passing year. Digital Nepal Framework formulated by the Government of Nepal has identified eight domains and eighty digital initiatives. Connectivity always remains to be a key component in achieving these objectives. Microwave, Optical Fiber Networks and Satellite Networks are predominant as underlying connectivity technologies in Nepal. The uptake for wired and wireless broadband is equally exciting in terms of penetration in the past few years.

Nepal Telecom has rolled-out high-speed 4G wireless broadband across the nation covering every nook and corner through ADSS optical fibre, microwave and satellite technologies as backhaul networks to connect the unconnected population of Nepal. With gradual deployment of 4G/LTE network in B20 and B3, access to high-speed broadband connectivity is increasing, and so does the data usage. The LTE footprint has already covered all 77 districts and 539 out of 753 total local self-government. Similarly, Fiber To The Home (FTTH) networks are also being developed and distributed to the customers with high-speed Internet. Currently, Nepal Telecom is further involved in laying out high-speed optical fiber backbone in Province number 1, 2, Bagmati, Karnali and Far Western provinces through the Rural Telecommunications Development fund (RTDF) supported by NTA. These ICT infrastructures will support socio-economic transformation through the digitalization of services and economy.

Cloud-based infrastructures, BigData, Machine Learning and AI-related high-tech infrastructures are also being developed to cater the future demand of ICT services and applications.

ICT services help people remain virtually connected, informed and entertained during the Covid-19 pandemic lockdown period. NT also contributed from its domain to aware of making people connected for their daily works, online education and entertainment and so on to address the requirement of different segment of its customer base.

What ICT can do for Sustainable Development?

Oystein Sabo
Department of Information System
Agder University, Norway

Sustainable development is a key issue at the global agenda, and ICT is considered a key driver towards a more sustainable future. UN's sustainable development goals are increasingly influencing policies and actions within private as well as public organisations. In this talk we will discuss the role of ICT for achieving these goals, as well as the potential positive and negative effects ICT may have. We will do so by discussing sustainability from the three main perspectives introduced by UN; the social, the economic and the environmental. Examples will be introduced, as well as an attempt to present a future research agenda, addressing how practitioners, students and researchers within the ICT 4D field may play a role for a more sustainable future.

ICT to Better Health (I2H)

Pranita Upadhyaya
Meddsoft Nepal Pvt. Ltd

Genetic disorders are common, costly, critical, and mostly goes undiagnosed in Nepal. Annually, they affect 6% of births worldwide. Suffering afflicted by resulting illnesses is enormous. They account for ~20% of all infant deaths while leaving many more with life-long disabilities. A timely diagnosis of disorders like hearing impairment, sickle cell, or thalassemia can significantly improve infant survival rates and children's quality of life.

While Genetic Sequencing is the most appropriate method for detecting congenital disorders, the availability of testing is virtually nonexistent in Nepal. Manual clinical evaluation is susceptible to sizeable errors, as most infants get misdiagnosed. Artificial Intelligence offers a low-cost approach to the diagnosis of these syndromes with greater accuracy and this would be more eventful in places where there is a lack of human resource and genetic lab facilities.

This presentation aims to discuss a project that develops an augmented intelligence tool utilizing numerous parental and newborn biomarkers to support health professionals during the diagnosis task. The tool harvests data using Computer Vision algorithms to identify abnormalities and detect infants with disorders. It provides a Collective Intelligence platform where humans (health professionals) and computers(AI) are interconnected to perform non-trivial diagnostics tasks accurately and efficiently.

This project is a leap towards the UN-sanctioned "Every Woman Every Child" vision that encourages innovative approaches to infant care and for Nepal, a step towards improving public health and well-being, and reduction of disabilities and inequalities.

The Use of Computers In The Context of Rural Schools in Nepal

Dhiraj Thapa
The University of Bolton, UK

Different Non-Government Organisation in Nepal are working towards the empowering rural and remote schools children with deploying laptops in various schools in Nepal, most of them pre-installed with materials designed to support the national curriculum. It has created additional hope that the standard of education that is accessible in these remote and rural areas of Nepal can transform the quality of education. In order to investigate if and how the technology can have this impact, a case study was carried out which gathered detailed data on the use of the computers in three schools in contrasting remote rural areas of Nepal. The principal data collection methods were interview, focus group discussions, classroom observations and questionnaires. The results show that the effectiveness of technology in transforming schools is strongly dependent on local conditions and practices. This study identifies constraining and enabling factors which can be identified in the case study data: infrastructure, classroom management, gender issues and teacher motivation and training.

Digitalization Ecosystem in SMEs

Yashoda Karki
University of South-Eastern, Norway

Digitalization is the intervention of technology in a fundamental way in order to upgrade the performance and increase the reach of enterprises. With the increasing trend of digitalization, it is a growing need for small and medium-sized enterprises (SMEs) to initiate this process. SMEs should adopt digitalization in order to remain competitive and cope with the increasing complexity of consumer needs. It enables SMEs to create multiple opportunities in order to co-create, deliver and capture values with increased work efficiency. However, the ability to realize the value of digitalization for SMEs due to lack of resources is a challenging endeavor. Besides having relatively less resources, several other, technical, formal (such as organizational policies) and informal (such as socio-cultural norms), factors play an important role while initiating digitalization in SMEs. The objective of this research is to identify those factors and analyze how they affect the digitalization process in SMEs. For this purpose, I will conduct comparative case studies in Nepal and Norway. In doing so, this study will enhance understanding of how does the digitalization ecosystem in SMEs varies in the context of developing and developed countries.

Digital Entrepreneurship and Middle-Class Youth Subjectivities: A Qualitative Study of Kathmandu's Highly Educated Youth Digital Entrepreneurs

Pragyan Thapa
Kathmandu University, School of Arts

Unemployment among highly educated youth is a prevalent problem in global South. In Nepal where an average citizen is aged at 21 years and the youth population has greater level of education than the adult population, youth dissatisfaction brought by high graduate unemployment level affects all spheres of society, not only the economy. As a response, state policies and development partners have looked towards developing enterprise culture in young educated people to reduce the youth unemployment gap through vocational trainings and entrepreneurship fund programs. But these policy responses have been inadequate in improving the situation and have been criticized for being too politically motivated and more improvisational in nature rather than well thought out and context specific.

Ironically, like in other global South countries, majority of young people in Nepal are already engaged in some form of self-enterprising. But they mostly operate in informal economy to address their livelihood challenges rather than to pursue neo-liberal notions of the 'entrepreneurial spirit'. And only a negligible percentage of self-employed young Nepalis are particularly satisfied with their self-employment or find it 'decent'. So the major challenge is not to cultivate enterprise culture per se but to harness the potential of youth in formal enterprising.

With the advent of new digital technologies, it has been assumed that new opportunities in labor market are being created. Wider expansion and use of Internet, mobile phones and social media, similarly digitalization of services and management processes have led to an emergence of digital entrepreneurship creating demand and market space for new forms of digital products and digitally enabled services, and more importantly new forms of jobs and employment. Overarching promise of digital entrepreneurship is that it is a low-cost and flexible form of entrepreneurship that reduces time and space barriers to open doors to global market opportunities, thus fostering conditions for enterprise development.

This study, at a broader level, is interested in explaining the linkage between youth entrepreneurship and the emerging digital enterprise to understand the promises of digital entrepreneurship through its local interpretation. In doing so, it focuses on experiences of highly educated middle class youth in Kathmandu engaged in leading and running their formal digital enterprise. Using a contextual lens to study entrepreneurship, this study conceptualizes entrepreneurship as a phenomenon embedded in social and geographical contexts. So the interest here is to draw on the experiences and perceptions of highly educated middle class youth digital entrepreneurs to illustrate the role of social and spatial contexts in how they influence the entrepreneurship process in shaping the participants' entrepreneurial aspirations, and their access to resources and markets.

Evolution of Digital Economy and Its Sustainability: A Case Study of Nepal

Arbindra Shrestha Yadav and Shristi Tandukar
Tribhuwan University, Nepal

The trend of advancement of technology has built an innovative pathway to digital economy for sustainable development of nation in the recent years. In Nepal also Information Technology in started to contribute towards the economy and also has introduced a substantial transformation to public and private businesses, making the virtualized existence of versatile business relationships and partnerships with improved access to market, revamp value chain on production and distribution process enabling faster results and less costly product designs.

The study is an attempt to understand and identify the strategic improvement of digital economy in least developing countries like Nepal and how digitization can grow to be sustainable on a longer run. The research method is exploratory Research design based on quantitative analysis of secondary data. The Expected outcome of this Research will help to identify the trends contribution by digital economy as well as major challenges and hurdles associated with evolution of digital economy in context of Nepal.

Investigating a Business Case Framework for the Nepalese Government Agencies to Understand the Significance of Cloud Computing for Improved E-Government Services

Bikash Pokhrel
Auckland University of Technology, New Zealand

The cloud computing service and deployment models are often considered as the improved technology for the effectiveness and efficient management of IT resources. The government agencies of developed countries like New Zealand have advanced further to explore the benefits of cloud computing. The literature review conducted earlier as a part of this study shows that the developing countries including Nepal tend to have three most common challenges for successful E-Government implementation. The common challenges are limited access to Information and Communication Technologies (ICT) infrastructure (computer hardware and software resources, networks and servers and adoption of new technologies); increasing ICT budgets for upgrading and maintenance of hardware and software computing elements; and lack of appropriate ICT skills of users (citizens and employees). Study shows that the adoption of cloud computing has the potential to minimise these common challenges by reducing IT costs, improving access to ICT infrastructure, and lowering the need for specialist technical ICT people. The relevance of adopting cloud computing to improve E-Government implementation in the context of developing countries like Nepal requires further investigation. This study proposes a business case development framework to identify the business and technical capabilities of the government agencies of Nepal linked towards the cloud computing adoption. The framework answers whether or not cloud computing is feasible to adopt and potentially help to minimise or overcome the existing challenges. Similarly, the framework also outlines the holistic cloud adoption strategy. The initial framework is developed by reviewing relevant literature and current industry standards. The outlined framework is used to compare the Total Cost of Ownership (TCO) of the existing on-premise ICT infrastructure and the infrastructure based on cloud technologies for the Inland Revenue Department (IRD) of Nepal. The IT stakeholders of IRD Nepal are interviewed to refine the framework after presenting TCO comparison result. This refined framework is on its process of revision and evaluation from the experts of the field. This study is highly significant to advance further in research to develop a cutting-edge cloud computing based business case development framework for the developing countries, Nepal as a case. The presentation will introduce the outline of the framework and the outcome of the business case review performed at IRD of Nepal.

Keywords: *Cloud Computing, Business Case, E-Government*

Mitigating Road Accidents Using AI-based Fatigue Detection

Deepak Upreti
REVA University, India

In this work, we implemented a fatigue detection system using machine learning and evaluated its performance. The proposed approach is based on the Viola-Jones face detection algorithm and the convolutional neural network (CNN). The Viola-Jones object detection framework is primarily focused on the detection of the face and facial features. The CNN is extended to the DenseNets and made full convolution to tackle the problem semantic image segmentation. The main idea behind the DenseNets is to capture the dense blocks that perform iterative concatenation of feature maps. The proposed system is implemented on many different video sequences and observed that its average accuracy is 99.18%, and the detection rate is 99.71% out of approximately 100 image frames. The system shows high accuracy in segmentation, low error rate, and quick processing of input data distinguishes from the existing similar systems. Finally, if we implement this system, it can minimize the number of accidents caused by drivers' fatigue.

Keywords: Convolutional neural network, CNN, DenseNets, ML, face detection, image processing

Need of Antenna Design Technology in Nepal

Sujan Shrestha
Macquarie University

Antenna Design Technology is the growing scope especially in the field of microwave and satellite communication which shall have direct impact on the telecommunication sector. Due to the growing population, there have been increasing demands for bandwidth, speed, light weight and low cost. Previously, antenna used to be design from the mechanical parts especially by using machine as well as patch antennas from copper. This has not only made antenna an expensive parts also increased the weight associated with that. The growing concept of three dimensional (3D) printing is the best solution for addressing such difficulties. Those antennas which is difficult to be visualized could be easily be fabricated from this technique using the most advance technique which involve the use of filament or resin components. Additionally, the advancement in 3D printing has been able to visualize the most widely used resonant cavity antennas parts. The partially reflecting surfaces above the source could be proposed by 3D printing techniques. It could be used to improve the bandwidth of wide band source, especially horn antenna which shall be building concept in the satellite transmission and reception sector. Most importantly, we could be able to steer the beam of incident source through the use of 3D printed parts. Thus, this shall enhance the global need for bandwidth, speed, light weight and low cost antenna.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S6: Innovation and Startups

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S6

Innovation and Startups

Funding for research and innovation is limited, and is increasing only at a very slow pace in Nepal. Due to lack of innovation, we have failed to make a direct impact on socioeconomic prosperity of the country. Government needs to drastically increase budget for innovation, and private sector need to increase proportional investment to develop required infrastructure and join global race for innovation. Local innovative research can also help build capacity to mitigate natural crises like COVID19. This session will discuss how GoN S&T agencies, academic, private sector institutions and NRNA need to build strong partnership and co-investment approach for the development of research and innovation. It will particularly focus on the role of NRNs in technology transfer, intellectual property protection, and product development and commercialization though startup companies.

Coordinators

Dr Raju Adhikari
Royal Melbourne Institute of Technology University, Australia

Dr Rameshwar Adhikari
Research Centre for Applied Science and Technology, Nepal

Program

Session:	S6: Innovation and Startups				
Date/Time:	09 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 23247938)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators/ moderators:	Dr Raju Adhikari and Dr Rameshwar Adhikari				
Session Chair:	Hon Dr Ram Kumar Phuyal				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:20	Prof Andrew Parratt	Invited Talk	General Manager	Cytomatrix Ltd, Australia	From Research to Commercialization – Cytomatrix Ltd: A Case Study in Pursuing Innovation
09:20 - 09:40	Dr RP Tripathi	Invited Talk	Former Chief Scientist	CDRI, India	Repurposing of Drugs for Management of Covid-19: Need for Scientific Collaboration
09:40 - 10:00	Dr Ron Chatelier	Invited Talk	Consultant	Universal Biosensors, Australia	From Invention to Manufacturing: the Story of a Biosensor Company
10:00 - 10:20	Dr Timothy Hughes	Invited Talk	Sr Principal Research Scientist	CSIRO, Australia	Photocurable Gelatins from Corneal Repair to 3D Bioprinting
10:20 - 10:30	Hari Pandey	Contributed Talk		Telstra, Australia	Road to EME Radiation Regulation and Public Safety Standard in Nepal
10:30 - 10:40	Dr Bhim Kafle	Contributed Talk	Assistant Professor	Kathmandu University	Diagnosis of Solar-Based Technologies in the Context of their Industrialization in Nepal: Sharing of Own Experience
10:40 - 10:50	Sumeena Karki	Contributed Talk	CEO	Rara Bioteck, Kathmandu	RaRa Biotech Journey from Idea to Startup
10:50 - 11:00	Kisun Ghalam	Contributed Talk	Founder, CEO	Kalapas Biotech	Why Nepal Needs Biotechnology, and Why Now? Story of Kalapas Biotech
11:00 - 11:10	Pavitra Bahadur Gautam	Contributed Talk		Karkhana, Kathmandu, Nepal	Innovation in Science and Technology Education in School Level
11:10 - 11:20	Bhaban Bhatta	Special Remarks	Ex-president	NRNA	
11:20 - 11:30	Hon Dr Ram Kumar Phuyal	Concluding Remarks	Member	National Planning Commission	
11:30 - 11:45	**Break**				
Session Chair:	Dr Ramesh Kanta Adhikari				

Session:	S6: Innovation and Startups				
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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
11:45 - 12:05	Dr Raju Adhikari	Invited Talk	Director	CRAM Polymers Pty Ltd	Sprayable Biodegradable Plastic Mulch Film For Crop Productivity
12:05 - 12:25	Dr Rabindra Puri	Invited Talk	Chair	Namuna Ghar, Bhaktapur	Preservation and Dissemination of Traditional Architectural and Structural Technology
12:25 - 12:45	Prof. Pramod B Shrestha	Invited Talk	Professor	Tribhuvan University, Institute of Engineering, Pulchowk	Disruptive Innovations Eco-System: A Performative Approach
12:45 - 13:00	Uttam Sanjel	Contributed Talk	Founder	Samata Foundation	Providing Quality Education for Underprivileged Children in Nepal
13:10 - 13:10	Bikash Gurung	Contributed Talk	President	Robotics Association of Nepal	Technology Development and Innovation against COVID-19
13:10 -13v20	Dr Jyoti Giri and Pankaj Panjiyar	Contributed Talk	Asst Professor	Tribhuvan University/ Doko Recycler	The New Social Challenges After Covid-19: E-waste Management
13:20 - 13:30	Asmita Khanal	Contributed Talk	Researcher	Research Centre for Applied Science and Technology (RECAST)/ National Innovation Center	Small-scale Food Processing Enterprises
13:30 - 13:40	Krishna Bahadur Rai	Contributed Talk	Lecturer	Patan Multiple Campus	Innovative Pathways to Energy Storage Nanomaterials
13:40 - 13:50	Govinda Giri	Contributed Talk	CEO	Sagoon Inc., USA	Role of Social E-commerce in Emerging Economy
13:50 - 14:00	Dr Ramesh Kanta Adhikari	Concluding Remarks	Academician	Nepal Academy of Science and Technology	
ICC Representative	Prabeen Gurung	Vote of thanks	Middle East Regional Coordinator	NRNA	

Abstracts

From Research to Commercialisation – Cytomatrix Ltd: A Case Study in Pursuing Innovation

Andrew Parratt
Cytomatrix Ltd

Cytomatrix is a public unlisted company in Australia. It began its life as a spin-off from an Australian listed company to develop uses for ceramic disk developed by NASA for use in the space program. Dr. Mark Kirkland, a specialist haematologist researching stem cell development and potential clinical uses. The company was formed in 2007 over the period to 2020 has produced in excess of 10 patents, three spin-offs, undertaken in excess of $20M of R&D and directly raised $15M in funding. The journey has been one of tragedy, opportunities, successes and failures.

Repurposing of Drugs for Management of Covid-19: Need for Scientific Collaboration

RP Tripathi
National Institute of Pharmaceutical Education and Research and *CSIR-Central Drug Research Institute, Lucknow*

The novel pandemic severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing coronavirus disease-2019 (COVID-19) is a global pandemic resulting in high rate of infection and millions of death. In absence of any drug or vaccines to be effective in COVID-19 prevention or treatment social distancing and personal/public hygiene is the only solution. Repurposing of drugs from the available drug arsenal by scientific research and innovations to search new therapeutic agent or combination thereof for the disease is underway in various countries to treat the Covid patients. A huge amount of work needs to be done to achieve a successful treatment result with full safety and efficacy. New collaborative models that draw on the strengths of pharmaceutical companies biotechnology companies, academic researchers, venture capitalists, and others will be needed if repurposing is to be successful. Tools such as electronic medical records could be valuable for understanding drug effectiveness, drug safety, and patient outcomes and could improve the statistical power of studies. In this context it is intended to present the need of scientific collaboration in sharing database obtained through research publicly to accelerate drug discovery to manage the Covid-19 disease.

From Invention to Manufacturing: the Story of a Biosensor Company

Ron Chatelier
Consultant in electrochemical biosensors

A brief overview will be given on some of the processes to consider when starting up a biosensor company, building a team, protecting intellectual property, carrying out the foundational research, developing a product, manufacturing in high volumes at high speed, market launch and customer service.

Photocurable Gelatins from Corneal Repair to 3D bioprinting

Timothy Hughes
CSIRO Manufacturing, Australia

Materials which can mimic the extra cellular matrix (ECM) are of great interest for many biomedical applications such as tissue engineering and cell therapies. Photo-initiated crosslinking of biopolymers are an attractive route to produce degradable supportive scaffolds that are amenable to minimally invasive implantation. With this in mind, we have explored the use of phototriggered reactions as a method to produce injectable and photocurable cell supportive scaffolds that can be cured in the presence of cells and have potential to be used in the repair of damaged cornea and resins for 3D bioprinting.

Vinyl functionalised gelatines were produced from gelatine and vinyl anhydrides (eg: acrylate and pentanoic anhydride).[1] Light triggered thiol-ene reactions were used to crosslink the vinyl functionalised gelatines with multifunctional thiols included thiolated gelatine. The rheological properties of the precursor formulations as well as the final gels and their cure profiles were measured using photorheology. The effect of solids content, ratio of components and light intensity were investigated. The water content, optical transparency and mechanical properties and microscopic morphologies of the gels were also measured. The ability of bovine corneal endothelial cells (bCECs) and fibroblast cells (L929) to grow within the gels was investigated. The gels were investigated in the repair of focal corneal defects in rabbit model. Finally, due to their ability to be photocured, similar gelatin materials were also investigated as potential resins for 3D Bioprinting.

Phototriggered thiol-ene reactions are rapid and facile methods of crosslinking gelatines. They resulted in transparent gel with mechanical properties suitable for soft tissue replacements. Moreover, they could be cured in the presence of cells and maintain high viability. The resulting materials are promising candidates for repair of corneal focal defects and resins for 3D bioprinting .

[1] Lingli Li, et al, "Gelatin-Based Photocurable Hydrogels for Corneal Wound Repair", ACS App. Mat. Inter., 2018, **10**, 13283-13292.

Road to EME Radiation Regulation and Public Safety Standard in Nepal

Hari Pandey
Telstra Corporation Ltd, Australia; Nepal Science Foundation Trust - Oceania coordinator

The electromagnetic waves are used to transmit information (communication) from one location to other. An antenna is used as transducer to convert the electrical power into electromagnetic waves and vice versa. These antennas have higher gain to cover the large area of communication and often emits higher power (radiation) that can cause significant health issues to human beings. The prolonged high exposure to this radiation has been proved detrimental to public health and well beings. The management of these radiation from antennas is very critical in Radio Frequency [RF] Network planning and design to ensure safety of general public & RF workers. EME regulation in Nepal is in very primitive stage and need more detailed discussion and implementation. Public awareness in EME radiation is found to be very limited. There need to be a discussion on how Nepal can learn the experience from Australia and other countries to establish EME regulatory framework including RF site management and public awareness.

Hari had previously shared his experience and current Australian standard for EME radiation management and regulation for Telecommunication network during his various conference and meetings in Nepal. He has emphasized the requirement of public awareness & RF site radiation management framework in Nepal. Hari has led this discussion with Nepal Telecommunication Authority (NTA) and Australian regulatory body (AMTA) and Public telco carrier Telstra to start the collaboration & knowledge sharing that will help to establish this EME regulation in Nepal. During this presentation Hari will provide the roadmap for radiation regulation and emphasize the requirement of RF radiation awareness and regulate this area and to ensure public safety.

World health organization (WHO) governs the Environmental health guidelines. International commission for Non – Ionizing Radiation (ICNIRP) guideline provides two exposure references (RF worker and General public) and accompanying controls on access. These are developed from scientific understanding of body heating and the translation to incident EME waveform power densities which both vary with frequency. Mobile Networks [3G, 4G, and 5G] and wireless Radio Network [Wi-Max, Smart meters, Microwave network etc.] are integral part of smart and sustainable cities. The efficient planning and installation of these wireless network must ensure RF radiation from these devices are within the exposure limit to general public and meet regulatory requirement. With current conspiracy theory around 5G & COVID-19, it has become more important for government to regulate this area and provide assurance of public safety by conducting scientific measurement.

Diagnosis of Solar-based Technologies in the Context of Their Industrialization in Nepal: Sharing of Own Experience

Bhim Kafle
Department of chemical Science and Engineering, School of Engineering, Kathmandu University

Nepal is blessed with about 5:30 hrs of daily solar radiation and thus suitable for exploring solar based technology, specifically for reducing the use of traditional (nonrenewable) energy (which weighs about 65%) for fulfilling the thermal energy needs. In this context, at present we are developing solar based technologies for water heating and space heating using. We are employing mainly two approaches: In the first, we are storing solar energy adopting the phase change materials and reuse it when needed (at night).Our proto-type product demonstrate very promising results and can for hand warming by the mountain dwellers, mountain hikers (tourists) and motorbike riders. This product can be expanded to water heating application as well. Similarly, in the second approach, we are storing solar energy in home-brewed flat plate solar thermal collector. Our proto-type product demonstrates about 20% more efficient than that of locally made collectors and could compete with the other imported technologies. In this meeting, we will highlight major achievements towards commercializing both of the products.

RaRa Biotech Journey from Idea to Startup

Sumeena Karki
Founder and CEO, RARA Biotech Pvt. Ltd., Nepal

In 2017, Sumeena Karki, a Nepalese biotechnologist, came up with an idea that would change the lives of farmers in her country. With over 72 million cattle, agriculture is the main source of income for Nepalese households, yet they still lack technological resources that could make their work easier. Convinced that biotechnology can systemically change the quality of living for people in rural areas, RaRa Biotech set out to start their journey as early-stage entrepreneurs. However, at the time, the Nepalese entrepreneurship ecosystem was underdeveloped, especially for a team made up of 6 female most of them being biotechnologists with no business idea fought harder to build a prototype that they knew would be convincing enough through their company RaRa Biotech, later being Nepal's first female founded biotech company.

"We have a popular saying that the people are rich and the government is poor – and I believe it's very true. We blame the government while also hoping it will step forward and solve our problems. We still wait for the perfect leader. But I didn't have the patience to wait for the perfect leader. My parents taught me that no one will come to solve our problems. If we want change to happen, it should first come from within. I didn't want to regret during my 60s looking back saying I wish I had done something to my country. At least I will be happy even if I fail, because I tried" - Sumeena Karki

There were no policies in place to support entrepreneurs, let alone biotech companies. High rates on bank loans and taxes made it almost impossible for early-stage companies like RaRa to get funding, and the cultural and political environment wasn't favorable either. For months, Sumeena and her team worked from their own pocket money.

A year later, RaRa Biotech has diversified their business, adding the production of shiitake mushrooms and waste management to further support Nepalese farmers and empower the country to return to food sustainability. They have bagged many prizes like winning Swiss-Nepal workshop, Start-Up Mela, Cohort of Bridge for Billions and many more. RaRa Biotech got International recognition by winning Best startup at World Innovation Forum. Now they support incubation programs to uplift the entrepreneurship ecosystem in Nepal.

"The biggest lesson I learned till now is that until we don't focus on those research-based projects which are able to uplift the economic status of people, we're not going to help improve the present conditions of our country."

Innovation in Science and Technology Education in School Level

Pavitra Bahadir Gautam
Karkhana, Kathmandu, Nepal

Nepal's contribution to global science, Technology & Innovation (STI) sector is negligible, which is not just that Nepal hasn't been able to properly engage science and technology for the development of our own society. The Challenge begins from a young age for any individual. The priority is given to topics of science and technology education and the pedagogy for it has not been able to create a foundation for the development of STI in Nepal.

The short presentation will revolve around the approach that can be used to unlearn and relearn about science and technology from an early age. The sharing will touch upon the possibility and work that is happening on a small scale in Nepal - taking an example of the approach by Karkhana. The presentation will be able to bring hope and possibility that has been budding in Nepal, where students of Nepal not only have to be the consumer of ideas and technology but also producers of it.

Sprayable Biodegradable Plastic Mulch Film For Crop Productivity

Raju Adhikari
CRAM Responsive Polymer Pty Ltd. Victoria, Australia

Preformed plastics have been widely used as a mulch film to reduce soil evaporation, weed growth, and increase crop productivity[1]. However, it's non-degradable nature cause long-term environmental pollution. In light of this non-degradable plastic mulch films are on the way to be phased out in the near future and some European countries have already banned its use. Biodegradable, bio-based, and compostable mulch films are now gaining increased attention as a more attractive alternative option despite its relatively poor performance and high cost to date. More recently, sprayable polymeric mulch films have also received increased attention due to their versatility and ease of application.

In the literature, several sprayable polymer mulch films have been reported and tried in field conditions but there are no commercial products in the market due to poor efficacy. Adhikari et al have recently reported[2] a novel water-dispersible sprayable polyurethane membrane with high efficacy for reducing soil evaporation and weed growth with improved efficacy. The polyurethane formulation (PUF) is stable at ambient temperature and can be sprayed using existing farm equipment.

I will present an overview of sprayable biodegradable plastic mulch technology and discuss physico-mechanical properties and field results. The presentation will also discuss the relevance of such technology in Nepal

1. Liakatas, A., Clark, JA., Monteith JL., 1986. Measurements of the heat balance under plastic mulches part I. radiation balance and soil heat flux. Agriculture and Forest Meteorology. 36, 227–239.

1. Adhikari, R., Casey, P., Bristow, K.L., Freischmidt G., Hornbuckle, J.W., 2016. Preformed and Sprayable Polymeric Mulch Film to Improve Agricultural Water Use Efficiency. Agriculture Water Management. 169, 1–13.

Disruptive Innovations Eco-System: A Performative Approach

Pramod B. Shrestha
Engineering Management, University of Alberta, Canada
Department of Mechanical Engineering, Institute of Engineering, Tribhuvan University, Kathmandu, Nepal

This century is best described as an era of *continual disruption* in which technological innovations and new business models are affecting not just individual, firms, but entire industries and ecosystem. Every day we experience the accelerated pace of technological innovations that shape our life and living. Technological innovations can be disruptive, prompting us to rethink about our existing value system and value networks or existing business models. In a disruptive innovation eco-system, we are interested in ***interactivity*** and ***integration***, not just ***connectivity***. In any innovation ecosystem, the ways in which organizations manage *skills, competencies and knowledge* will be a function of those forces that will shape the organization. The critical element of the organization will be the *dominance of knowledge, skills and competencies* as a *factor of production*.

When we study the process of continual disruptions, by endogenizing the disruption contexts within which disruption enfolds, there is a *relational perspective* that considers ecosystem dynamics. By considering the process dynamics associated with disruptions, *temporal perspective* is highlighted. When we consider the *relationality and temporality* of the disruption dynamics, a heterogeneity of responses and strategies are generated overtime which lead us to a performative, as opposed to a predictive approach to technological disruptions.

In my presentation, I will try to *anchor, explore and extend* the meaning associated with the concept of disruptive innovations. I will also try to present a topology and a general architecture of a PERFORMATIVE (as opposed to a PREDICTIVE) approach to disruptions. Clear trends/shifts which will set the innovation agenda in the 'New Normal' world (after COVID-19) will be highlighted. My intention of this presentation is to open up this important agenda for all the researchers, practitioners and policy makers involved in innovations.

Providing Quality Education for Underprivileged Children in Nepal

Uttam Sanjel
Founder, Samata School, College and Hospital, E-mail: uttamsanjel3@gmail.com

Many children in Nepal are deprived of education primarily due to low economic condition which lead many of them to beg even on the streets just to survive. Thus, the children, who are the backbone of the nation, need supports and protection which will ultimately contribute to strengthen our nation as a whole by making them able to stand on their own feet and take any challenges and responsibilities. We need to invest our time and efforts in this mission both bottom-up and top-down ways. Samata School is a bottom-up endeavour towards empowering the underprivileged children and supporting them to come to mainstream national development. In this paper, we will discuss our decades long experiences of the initiative in the direction of providing value based quality education to our children.

Technology Development and Innovation against COVID-19

Bikash Gurung[1], Nabin Munankarmi[2], Ramesh Kumar Maskey[3], and Rabindra Dhakal[4]

[1]President, Robotics Association of Nepal

[2]President, Bio-technology Society Nepal

[3]Coordinator of Science Committee of Nepal National Commission for UNESCO

[4]Chief of Technology Faculty, Nepal Academy of Science and Technology

The Technology Development and Innovation (TDI) thematic sub-committee formed by Nepal Government, three working groups, namely: The Authentication and Documentation Group led by Nepal Academy Science and Technology, the Technology Supervisory Group led by the Robotics Association of Nepal, and the Fund-Raising Group led by Biotechnology Society. The committee adopted a voluntary modality for the implementation of the goals. A 70 plus, representative of different organizations joined to share their ideas, insights, knowledge, expertise, and brainstormed on fighting against this COVID19 pandemic. These working groups brought a list of 22 different solutions, such as the development of apps, software, robotics solutions, personal protective equipment, disinfectant, drones for rapid response, AI solutions, and biotechnology. After several rounds of rigorous discussions within the groups and different organizations, the TDI sub-committee proposed short- term, mid-term and long-term action plans to the High-Level Committee to create a Centre of excellence through enhanced scientific knowledge and research industrialization.

To achieve the short-term goal, the TDI sub-committee proposed three-tier activities: 1. Technology assessment and selection, 2. technology prototyping, and 3. technology promotion, production, and dissemination. The committee worked continuously with the High-Level Committee to share the committee's outcomes during the first tier of activities. The TDI sub-committee successfully brought more than $200,000 grants from the Nepal government through NAST to support the second tier of actions by the local innovators and startups. More than 31 institutions and innovators are working at present to develop tools and technologies that can support the Nepal Government in fighting against the COVID-19 pandemic. Though the TDI sub-committee could bring financial resources to enter the second tier of activities, challenges exist for the innovators in terms of materials, mobility, human, collaboration, and many other hurdles due to lockdown and travel restrictions. Without entering the third-tier activities, the goal of self-reliance on technology to fight against the pandemic like COVID-19 cannot be achieved. Such intervention needs a funding source of more than 1 Million US$ from the Government, which could be an investment to create an ambiance for innovators leading to creating a center of excellence in technology innovation and industrialization. This voluntary collaboration provides unique insights on how the public-private partnership led interventions can create impact and how those interventions can be made useful.

New Social Challenges After COVID-19: E-waste Management

Jyoti Giri [1] and Pankaj Panjiyaar [2]
[1]Tri-Chandra Multiple Campus, Tribhuvan University
[2]Doko Recyclers, Waste Management Solution

Human nature always moves towards developments and advancements for sophisticated life with application of electrical and electronic gadgets in day to day life producing E-waste in huge amount. E-waste management is challenge in itself globally and COVID-19 pandemic added more woes in it by enormous use of electronic gadgets to produce virtual plates for study, meeting, official-works and building networks to work in this critical state. Developing country like Nepal lacks basic infrastructure for E-waste management. Due to COVID-19, whole cycle of waste management gets disrupted starting from collection, segregation, recycling and disposal. The restriction in movement of people and goods, first impact on E-waste management is collection system. Nepal's collection system depends on informal sector without any use of PPE and basic safety guidelines. The E-waste collection and disposal in Nepal rely on informal workers mainly from India. The restriction in movement had brought the E-waste collection system stand still and there is no sign of recovery from this covid-19 situation somewhere in near future. Holding hazardous waste category contained in homes and offices will add toxic in living locality while disposal and recycling is being carried out in very unsafe manner for fraction of E-waste collected. Bio medical instruments and equipment being used in treatment of COVID-19 patients are added E-waste fraction from this pandemic situation. Handling of this medical is another level of challenge. There are some good changes coming up due to COVID-19pandemic where people are becoming more aware about keeping environment clean and waste management. This will be right time to include E-waste management in general public awareness manifesto.

Developing a Small-scale Food Processing Enterprise

Asmita Khanal, Prasmasha Pant, Rakshya Dangol and Prativa Parajuli
Research Centre for Applied science and Technology (RECAST), Tribhuvan University, Kathmandu, Nepal
National Innovation Centre (NIC), RECAST, Kathmandu

Small-scale food processing enterprises are the fastest growing economies globally which are highly accessible as a start-up business. Such an enterprise can create employment, increase food security, and improve nutritional standards. With changing lifestyles and increasing income diversified food products like instant snacks, drinks and other convenience food are being popular among urban consumers. Nepal has a high dependency on such foodstuffs which are mostly supplied through imports. In order to promote a domestic foodstuff, small-scale food processing enterprises play an important role. Even a small level of food import replacement with local food product will make a significant contribution to socio-economic development. Our objective is to develop an enterprise based on the local food product and farm-based production with value addition and tap into niche areas to market the product. New food products for the market based on our traditional knowledge and farm-based ingredients, for example, juice and wine from neglected and underutilized yet potential fruits i.e, Bell, Chiuri, and Haluwabed. Jam and candies from highly nutritive and potential crop like Moringa, development of food supplements, and snacks for better nutrition from various seeds and crops are some projects under research and development. Financial constraints, market information, and lack of technology are the major challenges, among others to start a food processing enterprise. An infrastructure is needed that can assist and support the food processing entrepreneur for sustainable enterprise to operate in an open market.

Keywords: Food processing, value added, small-scale enterprise, food security, Entrepreneur, Nation development

Role of Social E-commerce in Emerging Economy

Govinda Giri
Sagoon Inc., USA

As the Internet has continued to evolve, we have seen significantly shifting in the ways we communicate and make purchases.

Social media has become a steady influence in our everyday lives on these fronts with 3.8 billion people across the globe now using at least one social network. E-commerce is no different, as we are now able to shop from anywhere, at any time, on any device, bringing the world of products to our fingertips.

However, what's missing until now is that there is NO platform where users can both bond socially and shop - and be rewarded for doing so. Sagoon was founded to evolve this space and evolve in this space.

Sagoon – a social eCommerce platform is founded by the Nepali diaspora to enable users to connect, share, and earn. Users at Sagoon connect with their friends, share knowledge and experience, and earn rewards for engaging and shopping.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S7: Intersection in Natural Sciences

9-11 October 2020

Online Event

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Program & Abstracts

S7

Intersection in Natural Sciences

We are at the crossroads of an unprecedented transition in the way we think and do science. Because of the rapid progress in computer technology and electronics, we are in a better position to interrogate the microparticles and living cells to the entire universe through research. This symposium is designed to serve as a forum for discussion on topics that are related to natural sciences such as mathematics, physics, chemistry, and biological sciences. There will be keynote speeches on the changing landscape of natural science domain and challenges that exist in Nepal for catching up with the rest of the world. In addition, there will be scientific presentations on research data preferably that intersect more than one natural science disciplines.

Coordinators

Dr Tara Sigdel
University of California San Francisco, USA

Dr Narayan Adhikari
Central Department of Physics, Tribhuvan University, Nepal

Program

Session:	S7: Intersection in Natural Sciences				
Date/Time:	11 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 23247938)		Passcode:	nrna2020	
Zoom Support	zoomsupport@nrna.org				
Coordinators/ Moderators:	Dr Tara Sigdel, Associate Professor, University of California San Francisco, CA, USA and Prof Dr Narayan Adhikari, Professor, Tribhuvan University				
Date/Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 11:00	S7A: Planning & Policy Introduction				
09:00 - 09:05	Session coordinators				Introduction to session
09:05 - 09:25	Prof Bhadra Man Tuladhar	Keynote Speech	Former Registrar	Kathmandu University	Science, Technology, and Society
09:25 - 09:45	Prof Dr Dharma K Baskota	Keynote Speech	Vice Chancellor	Tribhuvan University	Changing Landscape of Natural Science Education in Nepal and Challenges for Catching up with Rest of the World
09:45 - 10:05	Dr Giridhari Sharma Paudel	Keynote Speech	Vice Chairman	Planning Commission Gandaki Pradesh	Changing Landscape of Science and Technology Education in Nepal
10:05 - 10:25	Prof Dr Nanda Singh	Keynote Speech	Vice Chancellor	Mid-Western University Nepal	Nepal as a Biological Goldmine should be Converted into a Prosperous Nation with Disruptive Science and Technology (S&T) Policy
10:25 - 11:00	Panel discussion				
	Dr Rameshwar Adhikari	Panelist	Director	Research Centre for Applied Science and Technology (RECAST)	
	Dr Suresh Dhungel	Panelist	Spokesperson	Nepal Academy of Science and Technology (NAST)	
	Dr Rajani Malla	Panelist	Professor	Tribhuvan University	
11:00 - 11:30	**Break**				
11:30 - 13:30	**S7B -Contributed Talks**				
11:30 - 11:40	Dr Achyut Adhikari	Contributed Talk	Asst. Professor	Tribhuvan University	Natural Products a Potential Source for the Sustainable Development of Nepal
11:40 - 11:50	Prof Dr Bhadra Pokharel	Contributed Talk	Professor	Tribhuvan University	Evidence of Reentrant Relaxor Ferroelectric Phase transitions in Antiferroelectric Based Perovskites for Energy Storage Devices
11:50 - 12:00	Dr Bhanu Neupane	Contributed Talk	Asst. Professor	Tribhuvan University	Importance of Smartphone Based Microscopic Systems in Resource Limited Settings

Session:	S7: Intersection in Natural Sciences				
Date/Time:	11 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 23247938)		Passcode:	nrna2020	
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Date/Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
12:00 - 12:10	Dr Bikash Shakya	Contributed Talk	Scientist	Stanford University, CA, USA	Deciphering the Role of Erythrocyte CD55 in Plasmodium Falciparum Invasion
12:10 - 12:20	Dr Ghanshyam Bhatt	Contributed Talk	Associate Professor	Tenesse State University	Mathematics in Compressed Sensing
12:20 - 12:30	Dr Rajani Malla	Contributed Talk	Professor	Tribhuvan University	Bacteriophage: A Potential Game Changer for 21st Century Antibiotic Resistance Crisis
12:30 - 12:40	Dr Rajendra Pangeni	Contributed Talk	Research Scientist	City of Hope, Los Angeles, CA, USA	Transforming Academic Institutions in Nepal into the Research Driven Academic Environment to Promote Research in Biomedicine
12:40 - 12:50	Dr Rameshwar Pandit	Contributed Talk		Sungkyunkwan University, Suwon, S. Korea	Custom Synthesis: A Requisite for Cutting-Edge Research in Organic Chemistry
12:50 - 13:30	Panel Discussion and Q&A				
	Dr Rameshwar Adhikari	Panelist	Director	Research Centre for Applied Science and Technology (RECAST)	
	Dr Suresh Dhungel	Panelist	Spokesperson	Nepal Academy of Science and Technology (NAST)	
	Dr Rajani Malla	Panelist	Professor	Tribhuvan University	
	Dr Tara Sigdel	Panelist	Associate Professor	University of California San Francisco, CA, USA	
	Dr Narayan Adhikari	Panelist	Professor	Tribhuvan University	
ICC Representative	Hom Pandey	Vote of thanks	Oceania Regional Coordinator	NRNA	

Abstracts

Changing Landscape of Natural Science Education in Nepal and Challenges for Catching up with Rest of the World.

Dharma Kanta Baskota
Tribhuvan University

Existence of natural science could be expected from the time, whenever creation of earth along with initiation of living being in our planet started. But study of natural science started quite late, in different part of our planet during different time period(various civilizations) like: Mesopotamia, ancient Egypt, China, Greek, Roman and Indus valley civilization. Likewise, formal natural science education started even late and all disciplines of natural sciences crossed their different milestone of development. Now biology, physics, chemistry and astronomy are in the advance phase of development like "genetic study", quantum physics/ robotics, molecular chemistry and space science respectively.

If we recall our ancient holly books, we can easily presume that, at that time natural science of our part of the world was much more developed in comparison to other parts. Typical examples of these development were "Pushpak Biman" (aircraft faster than today's concord aircraft), "Setubanda" (bridge) built on top of sea in Ramesworam, successful transplantation of an elephant's head on body of Ganesh, unconscious people could be recovered after taking of herbal medicinal plants of Himalayas.

Now we are gradually recovering the natural science education in Nepal after establishment of Tribhuvan University by incorporating modern teaching methodology, research and innovation in natural sciences. We have to appeal Government of Nepal, to increase funds for attracting brilliant students in this field, providing good platform for research and innovations and apply the research outcomes for national development and welfare of the people, so that we can also catch up development of natural sciences with rest of the world.

Changing Landscape of Science and Technology Education in Nepal

Giridhari Sharma Paudel
Planning Commission Gandaki Pradesh

Main objective of this study is to highlight on changing landscape of science and technology education in higher secondary school and university in Nepal. Information for this study was collected from Economic Survey of Nepal, Flash Education Report and key informant interview. A transformation from general education to science and technology based education is on high demand in Nepal for achieving the ambitious national goal of prosperity by 2043. However, supply of science and technology education is creeping gradually because most of the university, college and school in Nepal were established during literacy period between 1951-2015. Main intent of universities, colleges and higher secondary schools was to produce teacher, administrator, security personnel and little attention was given for technician and entrepreneur required for industrialization and economic transformation of the country. The number of students enrolled in universities in science and technology and technical subjects increased by 201 and 508 percent respectively between 2003/2004 and 2018/2019. However, net sheer of students in science and technology in total university students increased marginally from 9.6 percent to 12 percent during this period. Similarly, the share of students in technical subjects in total university students increased from 17 to 26.1 percent during last 15-year period. The share of students enrolled in science in total students in higher secondary school (Grade 11 and 12) is just 15 percent. The national plan to transform Nepal from the least developed country to developing country by 2022, middle income country by 2030 and developed country by 2043 demand reorientation of education system and give adequate emphasis for science and technology subjects in secondary school and university. Upgradation and modernization of community secondary school, as a source of potential student supplier, is essential for increasing student in science and technology subjects in university. Refinancing to upgrade science lab, class room, teacher training and revision of curriculum is equally important.

Nepal as a Biological Goldmine should be Converted into a Prosperous Nation with Disruptive Science and Technology (S&T) Policy

Nanda Bahadur Singh
Mid-Western University, Nepal

Nepal is a land of biological goldmine which should be converted into a prosperous nation by formulating and implementing a disruptive Science and Technology (S&T) policy. Nepal can never be transferred into a prosperous nation without allocating a substantial amount of Research and Development (R &D) budget in Nepal's national priority.

The immense possibility of an applied example will be demonstrated with the research outcomes of the the ethno-genomics as a representative icon of Nepal's biological gold mines.

Science, Technology and Society

Bhadra Man Tuladhar
Former Registrar, Kathmandu University

This presentation is on the role of Science and Technology in Society. It starts with some quotes on Science from different personalities. Then it deals with the application of Science and Technology to Development. The Science and Technology Policy of Nepal is presented. The conditions for the effective application for science and technology in development is discussed. Institutions dealing with research in science and technology is described. The presentation concludes with the quote on Society by A. P. J. Abdul Kalam "Man needs his difficulties because they are necessary to enjoy success".

Deciphering the Role of Erythrocyte CD55 in Plasmodium Falciparum Invasion

Bikash Shakya and Elizabeth Egan
Department of Pediatrics, Stanford University, CA, USA

During erythrocyte invasion, Plasmodium falciparum relies on both host and parasite factors to ensure attachment, entry, and internalization. Previ-ously, an RNAi screen for host determinants of P. falciparum invasion identified CD55 as essential for in-vasion. However, the molecular function of CD55 during invasion and how it interfaces with other events and factors known to mediate this complex process are unknown. We sought to study the function of erythrocyte CD55 in the multistep invasion by P. fal-ciparum. We generated isogenic CD55-null and control erythrocytes from primary hematopoietic stem cells using CRISPR/Cas9 and ex-vivo erythropoiesis. P. falciparum invasion was markedly reduced in the CD55-null cRBCs as compared to isogenic controls, confirming the requirement for CD55 during invasion. We further characterized the role of CD55 in the invasion, using antibody-based inhibition, immunofluorescence and live cell imaging.

Transforming Academic Institutions in Nepal into the Research Driven Academic Environment to Promote Research in Biomedicine

Rajendra Prasad Pangeni[1], Tara Sigdel[2]

[1] Department of Surgery, City of Hope National Medical Center, Duarte, CA and

[2] Department of Surgery, University of San Francisco & San Francisco, CA

Biomedical research makes a crucial backbone in shaping public health and individualized treatment in developed world. Therefore, biomedical research in Universities, hospitals and higher education institutions guide government to provide a level of directions to public health system of a country. However, in Nepal, academic institutions, Universities and hospitals lack research in biomedicine and other related disciplines. Recently, a number of research institutions have been established Nepal that have secured international funding to pursue research. It is a high time to transform well-established higher education institutions of Nepal into a research-driven academic environment, in order to maintain continuous funding and to train young generation in biomedicine. In order to fill up this gap of research need and Nepal's current status of research in Biomedicine, a group of Nepalese researchers have come up together to build up an institution to carry out research driven academic activities in semi-urban area with support from Local/province government and community.

Keywords: Biomedical research, Higher education, Funding, Research-driven, institution, government

Importance of Smartphone Based Microscopic Systems in Resource Limited Settings

Bhanu B. Neupane

Central Department of Chemistry, Tribhuvan University, Nepal

An imaging system helps to visualize small specimen or the details within the larger specimens which are not visible to naked eyes. In recent years, smartphone microscopic systems are being explored as an affordable alternative to image and/or quantify specimens of few micrometer to few tenths of micrometer. In this talk, I will provide a brief overview of such systems and discuss the specific applications of the system: a) in detection and quantification of (oo)cyst in vegetable samples, and b) in characterization of micro-porous and fibrous materials such as cloth facemask.

Keywords: Imaging system, Smartphone microscope, Facemask, (oo)cyst

Natural Products a Potential Source for the Sustainable Development of Nepal

Achyut Adhikari
Central Department of Chemistry, Tribhuvan Uniersity, Kirtipur, Kathmandu, Nepal

Although Nepal is a small country it has a huge diversity of plant species because of its enormous range of habitats. According to the report of Royal Botanic Garden Edinburgh UK over 7000 species of vascular plants are found in Nepal, among them 300 are endemic (only found in Nepal). Nepal rises from subtropical lowland forests only 60 m above sea level to the alpine vegetation of its high mountains. More than 700 species of medicinal plants grow wildly and a vast number is yet to be explored. The microbial flora of the country has not been explored yet. This nature's gift would be a good income source for the country if we develop and market it properly.

Herbal products is a growing business with exponential increasing and the total herbal products market is estimated to be US $ 100 billion and expected to grow US $ 5 trillion by 2050. Similarly, the global market for essential/aromatic oil is US$ 6 billion. Now the practice of using dietary supplements and herbal remedies is on the rise even in the developed parts of the world such as USA and Europe.

From Nepal we are exporting herbal products mostly in the raw form, therefore not getting a good price. We should export refined and standardized products and for this purpose increase of research on medicinal plants is an immediate need. This talk will focus on the medicinal importance of some of the famous medicinal plants and spices of Nepal, and steps to do for the value addition of herbal products and essential oils for the export in the international market.

Bacteriophage: A potential Game Changer for 21st Century Antibiotic Resistance Crisis

Rajani Malla
Central Department of Biotechnology, Tribhuvan University

The worldwide emergence of multidrug-resistant bacteria is one of the greatest challenges to public health globally. *Klebsiella pneumoniae* is one of the multidrug-resistant pathogens that cannot be treated with fourth generation cephalosporins that causes a variety of nosocomial infections and leads to high morbidity and mortality. Phage therapy – application of lytic phage to kill pathogenic bacteria – is increasingly considered as one of the promising alternatives in current antibiotic crisis. For successful application of phage in therapy, the phage candidate must be both well-characterized and must have proven therapeutic efficiency. In this study, pharmacokinetics and pharmacodynamics of a novel lytic phage KP_Pokalde_002 were evaluated using *K. pneumoniae* infection model.

Results

Kp_Pokalde_002 is an icosahedral phage with prominent capsid and a short tail. Complete genome sequence analysis revealed that the phage is strictly lytic and belongs to the Podoviridae family (T7-like viruses). The genome was free from any virulent and antibiotic-resistant genes. The survival rate of the mice was found to be 100% when treated via the IP route in the simultaneous and 1 hr. delayed treatment group. However, survivability was decreased to 40% with the oral route. Interestingly, 80% of survival was recorded in the 24hrs. pre-phage administrated group. There was a significant reduction of bacterial load, pro-inflammatory cytokines, and to a lesser extent of lung inflammation as compared to the untreated group. The maximum phage count in the mouse body was found at 4 hrs. and 8 hrs., when administrated via the IP and an oral route respectively. Similarly, the half-life of the phage in the mice ranged from 3.3 to 4hrs. via the IP route and 4.2 to 5.1hr. via the oral route.

Conclusion

Phage Kp_Pokalde_002 effectively increases the survival of the infected animals. The results strongly suggest that the phage Kp_Pokalde_002 can be considered as a potential therapeutic candidate for future phage therapy.

Evidence of Reentrant Relaxor Ferroelectric Phase transitions in Antiferroelectric Based Perovskites for Energy Storage Devices

Bhadra P. Pokharel
Materials Science and Engineering Program, Applied Sciences & Chemical Engineering Department,
Pulchowk Campus, Institute of Engineering, Pulchowk, Nepal

A novel (Pb1-xBax) ZrO3 (PBZ) ceramics system with compositions x>0.30 exhibit a reentrant relaxor ferroelectric phase transition in an antiferroelectric-based perovskite is presented. Dielectric measurement has confirmed that the imaginary part of the dielectric constant for the reentrant phase is nearly frequency independent below a freezing temperature. The reentrant behavior could be scaled to a phenomenological equation involving the Vogel-Fulcher relationship. These results were further complemented by the polarization measurements. The PBZ samples were fabricated using a semi-wet synthetic route involving a solid-state thermochemical reaction. We believe this unusual phase transition sequence in PBZ materials would be highly useful in perovskite solar cells and high density data storage devices.

Keywords: dielectric; ferroelectric; PbZrO3; reentrant; solar cell; superparaelectric; supercapacitor, Vogel-Fulcher.

Mathematics in Compressed Sensing

Ghanshyam Bhatt
Tennessee State University, Nashville, TN

The compressed sensing is a technique of compressing the data at acquisition. This is useful when a signal is sparse. For such a signal only a small number of measurements (far less than actually required in principle) are enough to reconstruct it. In this talk we will talk about the mathematical theory of compressed sensing and associated mathematical challenges.

Custom Synthesis: a Requisite for Cutting-edge Research in Organic Chemistry

Rameshwar Pandit
Department of Chemistry, Sungkyunkwan University, Suwon, Korea

Currently research in organic chemistry has become multi-dimensional since it covers invention and investigation of reactions at the interface of organic chemistry with biology, medicine, nanotechnology, material sciences. The design and synthesis of macromolecules, bioactive molecules and drug candidates (Remdesivir) also belong to research in organic chemistry. While the scientists in this field are deploying advanced technologies to offer solutions through cutting-edge research in organic chemistry, custom synthesis provides several reagents from small scale to bulk quantities of chemicals, catalysts, materials for organic electronics, standard solutions, polymer etc as feed stock to promote smooth operation of investigation process.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S8: Life and Health Sciences

9-11 October 2020

Online Event

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Program & Abstracts

S8

Life and Health Sciences

Provision of quality health services is essential for assuring good health and well-being of the people. Their affordability and equitable access to all segments of the population are equally important for a just society that we envision for Nepal in the 21st century. Progress in modern medical sciences and technologies has improved the diagnoses and treatments of diseases such as various cancers, heart diseases and other chronic diseases. However, these advances have not always been resource friendly for Low-and-Middle Income Countries like Nepal, which continue to struggle with implementing latest practices in diagnoses and treatment of these diseases. On the other hand, many diseases, especially, the non-communicable chronic diseases, which are carrying increasing high resource burden on the society, are preventable through health promotion and policy changes in multiple sectors. The symposium aims to examine various aspects of health care and public health in Nepal exploring the potentials for strengthening the system of health care integrating primary care, acute care, specialized care and public health.

Coordinators

Dr Drona Rasali
British Columbia Provincial Health Services Authority, Canada

Dr Archana Amatya
Save the Children, Nepal

Dr Saroj Niraula
Faculty of Medicine, University of Manitoba

Program

Session:	S8: Life and Health Sciences				
Date/Time:	11 October 2020, 09:00 - 13:30				
Room 3:	https://bit.ly/3jjKz3d (975 6253 9651)			Passcode:	nrna2020
Zoom Support	support@nrna.org				
Coordinators:	Dr Drona Rasali, Dr Archana Amatya and Dr Saroj Niraula				
Moderator:					
Session Chair:	Dr Sudha Sharma				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:05	Dr Sudha Sharma	Session Chair	Former Secretary	Ministry of Health and Population	Welcome & Introductions
09:05 - 09:25	Dr Gyanendra Gongal	Keynote Speech	Regional Advisor	WHO Regional Office, New Delhi	The Epidemics of Noncommunicable Diseases in Nepal: Challenges and Opportunities
09:25 - 09:40	Dr Md Khurshid Alam Hyder	Invited Talk	Public Health Administrator	WHO Nepal	Noncommunicable Disease Prevention and Control in Nepal
09:40 - 09:55	Prof Dr Abhinav Vaidya	Invited Talk	Professor	Department of Community Medicine, Kathmandu Medical College Public Limited	Noncommunicable Diseases and Injuries among the Poorest Billion: a Nepalese Perspective
09:55 - 10:10	Dr Phanindra Prasad Baral	Invited Talk	NCD and Mental Health Section	Ministry of Health and Population	Health Care Service Delivery for Non- Communicable Diseases and its Challenges in Nepal
10:10 - 09:25	Dr Saroj Niraula	Invited Talk	Associate Professor	University of Manitoba, Canada	Mitigating Disparities in Cancer Outcomes between High-, and Low-and-Middle-Income-Countries through Participation in Cancer Research
10:25 - 10:40	Dr Rajesh Gongal and Dr Om Rajbhandari	Invited Talk	Founders	Hospice Nepal	Hospice Nepal: History and Development
10:40 - 11:00	Dr Simon Sutcliffe	Keynote Speech	Oncologist/Palliative Care	Two Worlds Cancer Collaborations	The Two Worlds of Palliative Care – Bridging the Gap with Nepal
11:00 -11:10	Prof. Dr. Shanthi Johnson	Invited Panelist	Dean	University of Alberta, School of Public Health, Edmonton, Canada	Panelist's remarks.
11:10 - 11:25	Dr Biraj Karmacharya	Invited Talk	Chief	Department of Community Programs, Dhulikhel Hospital, Dhulikhel, Nepal	Preventive and Promotive Health Services through the Community Approach: An Experience of Dhulikhel Hospital Kathmandu University Hospital

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Moderator:					
Session Chair:	Dr Sudha Sharma				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
11:25- 11:35	Bharat Nepal	Contributed Talk		Australia Nepal Public Link Inc	Impact of COVID 19 in Mental Health and Wellbeing: Current Crisis and Role of Nepali Diaspora
11:35- 11:50	Prof Dr Anjana Singh	Invited Talk		Central Department of Microbiology, Tribhuvan University	Emergence of Dengue Virus Infection in Nepal
11:50- 12:00	Sunil Mishra	Contributed Talk		Tribhuvan University	Prevalence of Human Bocavirus in Children Suspected with Respiratory Tract Diseases
12:00- 12:15	Dr Krishna Kaphle	Invited Talk	Associate Professor	Veterinary Teaching Hospital, TU Institute of Agricultural and Animal Science	Mid Hills of Nepal and its Transformation from Wildlife-Human Conflicts to Hotbeds for Zoonotic Diseases
12:15- 12:35	Prof A. Basseer Jeeawody	Keynote	President	Emotional Well Being Institute (EWBI), Geneva	COVID-19 a Complex Societal Challenge: Re-thinking the Path to Recovery in Nepal
12:35- 12:50	Dr Krishna B. Thapa	Invited Talk	Faculty	Department of Special Needs Education, Tribhuvan University, Kirtipur, Kathmandu	Dyslexia in Nepal: The Urgency of Raising Awareness and Taking Initiation for Collaboration and Cooperation
12:50- 13:00	Tara Gaire	Contributed Talk		Innovative College of Health Sciences, Kathmandu, Nepal	Knowledge Regarding Prevention of Varicose Vein Among Traffic Police Working in Kathmandu
13:00- 13:10	Dr Suman Shrestha	Contributed Talk		Gunma University	Role of Fluoro-deoxyglucose Positron Emission Tomography in Unknown Primary Cancers
13:10- 13:20	Dr Vinuja Verma and Shrishtee Kandoi	Contributed Talk		Department of Life Sciences, Tata Consultancy Services, Noida, India	Gene Expression Data Analysis Using Publicly Available Databases
13:20- 13:30	Dr Sudha Sharma	Concluding Remarks	Former Secretary	Ministry of Health and Population	
ICC Representative	Narayan Acharya	Vote of thanks	Europe Regional Coordinator	NRNA	

Abstracts

The Epidemics of Noncommunicable Diseases in Nepal: Challenges and Opportunities

Gyanendra Gongal
World Health Organization, Regional Office for South East Asia, New Delhi, India

Description:

Noncommunicable diseases (NCDs), are the major cause of death worldwide and kill 41 million annually, disproportionately affect people in low- and middle-income countries (LMICs) where more than three quarters of global NCD deaths occur. NCDs pose a huge economic and societal burden as it is chronic in nature demanding lifelong treatment, escalating health care costs and force to poverty. The adoption of the Global Strategy for the Prevention and Control of NCDs at WHO's 53rd World Health Assembly in 2000, as an act of solidarity with the LMICs that faced catastrophic consequences from NCDs. The decision by the United Nations General Assembly to convene a High-Level Meeting on NCDs in 2011 presents a unique opportunity for the international community to take action against the epidemic and enhance development initiatives. The Sustainable Development Goals 3.4 targets to reduce, by one-third, premature mortality from NCDs and promote mental health and well-being.

NCDs account for 67% (9 million) of all deaths in the WHO South-East Asia Region, where half of these deaths (4.5 million) happen prematurely between the ages of 30 and 69 years. In Nepal, NCDs are estimated to account for 66% of all deaths in 2016. Four main groups of NCDs – cardiovascular diseases (30%), cancers (9%), chronic respiratory diseases (4%), and diabetes mellitus (4%) are responsible for majority of these NCD related deaths. Cancers of mouth and lungs are dominant in males, whereas cancers of breast and cervix uteri are the leading cancers in females in Nepal. It is estimated that the burden of cardiovascular diseases will increase to 35%, cancer to 12% by 2030 and younger population are expected to suffer more in future. Tobacco use, harmful use of alcohol, unhealthy diet and physical inactivity are common behaviorally modifiable risk factors of NCDs. Air pollution and use of agrochemicals in agriculture production are environmental risk factors contributing to NCDs in Nepal. Mental illnesses are emerging public health problem in Nepal.

Nepal is a signatory of the 'Political Declaration of the General Assembly on the Prevention and Control of NCDs (2011) and is committed to achieving the goals and targets set in the WHO Global Action Plan on the Prevention and Control of NCDs. The Government of Nepal a 'Multisectoral Action Plan for the Prevention and Control of NCDs (2014-2020) with WHO support. WHO has been working with international partners to provide technical support to Nepal Government in policy advocacy, early detection and treatment for prevention and control of NCDs including capacity building.

It is high time to use Health in All Policies approaches to multisectoral action for the prevention and control of NCDs, including those that address the social, economic and environmental determinants of NCDs. More investment is needed to strengthen health literacy through population-wide targeted campaigns to reduce the impact of all risk factors and determinants of NCDs. There is a need of paradigm shift in governance structure, human resource management and intersectoral dialogue for NCD prevention and control considering new political reality and growing public expectation.

Key words: non-communicable diseases, Health in all policies

Noncommunicable Disease Prevention and Control in Nepal

Md Khurshid Alam Hyder
World Health Organization Country Office, Kathmandu, Nepal

Introduction: Deaths due to noncommunicable diseases (NCDs) in Nepal is reported to be 66% of all deaths in 2016 (WHO NCD Country Profile, 2018). CVD is responsible for 30% deaths, cancer 9%, Diabetes 4%, chronic respiratory disease 10% and other NCDs 13%. The Nepal NCD STEPS survey 2019 also reveals increasing trend of NCDs and its key risk factors.

NCDs are not just a health issue but a challenge to the national development agenda, increasing individual and household impoverishment and undermining social and economic development. A four-year analysis of National Health Accounts reported highest healthcare spending was on NCDs at NPR 37.73 billion. Out of Pocket expenditure was also highest for NCDs with 31% OOP.

Background: In 2011, world leaders adopted the UN High-Level Political Declaration on Prevention and Control of NCDs. Nepal, a signatory to the Political Declaration developed the MSAP 2014 - 2020 in line with the Global and Regional Action Plans. This recognises the importance of multisectoral engagement for prevention and control of NCDs since most of the determinants and risk factors for NCDs fall outside the purview of health sector. The current MSAP (Multi-sectoral Action Plan) was built upon four strategic pillars: Leadership, Advocacy, Partnership to accelerate and scale up national multisectoral response and address the underlying social determinants of health; Health promotion and risk reduction coupled with legislative, fiscal measures and setting based approaches with focus on major risk factors; Health system strengthening for early detection and management of NCDs and its risk factors through integration in primary health care system and Surveillance, monitoring, evaluation and research.

The Action Plan has an established institutional mechanism at the highest-level - the High Level Committee chaired by the Chief Secretary and Secretary MoHP as Member Secretary, and National Steering Committee chaired by Secretary MoHP

Evolution of NCD care in Nepal:

Nepal was among the first countries to endorse an MSAP for prevention and control of NCDs with a well defined governance structure. Prior to this, focus on NCDs had been limited except for tobacco control through the FCTC and Tobacco Products (Control and Regulatory) Act 2011. With MSAP I, there were some notable achievements in NCDs in Nepal:

Achievements: MSAP I (2014-2020) guided the NCD prevention and control efforts in Nepal. Some of the notable achievements are listed below:

- High level advocacy on Prevention and Control of Noncommunicable Diseases (2016) and functional High level and National Steering Institutional structure. Designated focal points in Prime Minister's Office (PMO) and key line ministries for NCDs
- NCDs reflected in National Health Policy and Programs
- Smoke free policies and complete ban on tobacco advertisement, promotion and sponsorship. 753 local bodies had designated tobacco inspectors
- school nurse and Yoga introduced for school health promotion
- The WHO PEN Package which is the Package of Essential NCD interventions targeted at low resource settings to integrate NCD prevention and management into primary care system was scaled up to 51 districts within one year of

introducing a pilot project in two districts

- MSAP (2014-2020) comes to an end in 2020 and preparations are already in progress for the development of MSAP II (2021-2025)
- The National NCD risk factor survey (STEPS survey 2019) was conducted which provides data on prevalence of risk factors across the country. This will be useful in policy advocacy and guide the development of MSAP II

Conclusion: The multisectoral platform on NCDs led by the PMO and National Steering Committee led by the Secretary, MOHP are important in engaging the multiple sectors that are essential for prevention and control of NCDs. These platforms were also important in taking to decision to scale up PEN implementation in 51 districts with plan for covering all the districts by end of this financial year using domestic funding after WHO demonstration project in 2 districts

With demographic, epidemiological and nutritional transition occurring at fairly rapid pace, it is expected that the NCD epidemic will rise, posing a significant challenge for achieving the sustainable development goals. To achieve the 25% reduction of premature mortality due to NCDs by 2025 and the SDG target of one third reduction in premature mortality due to NCDs by 2030 in Nepal, the government will have to strengthen implementation of the multisectoral policies and strategies, through a "whole of government" and "whole of society" approach.

Key words: non-communicable diseases, Multi-sectoral Action Plan, STEPS,

Noncommunicable Diseases and Injuries among the Poorest Billion: a Nepalese Perspective

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Description:

The burden of noncommunicable diseases and injuries (NCDIs) in terms of disability and death in Nepal has more than doubled over the past 25 years. In 2015, 51% of all deaths and disabilities (DALYs) were caused by NCDs and 14% were caused by injuries. Although global targets in NCDs largely focus on four major diseases (cardiovascular disease, type 2 diabetes, chronic respiratory diseases, and cancers), 60% of deaths and disabilities from NCDIs in Nepal are due to other conditions, such as non-ischemic cardiac conditions, infection-related cancers, musculoskeletal disorders, mental health conditions, neurological disorders, and injuries (particularly as a result of natural disasters). Some of these conditions disproportionately affect poorer segments of the Nepali population, such as ischemic and hypertensive heart disease, COPD, haemorrhagic and ischemic stroke, asthma, hearing loss, rheumatic heart disease, congenital heart disease, cirrhosis due to HBV, and peptic ulcer disease.

Many of these conditions are more likely linked to untreated infectious diseases, living conditions associated with poverty, and poor access to health services. Injuries, gastrointestinal conditions, and heart-related diseases cause the most impoverishment among NCDIs across the population, and at an individual household level, cancers, injuries, heart-related conditions, and kidney/liver diseases are severely impoverishing.

Despite inclusion of NCDIs in basic health services and high reported availability of NCDI services at public facilities, availability of key medications and readiness of NCD services remain very limited, and availability of trained human resources is a particular challenge. Although the government allocates 11% of expenditures to health, 48% of total health expenditure in Nepal comes from out of pocket. Thirty-three percent of this out-of-pocket spending is on NCDIs.

Considering the burden and distribution of NCDIs in Nepal, the NCDI Poverty Commission selected 25 NCDI disease conditions on which to increase health sector interventions. These conditions, which build on the existing goals in the Nepal health system, include asthma, chronic obstructive pulmonary disease, hypertensive heart disease and stroke, rheumatic heart disease, diabetes (type 1 and 2), breast and cervical cancer, childhood leukemias/lymphomas, major depressive disorder, epilepsy, sickle cell disease, cirrhosis, motor vehicle road injuries and other injuries. The commission has identified 23 potential cost-effective interventions to be introduced and/or incrementally intensified within the health sector to establish Universal Health Coverage for these priority NCDI conditions by 2030. These interventions, if implemented to a realistic target coverage, are projected to avert at least 9,680 premature deaths every year by the year 2030. In addition to consideration of these interventions, the commission also identified several areas to strengthen governance, health system strengthening, and monitoring of this expanded set of priority NCDIs.

Health Care Service Delivery for Non- Communicable Diseases and its Challenges in Nepal

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Description:

As exhibited in WHO NCD Country Profile 2018, among total deaths 66% are due to NCDs with CVDs contributing to around 30% and if we add injuries (9%) to this NCDs list then the overall burden adds up to 75%. The STEPS Survey 2019 reveals among adults aged 15-69 years there is raised BP in 24.5%, raised blood sugar in 5.8%, and raised cholesterol in 11.1%. Also, 22.7% are overweight or obese, 28.9% use tobacco products, 96.7% do not take 5 servings of green fruits &/or vegetables as per WHO recommendation.

NCDs are recognized as a significant burden on health systems, economies, and a source of catastrophic expenditure for many individuals. However, the pressing challenges lie in the fact that many of their underlying determinants lie outside the health sector.

Considering the fact, the Ministry of Health and Population (MoHP) has developed Multi Sectoral Action Plan (MSAP) 2014-2020 for NCDs approved by the cabinet of the Government of Nepal (GoN) with four key action areas, i.e., 1. Advocacy, Leadership, and Partnership, 2. Health Promotion and Risk Reduction, 3. Health System Strengthening and 4. Surveillance, M & E and Research

Our target is to meet SDG target 3.4 (reduce premature mortality from NCDs by one third) by 2030. The GoN made a strong commitment and launched the Package of Essential Non-Communicable Diseases Intervention (PEN) program in the country with the technical support of the WHO in 2016. There is clear leadership from the government to address NCDs and mental health challenges and thus a dedicated – NCDs and Mental Health Section under Epidemiology and Disease Control Division (EDCD) was formed as a focal point. The financial resources for NCDs and Mental Health Interventions have been increased by many folds compared to a few years back. Under the leadership of EDCD, well-defined service packages and standardized protocols have been developed; core medicines of NCDs and Mental health have been included in the Essential Drug List (EDL), along with the promotion of task sharing by non-physician health workers and application of Team-Based Care Approach. By the end of this year, PEN program will be in all 77 districts and the Mental Health program in 41 districts.

Nepal launched the Framework Convention on Tobacco Control Strategy-2030 which focuses on strengthening the execution of existing plans and policies, utilizing tax to finance development innovations, enforcing legal provisions for tobacco control, creating a supportive environment for tobacco-free generation, and preventing interference of the tobacco industry in policymaking. GoN also passed a "National Policy on Regulation and Control of Alcohol -2017 imposing a total ban on alcohol advertisement, promotion, and sponsorship. Also, the strong implications of the Vehicle and Transport Management Act have reduced driving under influence leading to a decrease in Road Traffic Accidents.

NCDs are addressed in National Health Policy 2076 which states that **"Individual, Family, Society and Related Bodies are made responsible in order to prevent and Control NCDs by Making them developed and expanded through an Integrated Health System."** Bipanna Nagarik Kosh (Medical Treatment of Deprived Citizens) established in 2006 provides one lakh rupees as financial relief to people from difficult to cure and costly treatment like Cardiovascular diseases, Cancer, Renal failure, Alzheimer's disease, Parkinson's disease, Head and Spinal injury, Sickle Cell Anemia and Stroke. Likewise, the Social

Health Security Program (SHSP), a social protection program of GoN was formed in 2015 AD which aims to enable its citizens to access quality health care services without placing a financial burden on them. Implementation of the Community Mental Health Programs and the development of Child and Adolescents Mental Health Package, Suicide Prevention Program, initiation of Tele-Mental Health Services and endorsing Mental Health Strategy, etc. has enhanced the efforts in mental health services.

Our long term goal is to reduce the barriers to prevent, treat and eliminate health inequalities in the care of NCDs and Mental Health. To ensure that social and human development indicators in Nepal are not further compromised, more funding must be allocated to expand robust health and costing data to include NCDs and Mental Health. In addition to facilitating transparency and accountability, regular, updated quality metrics that are readily accessible and comprehensible will enable the provincial health departments to accurately plan, budget, and evaluate their activities. Such institutions and policy interventions have the potential to harness public health as the basis of inclusive economic growth. Given the huge fraction of health and inequality that characterizes our current development trajectory, addressing the NCD epidemic could not be more urgent. We must create an environment in which rich and poor alike are empowered to make healthy choices. With fewer sick people to support, our health system could focus on providing better-quality care.

Key words: Non-communicable disease, Multi Sectoral Action Plan (MSAP)

Mitigating Disparities in Cancer Outcomes between High-, and Low-and-Middle-Income-Countries through Participation in Cancer Research

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The United Nations Sustainable Development Goals (SDG) 2030 is an ambitious but achievable roadmap that consists of 17 goals with 169 targets to which all UN Member States have committed to achieving in the next 10 years. A common element in almost all of those 17 goals is the health of the world's citizens, to which non-communicable diseases (NCDs) such as cancer plays arguably the most vital role. Cancer claims close to 10 million deaths annually around the world with approximately 70% of those deaths occurring in low- and middle- income countries (LMIC). Strategies to lower this disparity are therefore integral to achieving UN SDG by 2030.

An obvious factor associated with this disparity in cancer outcomes is economic but that is only a part of the story, and possibly not even the biggest part. Awareness, culture and ethics, bureaucratic and system-level deficiencies, and inefficient mobilization of available resources likely play equal, if not larger roles. A tried and proven tool to improve outcomes from NCDs like cancer is through active participation in research, of which clinical trials are an essential component. Participation in clinical trials not only offers access to novel therapeutics, but has been demonstrated to improve overall outcomes of patients. Unfortunately, at present, evidence generated for treatment of NCDs originates almost exclusively in High Income Countries (HIC) representing 90% of clinical trials and 80% of participants in those trials. This directly widens the gap between disease outcomes in HIC and LMIC, and introduces uncertainties about generalizability of findings from those clinical trials to LMIC, owing mainly to anthropologic differences including social, cultural, and ethnic variability. On one hand lack of expertise in conduction of research is a major barrier in LMIC, on the other hand accumulating evidence suggests that clinical trials that include participants in both HIC and LMIC are of higher quality than clinical trials conducted in HIC alone, strengthening the rationale for HIC to seek collaborations with LMIC and vice-versa.

In the era of multi-national mega clinical trials in cancer, LMICs can strategically use the strength of their patient volumes not just to increase participation in such trials but also in their design to better represent sociocultural texture of LMIC. Handle on such opportunity can be achieved with investing in manpower and infrastructure to gain trust of international researchers. Temptation in research however should not outsize the goal of such research. Goal of cancer research is to eventually improve outcomes of cancer patients. This may or may not be the primary goal of the sponsors of clinical trials. Therefore in seeking collaborations, LMIC may benefit more from focusing their interest on 'low hanging fruits' that may have escaped attention of HIC, such as repurposing of pre-existing drugs.

High quality cancer research is not just feasible in LMIC, but is necessary as that can improve clinical care in both HIC and LMIC. Although conventionally cancer research has been viewed as a "luxury" of health care in LMIC, it is encouraging to observe the evolution of that attitude as a "necessity" component of high-quality healthcare delivery. To conclude, as a researcher with interest in improving cancer outcomes LMIC, I have to borrow Robert Frost's words: "But I have promises to keep, and miles to go before I sleep, and miles to go before I sleep".

Key words: Cancer outcome disparities, Quality cancer research.

Hospice Nepal: History and Development

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Hospice Nepal; Patan Academy of Health Sciences; Nepal Ambulance Service and Primary Trauma Care Nepal.

Om Rajbhandari

Nepal Ambulance Service; Rotary Club of Kasthamandap

Description:

It has been twenty years since Hospice Nepal, the first organization in the country in the field of palliative care, embarked on the journey of caring for people at end of life, especially those suffering from cancer when treatment options run out and waiting for death, often with pain, becomes inevitable. Starting from four beds in a private hospital, it is now providing inpatient service in 8 bedded unit at Lagankhel in a leased land. Every year we look after 150-200 patients in this unit.

Many patients prefer to be cared at home or patients who come to Hospice and return home after improvement in their symptoms would like to stay at home as far as possible. So in 2005 we started home care services in Kathmandu Valley.

In the same year, Hospice Nepal in collaboration with Patan Hospital started two day palliative care course for health professionals. So, far more than 1200 Healthcare workers have gone through this training.

80% of the population live in rural areas of Nepal and by logic, 80% of palliative care need is in rural Nepal. Therefore, it becomes imperative to develop palliative care in rural areas of the country. To this end, Hospice Nepal has been working in rural area of Makwanpur, a hilly district 5 hours drive from Kathmandu since 2014 to develop a rural model of palliative care based on the model of **' For the locals , by the locals'**. Initially, two local health care workers were trained and are now providing community based palliative care services in Makwanpur. The initial focus was on cancer patients. Apart from providing clinical care of the patients in the community, we have also been running orientation program for local public, local leaders and develop a cadre of local volunteers.

Realizing that there were many patients with non-malignant conditions requiring palliative care, we conducted a study on the need of palliative care in a rural community as a whole, looking at both the malignant and non-malignant disease. This study showed that there was a need to look after patients with non-malignant conditions as well. So we extended our service accordingly. The service has now been extended to other areas of Makwanpur with the Local Government taking the responsibility with our technical support.

The time has now come to expand the service across the country so that no Nepali citizen should live or die in pain. For this purpose, we need a state of art inpatient unit with training facilities to provide care pars excellence, to train health professionals, to carry out research in local context and to advocate for the peoples' right for **'Quality in Living and Dignity in Dying'**. Five ropanis of land in Dhapakhel, Lalitpur has been secured. A concept design of 20 bedded unit with training facilities has been completed. Fund raising, both locally and globally is underway.

Key words: Hospice, palliative care, Dignity in dying.

The Two Worlds of Palliative Care – Bridging the Gap with Nepal

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Description:

The population of Nepal is a little less than Canada, although Canada is 68 times larger. Most deaths are due to non -communicable diseases (NCDs). 70% of adults and 80% of children diagnosed with cancer die of the disease, compared with 45% and <20% respectively in Canada. Cancer is not a different disease in Nepal - the ability to control cancer differs.

TWCC- a Canadian volunteer society- aims "to bridge the gap", to help build better health, cancer control and palliative care (PC) through collaboration, trust and knowledge.

Limited specialized health services exist in Kathmandu and Chitwan. Regular care occurs at district hospitals and community clinics, often accessible only by long, difficult journeys over challenging terrain. Few physicians/cancer specialists have dedicated training and expertise in adult PC; even fewer in childhood PC. It is not a recognized specialist discipline in Nepal yet, and there are no funded training programs for physicians wishing to develop PC as a career. PC services are available in private hospitals, few public hospitals, and even fewer small community hospices. Many seek specialized care from hospitals in India.

Nepali Health professionals know that pain relief and PC is essential, that the majority of patients will require end of -life support, and that currently too little is offered to too few. The Nepal Association of Palliative Care (NAPCare), supported by Two Worlds, is implementing a strategic plan for PC. Decentralization of services to reach a dispersed, rural population will be necessary, with expertise at community, district, tertiary hospital and hospice levels- analogous to the Telangana, India PSK program where government is supporting PC clinics across all 31 districts, all linked by internet (Zoom) to achieve real-time case consultation, education, skills development and mentorship. Internet-based medicine to enhance local competence and expertise without requirement for travel (patient or health professional) is just evolving in Nepal e.g. childhood cancer palliative care through the Two Worlds Cancer ECHO program. Plans to re-build Hospice Nepal, an old facility in Kathmandu centre, are underway with local and international support (Rotary, Fairfield, New Zealand, and Challenge Fund, UK) to establish a larger facility, providing more support to more patients in a rural ambience on the outskirts of the city.

Palliative care is about finding peace, comfort and dignity when longevity of life is at high stake. It has little to do with technology, equipment, cancer treatment, or facilities, other than as required for supervised medical care. It is a less expensive part of health care; it can reduce costs and resource use by reducing unnecessary and inappropriate use of high cost acute health care/hospital services. Health care and services are improving in Nepal. Now is a good time to establish local, quality, sustainable PC for Nepalis through strategic collaboration, shared knowledge, expertise and "know how".

We would like NRNA and the government sector to join hands and be a collaborating partner with TWCC and NAPCare to support the continuing development of adult and childhood palliative care across Nepal, and the re-building of Hospice Nepal.

Key words: Palliative care, Hospice, Cancer

Preventive and Promotive Health Services through the Community Approach: An Experience of Dhulikhel Hospital Kathmandu University Hospital

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Description:

Dhulikhel Hospital Kathmandu University Hospital (DH) is a pioneering institution in establishing a community-based model of health care. Established in 1996 with a modest beginning of about 25 beds, it became one of the fastest growing health institutions in Nepal. Currently, it is a fully functioning tertiary hospital which is also the University Hospital of Kathmandu University. Besides the central hospital, it runs 18 rural health facilities in various parts of the country from where it provides round-the-clock quality health services. The unique element of this rural community-based approach is that DH integrates innovative community development programs in the health programs thereby creating a holistic approach to community-based health care. Three key lessons we have gained are: **First,** communities have heroes and as professionals it is our task to identify and empower them. **Second,** the solutions to the problems are best found in the places where the problems lie. Thus, it requires a continued engagement with local communities if we are to understand them and collaborate with them. And **third,** innovation shouldn't necessarily mean technologies only. We need to be innovative in terms of developing new approaches in our health system. In a resource-limited setting like ours, tapping the resources of the communities, in terms of the goodwill and support are critical for any sustained ventures.

Key words: Prevention, Health promotion, Community approach.

Impact of COVID 19 in Mental Health and Wellbeing: Current Crisis and Role of Nepali Diaspora

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Description:

Global effort to control and management of health crisis created by current COVID-19 pandemic has been a major public health and economic catastrophe having to deal by current global political and public health leaders and experts. This crisis also diverted direct attention to how well-advanced health care system is dealing with the crisis. This pandemic is multidimensional in the sense that it is not just a health crisis, it is crisis of the magnitude that severely and negatively impacted the global population.

Mental health issues are on the rise globally with continuously and worryingly high suicide even without effect of pandemic. The disproportionate burden is on the low- and middle-income countries. Nepal is one of such countries. Mental health issues and death by suicide is on the rise globally, however low-income countries fare worst in terms of addressing psychological distress. Recent survey undertaken in Nepal on impact of COVID-19 on mental health and wellbeing of Nepali adult found that many respondents are worried for their health, financial situation and their families which has contributed to have increased mental health distress and crisis people are experiencing.

Author's experience in working within public mental health system in NSW Australia along with findings of research on mental health literacy in Australia will guide presentation coupled with relevance and effectiveness in Nepali context.

Psychological wellbeing should be utmost priority in the crisis. Some lessons from Australia will be shared in presentation.

Key words: mental health, suicide, COVID 19

Emergence of Dengue Virus Infection in Nepal

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Description:

Dengue virus (DENV) infection, a mosquito-borne viral disease, is a significant threat to public health worldwide. The first Dengue Fever case in Nepal was reported in 2004 and the first recorded transmission in 2006. Since then cases have been reported every year. The emergence occurred in low land Terai belt region bordering India however, recently it has expanded to hilly regions. Though all four serotypes of dengue virus have been reported to circulate in the country, serotype 2 and 1 are responsible for major outbreaks. The DENV circulating in Nepal was most closely related to South Asian, Asian or Cosmopolitan genotype. Thus dengue epidemics are linked to different genotypes and serotypes of the virus. Due to geographical expansion of dengue affected districts and lack of specific vaccine, an effective vector control is essential for containment.

Key words: Dengue virus, Dengue Fever.

Prevalence of Human Bocavirus in Children Suspected with Respiratory Tract Diseases

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Description:

Acute Respiratory Infections (ARIs) are responsible for considerable morbidity and mortality worldwide. Human Bocavirus (HBoV), a newly identified virus, has been reported to be prevalent in the pediatric populations and is potentially associated with respiratory tract disease. HBoV has been associated with upper and lower respiratory tract infections and shown to be a cause of pneumonia in children. It has been found that HBoV affects individuals of all age groups but mainly targeting infants aged 6-24 months with respiratory symptoms. HBoV is a member of the family Parvoviridae (subfamily Parvovirinae, genus Bocavirus). The virus cannot be yet deep-rooted as a causative agent of disease due to the lack of animal models and /or for the difficulties in replicating it in in-vitro cultured cells which can be derived from Koch`s modified postulates. Viral infections are found to be more prevalent among pediatric population in Nepal and thus it is very important to root out the cause of such infections to provide quality health facilities to younger population. This research aims to provide knowledge on a new virus in Nepal that has not been previously studied in the country.

This study was carried out from December 2018 to May 2019, with the objective to determine the prevalence of Human Bocavirus in children suspected with respiratory tract diseases in collaboration with Tri-Chandra Multiple Campus, Kanti Children's Hospital and Central Diagnostic Laboratory and Research Center, Private Limited. During this period, a total of 120 nasopharyngeal swabs were collected from Kanti Children's Hospital from children between 0-15 years and analyzed by Multiplex RT PCR technique at Central Diagnostic Laboratory and Research Center Private Limited, Kamalpokhari, Kathmandu, Nepal. The required information of the participants was recorded in the patient information sheet and ethical approval to carry out this research was taken from Ethical Review Committee, Kanti Children's Hospital, Maharajgunj, Kathmandu, Nepal.

Out of 120 samples studied, 15 (12.5%) were found to be HBoV positive. The prevalence rate in male and female was found to be 15.58% and 6.98% respectively. The population of age group below 2 years was observed to be mostly affected with the prevalence rate of 33.33% followed by 3-5 years and 6-15 years. The highest number of samples was collected in March and the prevalence rate was also found to be high (60%). Only 10% prevalence rate was observed in in-door patients while it was found to be high in out-door patients. Co-infection of HBoV was found to be 33.33% with Respiratory Syncytial Virus (RSV) and 13.33% with Parainfluenza Virus (PIV). The symptoms of HBoV infection varies from individual to individual with fever and cough in all patients followed by wheezing in 80% of the cases. This is the first well conducted research on Human Bocavirus infection in Nepal and no previous research has been recorded on this virus in Nepal.

Key words: Human Bocavirus, Children, RTDs, Co-infection.

Mid hills of Nepal and its Transformation from Wildlife-human Conflicts to Hotbeds for Zoonotic Diseases

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The mid hills of Nepal have in last two decades transformed from heavily populated and anthropogenically active ecosystem to be dominated by wildlife. Wide scale migration to the plains, cities and abroad employments have resulted in depopulation and reverse invasion by nature. Human-wildlife conflict is a major issue of the day in the region. Now post COVID-19, many foreign employed youths have lost their employment opportunities are returning back. It is likely that many will try to settle down in their land of forefathers and resume the ancestral occupation of agriculture. With forest takeover of the cultivation land, it will again take a lot of efforts to clear it and prepare the farm. One danger of land use change is that the socio-economically vulnerable population gets exposed to zoonotic disease. It is established fact that known wildlife hosts of human-shared pathogens and parasites are higher in sites under substantial human use (secondary, agricultural and urban ecosystems that is bound to increase in the mid hills) compared with nearby undisturbed habitats. Likewise, the impact of rapid land cutting for road extension is also linked to disturbed water channels and serious incidences of landslides. Combined together, pressure on land, water and vegetation we have serious issues in hand, that demand interventions strategies beforehand. Thus, whatever was the reason for displacement of population in the mid hills of Nepal and the intensity of pressure that returnees are bound to bring, proper planning is a must. One thing that needs to be considered in the reengagement is the prevention and mitigation of zoonotic risks.

Keywords: Ecosystem, Midhills, zoonosis, Human-wildlife conflicts

COVID-19 a Complex Societal Challenge: Re-thinking the Path to Recovery in Nepal

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Description:

COVID-19 has severely affected every aspect of life globally, and Nepal is no exception. Despite maximum precautions, the pandemic continues to decimate communities, families, workplaces, and economies. Governments are affected, economies are crushed, social sector torn apart, societies disconnected, fear instilled, and vulnerabilities manifested. Nations are in a state of uncertainties, compelling them to implement extreme measures regardless of appropriate infrastructure and resources. This is a concern for Nepal, whose majority live in perpetual precarity, a state in which they experience hardship to maintain their basic livelihood.

We are struck by the commonality of responses being adopted globally. There is strict disciplined militarization and medicalisation of the pandemic, which is politicised in a variety of ways. Governments are relegating their citizen's capacity to make decision about their safety. Citizens, based on their insight and capability, make informed choices on experts' directives.

Nepal is gradually experiencing its real impact now. Economies, health, safety, security, and emotional well-being of citizens are severely affected. Citizens are living in quasi-states of emergencies with restricted movements and freedoms affecting work, family, and community life. Any deviation from practising restrictions create conflicts between the public, police force and government authorities. Such behaviours are potentially escalating infection threat levels. The emotional well-being of citizens is suppressed by impact of the pandemic and has limited the freedom of citizens and the liberal functioning of the market. These measures are necessary to contain the pandemic. However socially, the suppressed emotional well-being of the citizens has severe implications on mental health such as manifestation of iatrogenesis, and Hikikomori with long-term effects.

The Emotional Well-being Institute (EWBI) has already initiated process to engage in Nepal and aim to undertake a scoping study of the COVID-19 impact in local community's emotional well-being. In this session, we will present EWBI activities, share experiences and some of the envisaged initiatives in Nepal. This paper offers an opportunity to connect EWBI to health organisations and WHO efforts and assess the challenges of COVID-19 crises, and strategies to a path to recovery. This innovative method of "a whole of society approach" to leverage emotional well-being, and the energetic mobilisation to enhance preparedness in Nepal to address the long-term challenge of COVID-19 crises, also has implications to other nations.

Key words: Emotional Well-being, a whole of society approach.

Dyslexia in Nepal: The Urgency of Raising Awareness and Taking Initiation for Collaboration and Cooperation

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Description:

This paper aims to present the existing situation of Dyslexia in Nepal and calls for collaborative and cooperative action to fight off the growing dyslexic situation taking a reference of theoretical framework and praxis across the countries. Dyslexia is a neurodevelopmental disorder with a neurobiological origin which is mostly reflected in the process of learning basic literacy skills like reading, spelling, comprehension and numeracy or simple mathematical operations. It occurs without apparent etiology at birth and has lifelong persistence that affects a significant world's children population (i.e., 3.1-17% of school age children). Different approaches such as medical/clinical, social/functional and human rights have been developed and implemented in many countries to compensate for the loss due to this disorder. These measures and approaches have been implicated in identification, diagnosis, classification, labeling, intervention (therapeutic treatment) in including these children with dyslexia in the mainframe education and development. Despite these efforts, dyslexia is still an awareness issue not only at public level but also in the area of clinical services, academic practices and researches in Nepal. Assessment and diagnosis, targeted intervention as well as planning and implementation of special needs education program along with financial investment have been crucial concern in the current situation of the country. This paper makes an attempt to discuss various phenomena of dyslexia highlighting the urgency of using multidisciplinary approaches and collaborative action to raise not only the awareness level of the general populace but also design special needs education program.

Keywords: Dyslexia, need of awareness, collaboration and cooperation

Knowledge Regarding Prevention of Varicose Vein Among Traffic Police Working in Kathmandu

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Innovative College of Health Sciences, Kathmandu, Nepal

Description:

Introduction: Varicose veins have become a serious threat to lives of people in different profession such framers, teachers, civil service as well as in traffic police. Among all occupations studied, traffic police have the highest chance of varicose vein. Many traffic police are suffering from it, but most tend to ignore it and that is not good as it can lead to complication in the advanced stage. This causes the veins to become enlarged. Sitting or standing for long periods can cause blood to pool in the leg veins, increasing the pressure within the veins. The veins can stretch from the increased pressure. Varicose veins are twisted, enlarged veins, often appearing dark blue in color, near to or raised above the surface of the skin mainly seen in the lower limbs. Professions involving standing or sitting for prolonged periods of time have an increased risk of developing varicose veins i.e. store clerks, waitresses, hair dressers, flight attendants, teachers, nurses.

Aim of the study: to assess the level of knowledge regarding prevention of varicose vein in traffic police.

Methods: A quantitative approach of descriptive cross-sectional study design was used to assess the knowledge regarding prevention of varicose vein among traffic police. A sample of ninety people was chosen by using non-probability convenience sampling technique. Data will be collected through semi structured interview questionnaire. Collected data were analysed with descriptive statistics such as frequency, percentage, mean and standard deviation and using SPSS, version 16.

Results: Results show that majority of respondents were male (64%) and minority were female (35%). Similarly, Head Constables had in higher rate (52%), followed by Sub Inspectors (22%). Majority of respondents (81.1%) are working more than 10 hours. About 24.2% have reported some educational level, while just 1.1% have got bachelor and higher level education. Most of the respondents (64.4%) were from hilly region, followed by 33.3% from Terai and 2.2% from Himalayas. Majority 93.3% respondents had not heard about varicose vein. Only 6.7 % respondents had heard about varicose vein. The results reflect knowledge of varicose vein of traffic police, 33.3% having had high knowledge, 44.6% had moderate knowledge, 23.1% of respondent had in high knowledge of varicose vein.

Conclusion: Varicose vein is becoming the one of the common cases of morbidity now a days in Nepal. Many of people have no much idea about varicose vein, its cause, prevention and management. Due to lack of knowledge, negligence, geographical situation, prolonged job duty hours, prevalence rate of the varicose vein condition is rate higher. There is a need to have educational intervention program, especially to those prolonged standing people, and awareness program is necessary to them for prevention.

Key words: Varicose vein, occupational disease.

Role of Fluoro-deoxyglucose Positron Emission Tomography in Unknown Primary Cancers

Suman Shrestha
Gunma University, Japan

Description:

Cancer is the fifth leading cause of deaths in Nepal with the estimated 11,525 deaths documented in 2015. According to a November 2018's report of population-based cancer registry in Nepal, cancers diagnosed with metastasis but unknown primary tumors constitute about 6.2% of total cancers in males and 4% in females. Carcinoma of unknown primary (CUP) refers to the biopsy-proven malignant tumors whose origin remains unidentified. One of the reasons could be the quality of diagnostic information. With technological advancement and the establishment of sophisticated diagnostic tests, the incidence and prevalence of the CUP will continue to decrease.

In recent years, hybrid imaging with combined fluoro-2-deoxyglucose positron emission tomography (FDG PET) and computed tomography (CT) has been reported to be an excellent alternative to CT alone and conventional magnetic resonance imaging (MRI) in the detection of the unknown primary tumor. FDG PET/CT is a non-invasive test that uses the radioactive tracer FDG which is taken up by the tumor cells; PET gives us the metabolic information of the tumor and the CT component provides the structural information. The advantage of the FDG PET is that it also provides the quantification of the actual tumor burden. In Nepal, this technology is rarely known even to the medical personnel, and most of the cancer patients go to neighboring countries like India to do the FDG PET/CT scan. Though CUP is detected late, primary tumor detection may help in the proper management of the patient and improve the survival outcome.

In this presentation, I would like to present the use of FDG PET/CT in carcinoma of unknown primary and the associated challenges and problems. Not just in identifying the primary tumor, FDG PET/CT may help in the identification of additional lesions thereby changing the staging and treatment of cancer.

Key words: positron emission tomography (FDG PET), computed tomography (CT).

Gene Expression Data Analysis Using Publicly Available Databases

Binuja Verma
Department of Life Sciences, Tata Consultancy Services, Noida, India

Shrishtee Kandoi
Department of Biotechnology, Thapar Institute of engineering and Technology, Patiala, India

Sadhana Tripathi
Biotechnology Society of Nepal (BSN) Kausaltar-3, Bhaktapur, Nepal

Description:

Gene expression plays significant role to process and decode genetic information which is analyzed by high-plex techniques such as RNA Seq, Microarray. The sequenced data generated are stored in public repositories like GEO, Recount, Bioconductor which are later on analyzed through software like R, GEO2R through packages Deseq2, EdgeR and Limma and tools like DAVID. In this study, we generated and identified the gene ID's, log FC, P-value, gene symbol and gene title corresponding to their GEO accession number which provided insight for the analysis of differentially expressed genes in mutant vs normal strains. The previously generated gene-ids in the data were uploaded in DAVID to obtain the pathway in the associated study. Likewise, the data generated can be useful for future reference involving typical gene expression analysis in different research areas like drug discovery, specialized diagnosis of diseases, personal gene therapy, treatment of deadly diseases including Cancer and HIV. Using packages in R, dispersion parameters were generated for different sets of replicates depicting variation in their scatter pattern (heteroscedasticity) which inferred selected data for reference is of good quality. There is a dependence of variance on the mean (which changes with increasing number of replicates) for which an appropriate modeling of the mean- variance relationship in DGE data is coded, for extraction of differentially expressed genes.

Keywords: RNA Seq, Microarray, Cancer, HIV, Differential gene expression, R, P-value.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S9: Physical Infrastructure Development

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S9

Physical Infrastructure Development

This symposium will assess existing challenges and opportunities related to physical infrastructure development in Nepal, and recommend policies, programs and implementation mechanisms to jump-start major infrastructure projects to revive the sunken economy of the country following the global pandemic caused by COVID-19. Also, the symposium will deliberate upon a firm mechanism to integrate the large number of NRN returnees especially the migrant workers working in the areas of building and construction, by directly involving them into these infrastructure development project. Focus will include review of overall challenges in delivering large infrastructure projects in Nepal, critical analysis of the status of the past and ongoing mega infrastructure projects, also known as Projects of National Pride of Nepal and lessons learned from these flagship projects, use of new technologies and methodologies in construction, capacity enhancement of Nepali contractors, review of existing contracting process and procurement laws, and ensuring integrity in delivering mega infrastructure projects.

Coordinators

Mr Ratan Jha
Opal Global Developments Inc, USA

Er Satish Tripathi
P.E., Houston Water Planning, City of Huston; Texas A&M University

Program

Session:	S9: Physical Infrastructure Development				
Date/Time:	09 October 2020, 09:00 - 13:30				
Room 3:	https://bit.ly/3jjKz3d (975 6253 9651)			Passcode:	nrna2020
Zoom Support:	zoomsupport@nrna.org				
Coordinator/ moderator:	Ratan Jha and Satish Tripathi				
Session Chair:	Hon. Basnta Kumar Nemang, Minister for Physical Infrastructure and Transport				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:05	Session chair				Session briefing
09:05 - 09:20	John Messer	Invited Talk	Infra Investment Expert	Invictus, New York City, NY	Infrastructure Investment
09:20 - 09:35	Anil Gyawali	Invited Talk	CEO	Nepal Infrastructure Bank Ltd.	Infrastructure Investment in Nepal
09:35 - 09:50	Arun Dev Panta	Invited Talk	CEO, Senior Architect	Design Cell, Pvt. Ltd.	Building Infrastructure
09:50 - 10:05	Satish Tripathi	Invited Talk	Managing Engineer	City of Houston, Texas, USA	Smart Infrastructure
10:05 - 10:20	Prof Dr Sangeeta Singh	Invited Talk	Professor	Deputy Director, Centre for Disaster Studies	Sustainable urban Infrastructure Development
10:20 - 10:35	Keshav Raj Gnawali	Invited Talk	Project Engineer	City of Kyle, Texas, USA	Flood Infrastructure
10:35 - 10:45	Umesh Raj Joshi	Contributed Talk		Department of Civil Engineering, Kathmandu University	Study on Reservoir Induced Seismicity in Kulekhani-I Reservoir in Nepal
10:45 - 10:55	Hem Raj Pant	Contributed Talk		Traction Skills Lead, Arup	An Academic Roadmap for Rail Systems Engineering in Nepal
10:55 - 11:35		Q&A			
11:35 - 11:45	Er Deepak Babu Kandel	Observer Remarks	Mayor	Palungtar Municipality	
11:45 - 12:00	Hon. Basnta Kumar Nemang	Concluding Remarks	Minister for Physical Infrastructure and Transport	Government of Nepal	
ICC Representative	RK Sharma	Vote of thanks	Secretary	NRNA	

Abstracts

Building Infrastructure

Arun Dev Panta
Director, Architecture and Planning, Design Cell Pvt. Ltd.

The building and construction sector can be a key component in jump starting the economy from the doldrums induced by the COVID-19 pandemic. Nepal can utilize the vast base of migrant workers and technicians that have learned their skills in more developed nations to carry out larger scale projects that were previously difficult to design and implement. The newly acquired capabilities means that these projects can be developed and carried out locally in shorter time spans and can significantly contribute to the post pandemic recovery. In addition to the National Pride projects, local governments can develop their own visions that can transform their economies and reach. Large urban centers outside Kathmandu such as the Bhairahawa-Butwal segment are developing at a rapid pace and are attracting large private sector investments in hospitality, industrial and healthcare sectors. Similar is the case for other urban centers such as Biratnagar-Dharan-Itahari, Bharatpur-Gaidakot, Birgunj-Simara as well as Nepalgunj-Kohalpur segments. Secondary cities such as Pokhara can augment their tourism infrastructure by developing international level sporting facilities that can support the entire subcontinent and at the same time make use of the existing tourism related facilities. Similarly, the Janakpur region can be a religious and cultural hub provided that investments are made to create facilities that can attract the large potential south of the border. The education sector is another potential for development as has been shown by the rising number of medical colleges that have attracted students from neighboring countries and a similar case can be made for providing state of the art schools provided that the government encourages quality educationists from around the world to work in these schools of excellence and those that can compete with the best schools in the region.

Though the private sector is making some progress in these areas, the government must take a lead by creating exemplary projects that can be emulated by the rest of the country. The key detriment to this is the Standard Procurement Act that is inherently flawed as it qualifies mediocre firms and construction companies to design and implement projects in a manner that results in sub-par outcomes. The reason that this is possible is due to the fact that firms without the requisite knowledge and resources can get high marks in evaluation by building up experience points by using tools such as joint ventures and borrowed curriculum vitaes just for the sake of getting good numbers. This allows these mediocre agents to get maximum marks in the technical evaluation making it easy to outbid more genuine companies by lowering the price. This results in poorly finished projects - roads that fall apart in six months, bridges that collapse during construction or airport buildings that look like warehouses. The government along with the donor agencies should look to rectify this flaw in an urgent manner. The Nepalese people deserve the best that technology and skills can provide and it is almost criminal to maintain the status quo as it squanders the hard earned money of the national taxpayers as well as the well intentioned public of countries that provide the financial aid for many of these projects. The tax rate is already very high and it is not reflected in the quality of public facilities that are being constructed.

It is clear that the government alone cannot provide the requisite development and the private sector needs to be roped in for both investment and implementation. The Nepali diaspora can contribute to these projects by bringing some of the much needed resources and technologies. However, the government needs to provide the basic facilities that enables this growth. Transmission lines create new hydropower projects and roads provide the necessary backbone for development. It is unfortunate

that the nation in caught up with the concept of mega projects while ignoring the basic day to day maintenance and upkeep of facilities. It takes six hours to reach from Chitwan to Bhairahawa because of poorly maintained roads whereas 5 years ago it would take less than three hours. A megaproject of road widening has been planned but that does not mean that the road cannot be completely functional for the many years that it takes to complete these projects and should not be an excuse in not keeping the vital lifeline of the East-West Highway in top shape. The pandemic is an opportunity for us to focus on the smaller and more meaningful issues that affect everyday life. A novel approach that focuses on the seemingly small scale would pave the way for the much larger efforts that the population as whole can engage in.

How to Eat a Big Cake: Journey towards Smart City

Satish Tripathi

Houston Water Infrastructure Planning, City of Houston

Developed countries are in the process of shifting to a next-generation development model (NGDM) hugely based on enriched time-series data and technological advancement, most of the developing countries are still following the 1950s development model. Nepal could adopt smart planning, operation and investment approach to reach to the level of front liner countries in a short period. Smart cities need smart working culture and smart infrastructure. Smart infrastructures use the integration of IOT, cloud-based technology, GIS, advanced data analytics, integrated interactive platform, real-time data, deep learning, artificial intelligence, predictive/prescriptive analysis. Smart roads, smart streetlights, smart water distribution system, a real-time disaster warning system are some components of intelligent infrastructure. It allows planners to evaluate various alternatives based on the priorities and need of the region. To start the journey to become a smart city or smart nation, foundation should be built. Investment of every penny needs to align towards the goal of smart city. Nepali Diasporas have extensive working experience and firsthand knowledge in the "building process of smart city". The basic but smart tools / applications would help to build foundation of smart city. Nepali Diasporas bear the required skill to develop and maintain such tools and applications. The inclusion of tools like integrated planning tool, smart project prioritization applications, real-time project management and monitoring dashboard etc. would help cities to start their journey towards the smart cities.

Sustainable Urban Development: Challenges and Opportunities in the Context Of Nepal

Sangeeta Singh
Centre for Disaster Studies

The trend of urbanization is seen to be increasing and has drastically increased especially in the recent years in Nepal. With 58 municipalities and 17 percent urban areas in 2011 there has been an addition of a number of municipalities and the current number of municipalities have reached 293 with almost 60 percent areas considered to be urban. Declaration of new municipalities however can be seen as the government's strategy to set stage for proper and timely management of urban growth in urbanizing areas.

The urban areas in Nepal today have several challenges to face. In the absence of proper tools for planning haphazard urbanization is happening and land fragmentation and speculation along with urban sprawl have become a common phenomenon. Growing urbanization trends in the valley has led to the haphazard growth in the major cities of the valley: Kathmandu, Lalitpur and Bhaktapur have not only led to the reduction of open spaces and agricultural fields which formerly surrounded it, but has also created tremendous pressures on the limited natural resources and infrastructure. The rivers have also undergone tremendous pressure leading to the change of biotic quality, as a result of the increase in demographic growth and in economic activities. Although the upstream areas of the rivers have maintained the biodiversity to some extent these have been totally extinct when it comes to the parts of the rivers that are flowing in the peri urban, urban and downstream areas. The provision of physical infrastructure and services have been very poor with little access to poor and marginalized groups. Development of urban areas in sustainable manner is a major challenge especially in the municipalities that are still rural in nature.

The Government of Nepal has endorsed, ratified and adopted numerous international declarations and covenants aligned with sustainable development, some of which are: The sustainable Development Goals (2015), Sendai Framework for Disaster risk reduction (2015-2030), The Habitat Agenda (2016-2036) etc. Although some initiatives like the smart cities, new towns etc., have been envisaged by the government, the implementation have been very weak. However, there are still a lot of opportunities in realizing sustainable urban development. Nepal is a country with a diverse ecological background with resources spread across the mountains to the Terai plains including water resources. The country has a rich cultural background with socio cultural norms supporting sustainable development and the traditional settlements in the valley are glaring examples of settlements planned in balance with nature from the traditional times. There are a lot of lessons to be learnt from the traditional settlement planning which can be adapted to the new development initiatives. This paper mainly focuses on the challenges, the public and private initiatives in urban development and the opportunities in sustainable urban development highlighting on the sustainable approaches from the lessons learnt from the traditional settlements of Kathmandu valley in particular.

Flood Management in Cities with Smart Infrastructure

Keshav Raj Gnawali
Lead Design Engineer for City of Kyle, TX, USA

Nepal is situated in unique geographical condition. With tallest mountain range in the world and proximity to Indian ocean, it experiences large amount of rainfall in every monsoon season. It is received as invaluable resources to feed numerous streams, rivers and providing sole source of irrigation in significant portion of agricultural land. It also comes with challenge in managing floods and developing various infrastructures.

This presentation is focused on some of the flood management techniques and best practices of developed societies. Techniques presented here are low cost and easy to implement. These practices range from reducing number and extent of flood events, managing floods to post flood scenario. With the advent of information technology, most of these infrastructures can be designed as smart infrastructure.

Study on Reservoir Induced Seismicity in Kulekhani-I Reservoir in Nepal

Umesh Raj Joshi[1], Ramesh Kumar Maskey[2], and Kumud Raj Kafle[3]
[1]Department of Civil Engineering, School of Engineering, Kathmandu University
[2]Nepal Academy of Science and Technology, Khumaltar, Lalitpur
[3]Department of Environmental Science and Engineering, School of Science, Kathmandu University

Reservoir Induced Seismicity (RIS) is caused by impounding water by constructing a large dam across a river. The orientation of the tectonic regime, the magnitude of stress, rate of strain accumulation, location, size and volume of the Reservoir, hydro-mechanical properties of rock, hydrological conditions are factors that control the RIS. There are no reported incidences of RIS in Nepal. However, the seismic activities around the only storage type hydropower project in Nepal- Kulekhani-I could be Reservoir induced.

Several seismic activities with magnitudes ranging from 4.0 to 5.2 have been recorded within a 50 km radius of the Kulekhani-I reservoir from 2002 AD. The frequency of these seismic activities has increased after the Gorkha earthquake in 2015 that could be triggered by the Kulekhani-I reservoir. This study aims to find if the cause of the seismic activities around the Kulekhani-I reservoir is either by the Reservoir or by tectonic movements and develop a methodology for the study of Reservoir induced Seismicity in the Nepalese context.

The detailed study of RIS is essential in the context of Nepal, where several moderate to large storage type projects are being proposed. It has been suggested that the seismic activities are mainly due to the corresponding change in the water level during a complete cycle of filling and emptying of the Reservoir. This paper discusses the methodology developed to conduct the study on RIS at the Kulekhani-I reservoir.

Keywords: Reservoir Induced Seismicity, Hydropower, Gorkha Earthquake, Tectonic Movement, Reservoir, Storage Hydropower Plant

An academic roadmap for Rail Systems Engineering in Nepal

Hem Raj Pant
Arup, , Sydney, Australia

There are several activities starting to rollout in rail sector in Nepal such as starting of railway department and award of some of the early works contracts. However, there is serious lack of knowledge in this sector due to absence of university or other trade courses locally available so far. We are co-ordinating industry/academic experts in this area to put together a course material in Rail Systems Engineering. Rail is a multi-disciplinary sector in which there are mainly following key components; Permanent way (track, civil, drainage), Traction power, Overhead line, Stations, LV Systems, Earthing, Bonding and electrolysis, Signalling, Tunnelling, Project Management, Electromagnetic interference etc.

Different countries and regions adopt different rail systems depending on key parameters such as inter-connectivity, design life (typically 50 years), TPH (trains per hour)/Frequency of the trains, headway (time between two trains on the same track), speed of the trains, Rolling Stock type (Power demand of the trains), Grade/Terrain, Station types and their power demand, type of electrification and Environmental conditions (snow/flood/wind/temp etc).

In this technical content, we are aiming to analyse the technical and environmental aspects and propose a solution that is suitable for the context of Nepal. For each rail-discipline, the following sections will be included as a minimum; introduction, Design (practices worldwide and in Nepal's context) using illustrated examples and drawings, Testing & commissioning, Operation and Maintenance regimes, recommendation based on techno-commercial aspects (if there are multiple options).

The technical content will be written and reviewed professionally by the subject matter experts. The next step is to seek expressions of interest from the universities in Nepal those are willing to pursue the rail courses. This is volunteer work with an aim to contribute to the "Complete Rail System" education in Nepal, which in the long term, will be helpful in "informed" decision making, policy making, feasibility studies and construction/operation of rail systems in Nepal. This will also provide common platform for technical knowhow in different disciplines of railway engineering.

The course material will be prepared with an aim to support the objectives of the Department of Railways (www.dorw.gov.np). The technical content will be based on the industry experience of the subject matter experts and review/comparison of the BS/EN standards, Australian Standards, Indian Standards and various universities around the globe; University of Illinois, Institute of Metro Rail and Technology, India, Royal Institute of Technology (KTH).

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S10: Public Health and Pandemic Mitigation

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S10

Public Health and Pandemic Mitigation

The health crisis brought by Corona virus (Sars-Cov-2) pandemic reminded us that public health concerns are invariably primary and the rest, whether it is economic growth or personal wealth, is secondary. It exposed the inherent inequality and disparity in public's access to health care services, both in developed and developing societies. On the bright side, it unearthed the strength, resilience, audacity and tenacity we humankind, in particular the Nepali community, has in fighting the global health challenges. Though health has been recognized as a fundamental right of all, the reality is far from it. Over 8 million Nepali living in different parts of the globe and 29 million living in Nepal had to collective fight against the pandemic amid limited knowledge and resources. Via a scientific interaction among the healthcare professionals who are engaged in maintaining and improving the health of Nepali people, this symposium will explore both the limitations and strengths of our community. The theme of this session is public health for all, and mitigation of pandemic using innovation, collaboration and partnership. At the completion of this symposium, concrete Call For Action will be produced which will assist government agencies, general public and healthcare organizations in improving the health of Nepali people.

Coordinator

Dr Sanjeeb Sapkota
NRNA Global Health Support Committee, USA

Program

Session:	S10: Public Health and Pandemic Mitigation				
Date/Time:	09 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 4	https://bit.ly/2EONfH7 (925 9086 2548)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinator:	Dr Sanjeeb Sapkota				
Moderators:	Ms. Sriya Gajurel and Dr. Sanjeeb Sapkota				
Session Chair:	Upendra Yadav, Former Justice Minister				
Time	**Contributor**	**Contribution**	**Affiliation**	**Organization**	**Title of Presentation**
09:00 - 11:10	**S10A: Public Health & Pandemic Mitigation**				
09:00 - 09:10	Mourning for the Victims of Pandemic & Reading of Declaration of 2nd NRNA Global Health Conference: Dr Dinesh Gyawali				
09:10 - 09.30	Honorable Bhanubhakta Dhakal	Keynote Speech	Health Minister	Ministry of Health	Gaps in Health Care Delivery in Pandemic
09:30 - 09:45	Dr Dipendra Raman Singh	Invited Talk	Health Ministry	Department of Health Services	Health Challenges and Opportunities Pandemic Created
09:45 - 10:00	Dr Bhagawan Koirala	Invited Talk	Nepal Medical Council	Nepal Medical Council	Safety of Health Care Workers in Pandemic
10:00 - 10:15	Prof Dr Padam Simkhada	Invited Talk	Dean	University of Hadderfield, UK	Health Problem among Migrants Workers
10:15 - 10:25	Honorable Reena Gurung	Invited Talk	Member of Parliament	Province 2 Parliament	Indigenous & Minority Health
10:25 - 10: 35	Her Excellency Sharmila Parajuli	Invited Talk	Ambassador	Ministry of Foreign Affairs	Plight of Migrants in the Middle East
10.35 - 10:55	All	Q&A			
10.55 - 11:10	Honorable Upendra Yadav	Concluding Remarks	Justice Minister	Ministry of Justice	Health, Human Rights and Pandemic
11.10 - 11:30	**Break**				
11:30 - 13:30	**S10B: Scientific Session**				
11.30 - 11:40	Ms. Bhoma Limbu	Contributed Talk	Women Coordinator	NRNA	Health of Nepali Women Globally
11.40 - 11:50	Dr Ishan Adhikari	Contributed Talk	Epilepsy	NRNA Neurological Team	Epilepsy/Seizure Disorder among Nepali Population: Myths, Reality, Stigmas and Management
11.50 - 12:00	Dr Nishita Pathak	Contributed Talk	Mental Health Team Coordinator	NRNA Mental Health Team	Mental Health Problem Arising after Covid-19 is due to Normal People Exposed to Extraordinary Situation

Session:	S10: Public Health and Pandemic Mitigation				
Date/Time:	09 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 4	https://bit.ly/2EONfH7 (925 9086 2548)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinator:	Dr Sanjeeb Sapkota				
Moderators:	Ms. Sriya Gajurel and Dr. Sanjeeb Sapkota				
Session Chair:	Upendra Yadav, Former Justice Minister				
Time	**Contributor**	**Contribution**	**Affiliation**	**Organization**	**Title of Presentation**
12:00 - 12:10	Dr Dipedra Parajuli	Contributed Talk	Gastroenterology	NRNA Gastroenterology Team	Fatty Liver, Common Public Health Issue of Nepal
12:10 - 12:20	Ravi Nayak	Contributed Talk		National Law School of India University	Public Health and Pandemic Mitigation
12:20 - 12:30	Mohan Kumar Sharma	Contributed Talk		Tribhuvan University and Center for Research on Education, Health and Social Sciences (CREHSS) Kathmandu, Nepal	Knowledge, Attitudes, and Practices among the Nepalese Community towards COVID-19 Pandemic
12:30 - 12:40	Krishna Prasad Pathak	Contributed Talk		Koteshwor Multiple Campus, Kathmandu	Digital Health Technologies Access, Challenges and Opportunities in Different Countries
12:40 - 12:50	Dr Pushpa Raj Bhattarai	Contributed Talk	General Surgeon	President, South Africa NRNA-South Africa	Empowering Africa Based Nepali with Health, Education, and Information
12:50 - 13:00	Ms Janaki Poudel	Contributed Talk	Oceania Women Coordinator	NRNA	Impact of COVID-19 on Women's Health Challenges and Opportunities
13:00 - 13:10	Nirajan Gauli	Contributed Talk		University/Infrastructure Development	Mass Transit and COVID-19: Engineering Solutions for Public Health, Embracing the New Challenges
13:10 - 13:30		Q&A and Conclusion			
ICC Representative	Bhoma Limbu	Vote of thanks	Women Coordinator	NRNA	

Abstracts

Gaps the Health Care Delivery in Pandemic

Bhanubhakta Dhakal
Ministry of Health

The pandemic laid bare both the strength and the gaps in health care delivery systems of each nation around the globally, including of Nepal. Yet this gave us tremendous opportunity to identify what needs to be done in order to have an efficient health care delivery systems that provide optimal health to every section of the population. Health sector alone cannot solve the health problem and all stakeholders need to come together in order to prevent, treat and promote health of Nepali.

Health Challenges and Opportunities the Pandemic Created

Dipendra Raman Singh
Department of Health Services

Pandemic has given stronger reason to establish a center for excellence in the prevention of disease and their efficient management. Centers for Disease Control and Prevention (CDC) based in United States have been the model and example for countries around the world as the center for excellence for preventing and managing the disease. China, Nigeria, Kenya and other has similar created CDC in their countries. The health ministry of Nepal has moved towards creating similar center integrating and merging several departments and division. It takes significant amount of time and resources for the CDC. This presentation will discuss health challenges and opportunities pandemic created and also showcase key features of Nepal CDC.

Safety of Health Care Workers in Pandemic

Bhagawan Koirala
Nepal Medical Council

Safety among health care professional is paramount for the successful accomplishments in the treatment and management of the individuals seeking medical care and health care. Unfortunately Nepali doctors and Health Care professionals have long been facing with violence in the frontline while performing their duties, and the current pandemic has exposed such act. Reasons including but not limited to culture, stereotype, misunderstanding, lack of regulation, lack of insurance, inadequate security create the environment that make health care professionals vulnerable to violence. There is no reasonable excuse for the violence against the health care professionals. This presentation will help generate discussions on what factors help or aggravates in ensuring a safe working environment for doctors and health care professionals.

Health Problems among Nepali Migrant

Padam Simkhada
University of Hadderfield, UK

While a large section of Nepali migrants enjoy good health, many face health challenges including, but not limited to, conditions and disease related to kidney, heart, lungs, reproductive health etc. Data collection and continuous research are warranted for the surveillance of the health of the migrants. Unless we have adequate and appropriate data the health of the migrants could not be fully monitored. This presentation will illustrate general health issues Nepali migrant are encountered and ways to track them and manage them.

Indigenous & Minority Health

Honorable Reena Gurung
Bagmati Province 2 Parliament

Indigenous and minority people are among the hardest hit in any disaster and pandemic. They are difficult to reach, hard to understand, and have unique health issue. Barriers posed by language, culture, taboos, stereotypes all amount to limiting adequate health care to these people. This presentation sheds bright light on the dark side of the indigenous population and the factors that contribute to disproportionate access to health.

Pandemic and Nepali Migrants in the Middle East

Sharmila Parajuli
Ministry of Foreign Affairs

Close to 2 million migrants of Nepali origin work in different countries of the Middle East. Kuwait, Oman, Saudi Arabia, Qatar, UAE are the countries where most of them work. While the majority of migrants are in their 20s and 30s and they enjoy disease-free life, many also suffer condition and diseases that keep them from getting good quality of life. While the migrants and citizens were treated alike by the host countries when they fall sick due to pandemic, the health care systems in each of these countries was overwhelmed with the number of people seeking health care. This presentation will throw light on gaps that were seen during the pandemic in providing prevention and the efficient management of sick people during the pandemic.

Health of Nepali Women Globally

Bhoma Limbu
NRNA Women Coordinator

Education empowers women yet still a large section of them lack access to adequate education and vocational training. A large part of 8 million Nepali worldwide comprise of women. Many women from early age face unhealthy environment from an early age. Regulations, policies condusive to the improvement and or maintenance of women health need to be promulgated and those polices enforced to ensure women everywhere receive the encouragement and empowerment they deserve to lead their life to the fullest.

Health, Human Rights and Pandemic

Upendra Yadav
Nepal Parliament

The universal declaration of human rights outlines with clarity that Health is a fundamental Human Rights. However in practice it is far from the reality. Primary health care is inaccessible to a large section of our population, let alone secondary or tertiary level health services. This talk will put the inequity and inaccessibility of health to people on the spotlight. Nepal has multiple ethnics and groups. Some groups are under-priviledged and are under severe form of poverty. Addressing the social determinants of health that impacts the vulnerable population will have positive impact towards improvement and maintaining their health. This presentation will explain why health is a human rights and what barrier that exist in realizing this rights to the fullest.

Epilepsy/Seizure Disorder among Nepali: Myths, Reality, Stigmas and Management

Ishan Adhikari
NRNA Neurological and Epilepsy Management Team

Epilepsy and seizure disorders is not uncommon among Nepali community. At least 1 percent of Nepali population has this condition, totaling of 3.5 to 4 lakhs. The myths and stigmas associated with this condition has placed epilepsy as one of the most stigmatized and overlooked chronic lifetime disease among our people. Lack of awareness and qualified professionals have deprived many patients from getting seizure freedom in timely manner with correct medications and treatment.

This presentation aims to provide how stakeholders at all levels can work together to educate public to dispel stigmas about seizures and epilepsy, while supporting patients and families to lead a satisfying and meaningful life for years to come.

Mental Health Problem Arising after Covid-19 is due to Normal People Exposed to Extraordinary Situation

Nishita Pathak
NRNA Mental Health Team

Mental health problem arising after Covid 19 is due to "normal people exposed to extraordinary situation. This pandemic has not only affected the health but has created insecurities in all aspect of life (psychological, social, economic). The uncertainties attached with this makes the situation worse. Thus in such situation, there could be a myriad of presentation ranging from fear, worry, sleep disturbances, mood swings, boredom to anxiety, depression, substance misuse, suicide, relapse of mental illness. It has not only affected general population but also has also affected the front liners who has been working in long hours under difficult situation while facing many obstacles. Thus taking care of self , each other, increasing social support, community and government support, and awareness of mental health and mental illness, providing information regarding coping strategies and the access to health care may could also play a significant role to reduce mental health crisis during pandemic.

Fatty Liver Disease: the Silent Killer. Risk factors, Prevention, and Management

Dipendra Parajuli
NRNA Gastroenterology Team

Fatty liver disease is one of the most common liver diseases that can lead to serious health consequences including cirrhosis and liver cancer. Knowledge about this serious condition may not be prevalent in the Nepalese community. It has been branded as the silent killer. A large number of people are affected by it without their knowledge. Not treating on time and inadequate management leads to unfortunate demise of people. A short introduction to the risk factors, prevention, early detection and management will be provided during the presentation.

Public Health and Pandemic Mitigation

Ravi Nayak
Affiliation: Law Student

Public health is an Utmost crucial priority for the government of any nation. It an act of nation to prevent the citizens from any diseases and pandemic. Every nation policy includes the public health section with the topmost priority. Indeed, it is undebatable truth that, with the rise of technology and science revolution, the pandemic might be brought intentionally as a Bio-war. It is of utmost importance for the nation, to be well-prepared for such a bio-war which might bring pandemic. In the paper, the researcher will delve into, the importance of Public health; pre-preparedness by the nation for an unpredictable pandemic; the favorable Law; investment for the common forum lab comprising a virologist, microbiologist, bacteriologist, biochemist, and medical doctors to develop anti-bodies. Similarly, the researcher will also include the chapter which explicitly deals with reducing the risk of a pandemic and what might be the appropriate option to tackle such a pandemic.

Knowledge, Attitudes, and Practices among the Nepalese Community towards COVID-19 Pandemic

Mohan Kumar Sharma, Shanti Prasad Khanal, Jib Acharya, Ph.D. Ramesh Adhikari
Graduate School of Education, Faculty of Education, Tribhuvan University and Center for Research on Education, Health and Social Sciences (CREHSS) Kathmandu, Nepal.

Background: The COVID-19 is an infectious disease activated by a newly discovered micro-organism, called coronavirus which has become a pandemic at the moment. Most people, infected with the COVID-19 had experienced mild to moderate respiratory illness. In this context, the best way is to prevent transmission of the COVID-19, the disease it causes, and how it spreads.

Objectives: The key objective of this study was to assess the knowledge, attitudes, and practices about the COVID-19 amongst the Nepalese community.

Methods: This study used a cross-sectional quantitative research method. There were 224 participants who took part in the self-administered-structured-questionnaire. Data were collected through an email and analyzed using the SPSS software version 20.0.

Results: The 67.41% of males and 32.59% of females were involved in the study. Nearly 50% of the participants had an M-Phil/Ph.D. level degree and 4.9% had secondary-school-level degrees. The 96% of the participants were familiar with the clinical symptoms, whereas 63% of the participants were conscious of the common symptoms of the pandemic. The 87.1% of respondents have reported that early treatment can support patients to recover from the disease. Similarly, nearly 86% of the respondents revealed that the COVID-19 can be spread to others in asymmetric conditions and 84% of the respondents have argued that the virus can spread via the respiratory and droplets from the infected persons. Besides, 92% of respondents said that the people, who have contracted with an infected person, should immediately be isolated for at least 14 days for the observation. The 66.1% have believed that the spreading of coronavirus can be controlled through an appropriate political decision.

Conclusions: This study strongly suggests that public health approaches such as awareness; mass-education-campaigns and etc. are urgently required to control the outbreaks in the community.

COVID-19: Digital Health Technologies Access, Challenges and Opportunities in Different Countries

Krishna Prasad Pathak
Koteshwor Multiple Campus,Kathmandu

Background: COVID-19 has created huge challenges for health systems worldwide for health care resources and health care providers in health institutions. An immense range of digital health technologies can be considerable health strategies in during pandemic.

Aim: The aim of this paper is to review the access, opportunities and challenges of digital health technologies for the care of people during pandemic COVID-19.

Methods: We searched electronically published relevant articles in English language using these "COVID-19", "2019-nCov", "coronavirus", terminologies, "severe acute respiratory syndrome 2", SARS-CoV-2", "digital health", Telemedicine and e-health) access, challenges and opportunities in PubMed and Google search engine up until 23, July, 2020.

Results: The COVID-19 has affected as pandemic disease and made serious effect in health care system and people. We found a number of digital technologies are useful in holistic control, manage, care and prevention, digital information**,** collect data, transfer, store, analysis and proper monitor information system during the pandemic situation, discussed in the papers with their usefulness. This article describes how digital health technologies can be useful in COVID-19 and would be able to address today and upcoming future crises. Globally alternative preventive strategies to control the infection of the COVID-19 are applying such as social isolation, quarantine measures, contact tracing, wearing mask, and sanitizing hand washing have been used around the world.

On the other side, **positioning technologies, Satellite monitoring, health sensors and apps, Drones (drones were applied in carrying medicine) and** spraying disinfectants and 3D Printing which was deployed to mitigate shocks to the supply chain and export bans on personal protective equipment. The another advance types of apps**, Artificial Intelligence (AI), Autonomous vehicles, Mobile tracking/mass surveillance, Ways in which GIS can be used in an epidemic** to find out the train, bus, subway and plane information of diagnosis connected to the network based on Big Data analysis and geographic visualization through the real-time comparison of the coordinated traffic ticket information and epidemic observers**, mobile epidemic map are significantly contributed to stop the spreading the virus from the mass level connection in the day to day life.** Those technologies helped to provide safe, fast, and appropriate data of patients with in limited time and prevent not to be contamination for health care providers, general peoples and patients. Helped to be safe quarantine, by applying virtual conversations from home, from working place, consulting with experts via online/offline, smart health care system, decrease the patients overload to the health care professionals' in the institutions.

Conclusions: It is emerging concepts in health care services to offer remote screening, detection, care, treatment, prevention, assists monitoring, surveillance, and mitigation of the impacts on healthcare concomitantly with COVID-19. Thus, it is necessary to adapt digital health technologies although there are few studies on the use of digital health technologies focusing on COVID-19. It is not only for COVID-19 issues but also should be implemented to make our daily life easiest than before to fight with communicable disease.

Empowering Nepalese in Africa with Health, Education & Information

Pushpa Raj Bhattarai
President, South Africa NRNA-South Africa

Health is a state of complete physical, mental and social wellbeing, which is marked not only by the absence of disease or infirmity. Management, which includes diagnosis, treatment and further follow up, of complex and advanced medical conditions is expensive, comes with risks and not always successful. While changing the lifestyle can prevent or delay onset of many medical conditions, public awareness of some of worrying or dangerous symptoms of common serious diseases or acute condition, can help to detect diseases in early stage with chances of better outcome with smaller risk of complication and death, shorter hospital stay and less expenses. This presentation will include the role of screening with its merits and demerits in asymptomatic patients for some of medical and surgical conditions.

Impact of COVID-19 on Women's Health Challenges and Opportunities

Janaki Poudel
NRNA Oceania0020Women Coordinator

There is always an urgency of "wellbeing" to be a healthy person mentally and physically. A person with physical disability can gain wellbeing comparatively than a physically fit person if mentally unwell and undoubtedly; they risk their life. In another word, their life is threatened by self-harm. This type of threatening is escalating around the globe. A shocking fact proven by WHO 2017 illustrates that over 16 000 000 people worldwide attempt suicide every year and about 800 000 people die by suicide. Do we think Nepal is an exception? If no, can any one estimate the challenges of the Nation for the people?

Various reports say that since COVID-19, mental health is appeared as a big risk and a big challenge to manage it because of life threatened due to high suicide rate. In Nepal, a National health fact sheet shows that at least 20 people committed suicide every day during the lockdown compared to 15 suicide cases a day in the last year whereas 12 persons in a day found in 2016 (HERD International 2016). Comparing men and women, Nepal earthquake in 2015 reported a 10.9% prevalence of suicidal ideation (n = 513, 15.1% in women and 5.7% in men). This proves that women are more vulnerable due to other health issues associated with mental health such as sexual and reproductive health such as unwanted pregnancy, unsafe abortion, and sexual violence. Particularly, women workers in Nepal have committed suicide among women of reproductive age (15-49 years). Mental health is alarming towards the front desk heath workers in latest days in Nepal.

According to National Mental Health Survey, Nepal -2020 Fact sheet, there is no long history of research based caring mental health in Nepal. As a national survey begin in 2017 and continued till 2020 January collecting data from 15088 participants, the result explored that the adult of age between 40-49 and adolescence at 13 -17 are at high risk of mental health issues. Among, female is a risk factor for developing depression or anxiety disorders in Nepal and stress with physical symptoms among young Nepalese girls (less than 30 years) compared to boys (Hagaman et al. 2016). Still, there is a lack of enough sources in Nepal based on gender-based incidence in mental health field.

Escalating suicide rate might be due to the financial burden, stigma, stress, anxiety, depression and or escalation of domestic violence in lockdown situation. A report shows that the hanging is the higher than poisoning when people choose the method for suicide. Despite these facts, there is a lack of ample evidence. Also, there are so many unwandered questions and unknown reasons of mental health issue, resulting suicide in Nepal. Therefore, the challenges are unlimited for interested scientists and researchers.

In my presentation, I will present an overview on the impact of covid in women & girl's health in Nepal with few case studies.

Mass Transit and Covid19: Engineering Solutions for Public Health, Embracing the New Challenges

Nirajan Gauli
University/Infrastructure Development

The world is grappling with COVID-19 pandemic in many fronts, mainly major health crisis coupled with severe contraction of global and national economies.

While public health experts are dealing with health crisis. Engineering solution and adaptation of technologies may assist in this global effort. Nepali diaspora is widespread across the world and playing active role in many capacities in the front line of COVID19 management. This invaluable experience could be harnessed for Nepal.

NRNA could play a key role in this initiative and bridge between Government of Nepal and expertise within Nepali diaspora. In this presentation the author will endeavour to provide some of the tasks and arrangements that does not require technological sophistication nor will be too expensive.

The complexities and magnitude of crisis demand reciprocal response. In the extreme circumstances the response needs to be extreme too. For this courageous political leadership with vision is what required.

Road use to minimize potential spread of COVID 19 and other highly contagious diseases is a new frontier in pandemic situation.

Key words: road traffic accident, death

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S11: Social Sciences

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S11

Social Sciences

In recent decades, Nepal has seen unprecedented political movements, resulting in substantial changes in socio-cultural, political and economic spheres. Moreover, movements of people, particularly the rise of international labor migration in the past two decades, have led to multiple reconfigurations: of family structures, of socio-cultural and economic relations, of occupational practices, of consumption patterns, and so on. On the one hand, new class-based relations and inequalities are emerging. On the other, egalitarian —including caste and gender— policy reforms and behaviors are becoming more and more common. The sudden outbreak of Covid-19 has posed risks both to national and to international mobility. It has already disrupted the way we socialize and interact; old social norms are breaking down, and new patterns are emerging. In the face of these new challenges, as well as bearing in mind Nepal's commitment to the Sustainable Development Goals (particularly gender equality #5, reduced inequalities #10, race justice and institutions #16), the symposium on Social Sciences aims to bring leading social scientists and researchers from across the globe together in order to share and discuss recent research and experiences that help reshape policies to adapt to the new circumstances, and make use of new opportunities.

Social sciences entail a diverse field of studies, and issues to be discussed and addressed are multifarious. In order to accommodate to the format of the Convention (two allocated slots of two hours each), we are running sessions on selective themes which are among the most important issues facing the Nepali society: labor migration and higher education institutions building and research. The first session will be a seminar in which five invited experts in the field of migration in Nepal will be presenting papers covering issues concerning the subject, including Covid-19 and its impacts. The second session will be a roundtable discussion, in which six distinguished scholars from various Nepali and international academic institutions will engage in subjects of higher education institutions building and research culture. The sessions are also designed to engage general audience as much as possible. By sharing relevant personal experiences, and or presenting research-based evidences, and stimulating critical discussions, both the sessions are expected to be useful to the policy makers, researchers and practitioners. In addition, four papers covering various fields within social sciences will be presented under a special video/poster presentation session.

Coordinators

Dr Krishna Adhikari
University of Oxford, UK

Institutional collaboration:
Social Science Baha, Kathmandu

Program

Session:	S11: Social Sciences				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 5:	https://bit.ly/3n6ninF (958 3508 0179)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinator/ Moderator:	Dr Krishna Adhikari				
Session Chairs:	Dr Krishna Adhikari and Prof. David Gellner				
Time	**Contributors**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 16:30	S11A: International Labor Migration, Covid-19 and Impacts in Nepal				
14:30 - 14:35	Dr Krishna Adhikari	Moderator	Research Fellow	The University of Oxford	
14:35 - 14:47	Dr Bandita Sijapati	Invited Talk	Senior Social Development Specialist	World Bank, Sri Lanka	(Im)Mobility, Coronavirus and the Migrant Worker: Some Reflections from South Asia
14:47 - 14:59	Dr Tristan Bruslé	Invited Talk	Researcher	CNRS, France	Nepalese Workers in India: an Invisible yet Vital Labor Migration
14:59 - 15:11	Dr Ramesh Sunam	Invited Talk	Assistant Professor	Waseda University, Japan	The Future of International Labor Migration in the Post-Covid World: Challenges and Opportunities for Nepal
15:11 - 15:23	Dr Jagannath Adhikari	Invited Talk	Adjunct Faculty	University of New South Wales	Consequences of Covid-19 on Foreign Labor Migration in Nepal: A Need for Incorporating Resiliency Framework in Migration Policies and Activities
15:23 - 15:35	Dr Ganesh Gurung	Invited Talk	Former Executive Chair	Policy Research Institute (also ex-member of National Planning Commission)	COVID 19 and Migration: An Employment Strategy for Returnees in Nepal
15:35 - 15:40	Neha Choudhary	Commentator	National Project Coordinator	Integrated Program on Fair Recruitment (FAIR), ILO, Nepal	Brief comments
15:40 - 15:45	Dr Jeevan Baniya	Commentator	Assistant Director	Social Science Baha, Kathmandu	Brief comments
15:45 - 16:30	General Discussion (Q&A)	Participants			
16:30 - 17:00	**Break**				
17:00 - 19:00	S11B : Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)				

Session:	S11: Social Sciences				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 5:	https://bit.ly/3n6ninF (958 3508 0179)			Passcode:	nrna2020
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Session Chairs:	Dr Krishna Adhikari and Prof. David Gellner				
Time	**Contributors**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
17:00 - 19:00	Prof David Gellner	Moderator	Professor of Social Anthropology	Oxford University, UK	Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)
	Dr Pratyoush Onta	Panelist	Editor, SINHAS	Martin Chautari, Kathmandu	Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)
	Prof Joanna Pfaff-Czarnecka	Panelist	Professor of Social Anthropology	Bielefeld University, Germany	Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)
	Prof Kushum Shakya	Panelist	Dean at the Faculty of Humanities and Social Sciences	Tribhuvan University, Nepal	Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)
	Prof. Padam Simkhada	Panelist	Professor of Global Health, Associate Dean	Huddersfield University, UK	Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)
	Deepak Thapa	Panelist	Director	Social Science Baha, Kathmandu	Higher Education in Nepal: Building Institutions, Enhancing Research Capacity (Round-table)
19:00 - 19:20	S11C: Poster (Video) Presentation				
19:00 - 19:05	Deepak Chandra Bhatta	Poster Presenter	Assistant Professor	Far-Western University	Situation of Migrant Workers between Nepal and India during COVID-19
19:05 - 19:10	Kumar Bhatta and Yasuo Ohe	Poster Presenter		Chiba University, Japan	Females in Agritourism: Exploring Best Jobs
19:10- 19:15	Jivesh Jha	Poster Presenter	Judicial Officer	Birgunj High Court	Responding to the Coronavirus Pandemic: A Study of Nepal's Epidemic Law Regime
19:15 - 19:20	Raksha Ram	Poster Presenter	Judicial Officer	Supreme Court of Nepal	Right and Privileges of the Dalits in Nepal: A Constitutional Study
ICC Representative	DB Chhetri	Vote of thanks	Spokesperson	NRNA	

ROUNDTABLE

Higher Education in Nepal: Building Institutions, Enhancing Research Capacity

For over 25 years until the mid-1980s Nepal had only one university, with constituent campuses based in major towns. After 1990 Nepal permitted the establishment of new universities, both public and private, as well as non-governmental development and research institutions. Alongside the regional and specialized universities that are already in operation, under the new federal set-up there are policies in place to establish new provincial universities. The rapid expansion of higher education must certainly be welcomed as a necessary investment in Nepal's people, the country's main asset; and the development of high-quality education within Nepal is certainly desirable as a way to stem the flow of students leaving the country to study abroad. But the huge and extremely rapid expansion, and the rise of such extensive private provision, raises many questions about institution-building, about the quality of teaching, about whether the new institutions will actually meet the needs of the country, about the capacity of such tertiary institutions to encourage and support a culture of research activity among both staff and students, and about equity of access and widening participation. The proposed panel aims to open discussion on these issues.

This discussion panel will be in two parts. The first part will focus on the setting up of new institutions and the specific problems encountered in doing so. The second part will discuss research capacity, how it can be enhanced, and whether and to what extent there can be a role for NRNs, NGOs, and private research institutions and others, whether based in Nepal or abroad.

Abstracts

(Im)Mobility, Coronavirus and the Migrant Worker: Some Reflections from South Asia

Bandita Sijapati
World Bank, Sri Lanka

The COVID-19 induced economic crisis has brought the world, including migrant-receiving countries, to a near standstill. In addition to the possible loss of jobs and risk of contagion, the pandemic is also having a ripple effect in terms of the mass return of migrants, reduction in remittance flows that migrant-receiving households have been dependent on, and, in many instances, increases in xenophobic and discriminatory treatment of migrants. Among others, migrant-sending countries like Nepal are being forced to address the challenges experienced by their migrant workers abroad while at the same time attempting to keep their remittance-driven economy afloat. The experience from South Asia indicates that addressing these challenges is not easy but there are lessons to be learnt from the various measures that the individual countries in the region have taken which Nepal can adopt and adapt moving forward.

Nepalese Workers in India: An Invisible yet Vital Labour Migration

Tristan Bruslé
Centre national de la recherche scientifique (CNRS), France

Over the last two decades, the issue of Nepalese labour migration to India has been obscured by new migrations to Gulf countries and to South East Asia and by the process of diasporisation of Nepalese people in Western countries. Despite the fact that hundreds of thousands of Nepalese migrants go to work, either permanently or seasonally, in every part of India, they seem to be invisible and are not given appropriate attention. However, for millions of poor households, India is still a destination that enables them to make a livelihood (*gujara garna*), to make ends meet when agriculture no longer suffices or when the Nepalese labour market offers very few job prospects. In this paper, I will try to explain why labour migration to India is invisible in the public discourse, and what is at stake regarding this particular mobility in terms of livelihood strategies, jobs and migration dynamics.

The Future of International Labour Migration in the Post-COVID World: Challenges and Opportunities for Nepal

Ramesh Sunam
Waseda University, Japan

The coronavirus pandemic has significantly disrupted international labour migration. Unsettling Nepal's 'remittance economy', the pandemic and economic fallout has posed severe risks to the livelihoods of Nepali migrant workers and their families. Nepal is already witnessing a return of migrant workers from foreign countries, mostly irregular Nepali migrants and those losing jobs. In this paper, I examine the key characteristics of international labour migration and Nepal's own domestic contexts to contemplate the future of labour migration from Nepal. In the next few years, with movement restrictions and financial stagnation in labour destination countries including the Gulf Cooperation Council (GCC) and Malaysia, labour migration from Nepal may decline. However, I argue that given that Nepal is minimally prepared to engage a bulk of unemployed people and the migrant returnees, it is unrealistic to assume that foreign labour migration may not resume soon after the revival of global economies. The Nepali government can utilise this crisis to restrain labour outmigration with focused policies for agricultural transformation while addressing the critical push factors of migration. The agriculture sector provides tremendous opportunities for transforming Nepali 'remittance villages' to (re)engage both prospective migrants and migrant returnees for enhancing their livelihoods.

Consequences of COVID-19 on Foreign Labour Migration in Nepal. A Need for Incorporating Resiliency Framework in Migration Policies and Activities

Jagannath Adhikari
University of New South Wales, Australia

Covid-19 has clearly exposed the fact that Nepal government has no capacity and policy framework to protect its migrant workers in the event of disasters. Even though migrant workers have been contributing to the economy through hard and dangerous work, they did not receive even the basic support from the government that they are entitled to (for example, support from 'welfare fund') in this pandemic. With the lack of policy framework to manage migration during disasters like Covid-19, there was also confusion about how to support migrants who face problems. Based on studies with migrants and investigative journalistic reports, this paper highlights the problems that the migrants experienced in work (destination country), while returning to Nepal and in going back to their society, and their interests in migration vis-à-vis work in Nepal, and the support they expect from the government or public institutions. The findings are used to present a policy framework that could help in making migration resilient even during disastrous events like this pandemic. Here the concept of 'disaster management' that emphasizes 'rescue', 'relief', and 'recovery' are employed along with ways to integrate migration and remittances with economic growth within the country so that migrants can be engaged when they return home and the economy as a whole does not collapse. This could also help in making migration/remittances contributory to sustainable development within the country.

COVID-19 and Migration: An Employment Strategy for Returnees in Nepal

Ganesh Gurung
Policy Research Institute, Nepal

Before COVID-19, Nepal was sending 1,009 Nepali youths to foreign countries for employment every day. It was especially to the Gulf Cooperation Council (GCC) countries and Malaysia. In return, Nepal received 2.39 billion Nepali rupees in remittances every day, which is equivalent to 28 per cent of Nepal's Gross Domestic Product (GDP) and is more than from the agricultural sector. Thus, remittances remain a bloodline of Nepal's economy. However, after COVID-19, migrants are returning home every day and more than five hundred thousand have already returned from India. Nearly two hundred thousand youths are waiting to return to Nepal from GCC and Malaysia. Thus, there remains challenge to provide employment to the returnees. One of the potential sectors to employ these returnees is agriculture but it has structural barriers such as land ownership, rampant intermediaries, availability of agricultural inputs and profit margin. So, employment in the agricultural sector cannot be the strategy until the problems in the sector are addressed. Five to seven hundred thousand Indian workers have returned to India where Nepali returnees can be employed easily for which a proper practical planning should be crafted immediately until agriculture sector is ready to employ.

Poster Presentation

Situation of Migrant Workers between Nepal and India during COVID-19

Deepak Chandra Bhatta
Far-Western University, Nepal

Traditionally, India is the most popular and convenient labour market for the people of Sudurpaschim Province. Currently an estimated 5,00,000 people from this province are believed to be working in India. Likewise, Indian migrants are also employed in various trades and occupations in Nepal. Most Nepali migrants in India are engaged in jobs ranging from service sector to agriculture. Some also work in construction, and production sector, mostly of menial nature. On the other hand, Indian migrants in Nepal are found to be working for more skilled jobs in these sectors. Some of them are even entrepreneurs or self-employed. This paper aims to explain the current situation of migration between Nepal and India. A study was conducted to explore the state of migration during the covid-19 period using data from secondary sources, observations, and social media. In this study, returnee migrants were contacted to understand: 1) How did they arrive at their home from India? 2) What were their views at the time of return about working in India? And, 3) why are so many Nepalis going to India again? Generally, a large number of people from the rural hills of Sudurpaschim Province go to India to find jobs because of shorter distances and less investments required in the migration process as compared to going a third country. Similarly, the Indian migrant workers in Sudurpaschim come from rural areas (Dehat) of neighbouring State of Uttar Pradesh. However, Nepali migrants prefer to go to big Indian cities even traveling longer distances. This is partly due to their established network. During the period of Covid-19, it was very difficult for Nepalis to travel home; however, Indian migrants took benefit of the shorter distances and easily returned. Although the borders were locked, Nepali migrant workers from Indian cities continued returning home. The irony is that those Nepalis who reported that they have abandoned the idea of going back to India due to the pandemic, are again considering to return mainly because of the lack of an employment opportunity in Nepal. This is despite the fact that there are a lot of jobs that are empty due to the lack of skilled workers, such as barbers, masons, carpenters, auto-mechanics, and break makers. Governments at various levels need to invest in skill development activities to retain human resources and to stop remittances going out of Nepal.

Females in Agritourism: Exploring Best Jobs

Kumar Bhatta[1] and Yasuo Ohe[2]

[1]Chiba University, Japan

[2]Tokyo University of Agriculture, Japan

Women engaged in agritourism play an important role in its sustainability. However, due to the limited number of studies in developing countries, roles played by women in agritourism are still not clearly identified. Therefore, the authors attempt to investigate roles of women in Nepalese agritourism. The data were collected in January 2019 from 22 experts from Phikuri village, Nepal using google forms. All the questions were developed in Likert 5 scales. For the data processing, we employed the Mann-Whitney rank-sum test because of the non-parametric data type. We compared the opinions by gender (i.e. male vs female), age (young generation (up to 30 years of age) vs old generation (31 and over years of age)), types of work (public vs private workers). Opinions significantly differed on various types of works that women engage in this sector. Of various agritourism activities in which women are involved, the study shows that selling of goods is the strategically more suitable job for them because it does not need advance knowledge as compared to other jobs types. It also creates an opportunity for earning personal income for women, who otherwise economically depend on men. Thus, women should be given more priority for the selling of goods, which is a comparatively more straightforward job for them than other jobs. This study dealt only with the potential works of females in agritourism; the future study should focus on the status and quality of work.

Responding to the Coronavirus Pandemic: A Study of Nepal's Epidemic Law Regime

Jivesh Jha
Birgunj High Court, Nepal

The competent parliament of Nepal has enacted fair corpus of laws to stem the transmission of outbreaks. However, the laws have obvious gaps. It appears that these laws are neither up-to-date, nor are they comprehensive. The epidemic law prescribes the rights of the state but fails to lay down the duties of the state towards its vulnerable citizens during the health emergency-like situations. The Infectious Disease Act, 1964, which is enacted by then king Mahendra, nowhere prescribes for welfare functions to be carried out by the state for the welfare of the vulnerable citizens. The regal law does not necessarily oblige the government of Nepal to ensure arrangement of food or compensation or financial assistance to the daily wagers, migrant labourers, informal sectors or poor and needy ones who have suffered due to unprecedented lockdown. The epidemic law of India is also scripted in similar terms. Arguably, the existing law of the land fails to direct the state to set up a common forum comprising of bacteriologists, virologists, biomedical scientists and among other healthcare professional to conduct research on antibodies of pandemics. Nepal deserves to adopt a robust comprehensive epidemic law regime to fight the pandemic in future. Furthermore, the international best practices could be adopted at home. For instance, England's Coronavirus Act, 2020, which features as many as 102 Sections and 29 Schedules, envisages a sunset clause (Section 89) which says that the majority of the provisions will expire after two years. Nevertheless, this period may be extended by six months or shortened in accordance with Section 90. The Acts hosts plethora of progressive provisions, like indemnity against clinical negligence claims for healthcare professionals assisting in the response to the outbreak, audio-visual conferencing in court proceeding or compensation to the victims of Coronavirus. It shows the state's strong commitments in fight against the Coronavirus. This way, a comprehensive pandemic law could oblige the states to set a target of eradicating an outbreak in future within a given time frame—just like England's Coronavirus Act. This paper delves to study the epidemic law regime in Nepal and comparatively analyze the prevailing laws in South Asia and England and finally the paper would give conclusion and recommendation .

Right and Privileges of the Dalits in Nepal: A Constitutional Study

Raksha Ram
Supreme Court of Nepal

This paper focuses on rights and privileges of Dalits in Nepal under, and comparative study between previous constitution and new constitution.

Nepal has had seven constitutions so far but the new constitution makes principle distance with the previous charter of 1991. The previous constitution had condemned caste-based discrimination and mandated for equal protection of all the citizens under the constitution. However the previous constitution had implicitly failed to prevent discrimination along the lines of color, sex, caste, tribe, origin, language or ideological conviction or any of these.

Nevertheless, the new constitution has explicitly used the word Dalit and made the state liable to protect the rights and other concerns of the Dalit. The constitution has ensure proportional inclusion of Dalits in the all the state apparatus. The new constitution has unique provision regarding proportional inclusion, that the facilities conferred to the Dalit community must be distributed in a just manner so that the Dalit women, men and others in Dalit community can obtain such facilities proportionately.

This way the state is duty bound to ensure the representation of all under privileged and marginalized citizens in the state mechanism.

In this paper I will shed light on the national and international provisions regarding the Dalit community and reservation and measures targeted for the the under privileged society.

[1] Judicial Officer of The Supreme Court of Nepal.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S12: Sustainable Energy

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

S12

Sustainable Energy

The 7th Sustainable Development Goal is to provide affordable and clean energy to all by 2030. To achieve this goal, countries around the world are taking initiatives for power generation by switching to clean energies. Unlike many countries, Nepal satisfies all the energy requirements from renewable energies, with few exceptions like cooking, heating, and transportation for which biomass or imported petroleum fuels are used. Nepal has made remarkable efforts in electricity generation and transmission over the years; according to International Energy Agency, only 6% of the population remains without access to electricity today. Dependence on imported petroleum and providing subsidy for Liquefied Petroleum Gas for cooking put a huge financial burden on the country. It is the right time for Nepal to focus on increasing per capita energy consumption in various sectors like transportation, cooking, heating, agriculture, etc. by making use of surplus electricity which will be produced by the completion of the upcoming hydropower projects. This symposium will focus on ways to end dependency on imported fuels thus reducing the trade deficit, ensure energy security in case of irregular supply and blockades, and boost the national economy.

Coordinators

Dr Binayak Bhandari
Woosong University, South Korea

Program

Session:	S12: Sustainable Energy				
Date/Time:	11 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 4:	https://bit.ly/2EONfH7 (925 9086 2548)		Passcode:	nrna2020	
Zoom Support:	zoomsupport@nrna.org				
Coordinator/ Moderator:	Dr Binayak Bhandari				
Session Chairs:	Dr Indira Shakya, Gender and Energy Expert, Independent Consultant				
	Prof. Triratna Bajracharya, Pulchowk Campus, IoE,, Tribhuvan University				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 11:00	S12A : Energy Policy in Nepal: Status and Prospects				
09:00 - 09:20	Prof Dr Govind Raj Pokharel	Keynote Speech	Former VC	National Planning Commission	Sustainable Energy: Policy and strategy in Nepal
09:20 - 09:40	Sagar Raj Gautam	Invited Talk	Senior Division Engineer	Ministry of Energy, Water Resources and Irrigation	Energy Policy
09:40 - 09:55	Krishna Acharya	Invited Talk	Energy Developers	Independent Power Producers' Association, Nepal (IPPAN)	Sustainable Energy for Nepal and Role of Private Sector
09:55 - 10:05	Guan Raj Dhakal	Invited Talk	Chairperson	Renewable Energy Confederation	Energy Promoters
10:05 - 10:15	Bishal Thapa	Invited Talk	Managing Director	Saral Urja Nepal	Distributed Renewable Energy for Nepal: Connecting the Past to the Future
10:15 - 10:28	Dr Biraj Singh Thapa	Contributed Talk	Associate Professor	Kathmandu University	Hydrogen Ecosystem for Sustainable Development of Nepal
10:28 - 10:41	Rupesh Baniya	Contributed Talk		IOE, Tribhuvan University	Geographic Information System Assessment for Identification of Pumped Storage Hydropower Potential in Nepal
10:41 - 10:54	Ravi Chandra Koirala	Contributed Talk		University of the West of Scotland	Blockchain for Smart Grid: Exploring Applications in Energy Trading with Electrical Vehicle in V2G Network
10:54 - 11:30	Poster (Video) Presentation + Break				
	Vijay Jayshwal	Poster Presentation		Kathmandu University, School of Law	Development of Energy Law as an Independent Discipline: Phenomenological Study in Contemporary Practices of Energy Law

Session:	S12: Sustainable Energy				
Date/Time:	11 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 4:	https://bit.ly/2EONfH7 (925 9086 2548)		Passcode:	nrna2020	
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	Prof. Triratna Bajracharya, Pulchowk Campus, IoE,, Tribhuvan University				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
	Grishma Raj Dahal	Poster Presentation		Humboldt State University	Cost-Benefit Analysis Of Replacing LPG Stoves With Induction Stoves In Rural Households Of Kavre District, Nepal
	Suyesh Bhattarai	Poster Presentation		Aston University, UK	Rapid stochastic optimization of turbomachinery using lightweight ADT and SPH based CFD engine
	Bikrant Koirala and Keshav Dahal	Poster Presentation		School of Computing, Engineering and Physical Sciences, University of the West of Scotland	Modelling of RF Energy Harvester Harvesting and Consumption Rate Balance for Energy Neutral Operation and Minimum Energy Wastage
11:30 - 13:35	S12B: Energy Infrastructure: Operation and Management, Chairs: Barsha Pandey, Kushal Gurung				
Session Chairs:	Barsha Pandey, Operations Analyst, The World Bank; Kushal Gurung, CEO, WindPower Nepal				
11:30 - 11:50	Alan Michael Creighton	Keynote Speech	Senior Smart Grid Development Engineer	Northpower grid, UK	Facilitating Sustainable Electricity Generation, Regulation and Standards
11:50 - 12:05	Kulman Ghising	Invited Talk	Former Managing Director	Nepal Electricity Regulatory Authority	
12:05 - 12:20	Surya Lamsal	Invited Talk	Professional Engineer (PE)	New York Power Authority, USA	Cross-Border Electricity Infrastructure
12:20 - 12:35	Dr Ram Prasad Dhital	Contributed Talk	Commissioner	Electricity Regulatory Commission, Nepal	Challenges and Opportunities for Electricity Regulation in Nepal
12:35 - 13:30	Panel Discussion: Energy Resilience in Pandemic and Disaster				
Moderator:	Dr Vivek Bhandari, PE; Principal Architect and Lead Grid Control Business Segment; Siemens Australia				
12:35 - 13:30	Soma Dutta	Panelist	ENERGIA International Coordinator and Program Manager	The Netherlands	
	Dr Rabin Shrestha	Panelist	Senior Energy Specialists	World Bank	

Session:	S12: Sustainable Energy				
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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
	Prof Ben Campbell	Panelist	Durham University	United Kingdom	
	Dr Krishna Kant Panthi	Panelist	Professor, Department of Geoscience and Petroleum	Norwegian University of Science and Technology, Norway	
13:30- 14:00	Poster (Video) Presentation				
	Sushmita Dulal and Kushal Gurung	Poster Presentation		WindPower Nepal Pvt. Ltd.	Commercial Compressed Biogas Plant In Nepal: Challenges And Opportunities
	Ayush Acharya and Kushal Gurung	Poster Presentation		WindPower Nepal Pvt. Ltd.	Zero-Cost Framework for Accessing Nepal's Commercial Wind Energy Potential: A Case Study from Mustang
	Prakash Man Shrestha	Poster Presentation		Department of Physics, Patan Multiple Campus, IoST, Tribhuvan University, Nepal	Impact of Meteorological Parameters on Atmospheric Transmittance over Jumla
	Yaju Rajbhandari	Poster Presentation		Department of Electrical and Electronics Engineering, Kathmandu University	Technological Importance of Micro-grid in Sustainable Development
	Dilip Bhattarai Upadhyay	Poster Presentation		Kathmandu University	Comparative Analysis Of Different Types Of Diffuser For Micro Wind Turbine
	Deependra Neupane	Poster Presentation		Collage of Agriculture and Life Science, Tribhuvan University	Estimating Solar and Wind Energy Potential with Economics of Production in Provincial Level of Nepal
ICC Representative	Lok Dahal	Vote of thanks	Joint Treasurer	NRNA	

Abstracts

Sustainable Energy: Policy and strategy in Nepal

Govind Raj Pokharel

Sustainable development of modern energy through promotion and expansion of clean energy in Nepal is the agenda for future. Nepal also need to ensure access to clean energy by increasing the production and use of sustainable energy and contribute to energy security. As energy sector can help Nepal to generate revenues and create jobs, Nepal must generate more power also work on energy banking with India to avoid seasonal variation. Simultaneously, domestic demand must be increased so that net surplus could be minimized. Promotion of clean energy use in electric vehicle, agriculture, industrial & commercial, cooking (but together with above). Investment in developing the internal electricity market should be made. People should be able to buy home appliances, electricity cars at cheap price.

To ensure energy security and also address social equity distributed generation for energy mix and avoiding transmission congestion is also important.

Nepal also needs policy reforms in electricity sector. It is long overdue to unbundle NEA. NEA's so called profitable position has made it complicated, but it is necessary that we proceed with it. Generation sector should be competitive, distribution sector can be competitive and transmission line sector should be regulated monopoly for now. Trade talk among Nepal, India and Bangladesh should proceed and come to conclusion soon. Power Trading Company is needed to trade in India.

Transmission lines should be built at least as per suggestion of a masterplan for internal transmission line development strategy. Licenses of electricity should be issued according to this plan so that people don't make power generation plants in areas where transmission line is unlikely to be built. Private hydropower development should be promoted. They eventually will yield a lot of royalty to the government without really having to invest anything now.

Overview of Nepal Energy Sector

Sagar Raj Gautam
Ministry of Energy, Water Resources and Irrigation

In 2018, the fuel wood and the petroleum products dominated as main source of energy in the energy mix of the country. In the same year renewables accounted for only 6% of the total energy consumed. The presentation highlights on the status and projection of energy along with the status of the electricity mix and future development. Based on the White Paper on Energy, Water Resources and Irrigation unveiled by Ministry of Energy Water Resources and Irrigation (MoEWRI) in April 2018, National Planning Commission formulated a five-year plan 2019-2024 (Plan) of Energy Sector. While, the presentation will focus on general energy / electricity development policy, it will also touch upon vision and targets the Plan has set for and will conclude with few of the initiatives that the MoEWRI has taken up.

Sustainable Energy for Nepal and Role of Private Sector

Krishna Acharya
Independent Power Producer's Association, Nepal

Nepal's access to electricity is growing at a steady pace and already 94% of the population has access to electricity population (https://www.iea.org/statistics). Though the gird system of Nepal is dominantly hydro, still 72% of the country's energy is met by bio fuels and 19% by fossil fuel and hydro only accounts to 3%. Furthermore, the world energy dilemma index, Nepal ranks at 117, the bottom 25%. Hence, it needs to work on energy security, energy equity and environmental sustainability.

Nepal is endowed with abundant fresh water and 6,000 rivers traverse through some of the highest glaciers to the Southern flat land making Nepal's techno-commercial hydro power potential 43,000 MW. However, only 3% of this potential is used; hence the opportunity for growth in hydro generation is immense. The generated power can only contribute to national growth with augmentation of transmission and distribution reciprocal to generation growth. Hence, the overall energy sector needs further investment. As in the past, the private sector has a huge role to play in this overall growth. Private sector contributes to almost 55% of the total hydro capacity of the national grid system. It can also play an active role in other realms of the power system with suitable policy changes which in turn will ensure an improved world energy dilemma index.

Energy Promoters

Guan Raj Dhakal
Renewable Energy Confederation

Sustainable energy technologies can play a greater role in Nepal's economy. Nepal does not have fossil fuel resources. So all such fuels as energy is imported paying hard earned money. Renewable energy resources are available in Nepal. Some 1,400 MW of electricity has been generated and other renewable energy technologies are supporting in remote and off-grid areas.

Renewable energy technologies should be well utilized for agriculture, industries and transportation mainly. Private sector is involved in hydropower generation as equal as government sector.

Governments in all three levels should consider on generating more energy by deploying RETs in sustainable methods. Private sector needs to be supported with financial facilities and technical supports so as industries and entrepreneurship of RETs will grow well. The private sector also requires capacity building.

Nepalese working abroad as NRN should be well communicated to invest in RETs and also sharing knowledge and experiences. The COVID 19 pandemic brought in a new scope related to RETs. People coming home due to effect of pandemic require food and employment. Experts and professionals are advocating that there could be immense of opportunities in Agriculture and Agro-based industries.

Renewable Energy Confederation of Nepal (RECON) has been raising RE for agriculture as an opportunity for the country. Likewise financial facilities and capacity buildings are important aspects to grow smooth and grow well. It has been consulting with active stakeholders on the subject matters and informing authorities to create conducive environment through reformed policies.

Distributed Renewable Energy for Nepal: Connecting the Past to the Future

Bishal Thapa
Saral Urja Nepal

The singular focus on Nepal's hydropower as a source for electricity generation has served Nepal poorly. The rapid emergence of new clean energy technologies is changing the way people produce and use energy. Within a digitally interconnected world, such energy solutions are fundamentally altering how the energy system accommodates these innovations. To overcome the seasonal limitation of Nepal's water resources, and to ensure reliable, affordable, inclusive, and sustainable for all, Nepal must understand and embrace the technological changes sweeping the energy world.

Hydrogen Ecosystem for Sustainable Development of Nepal

Biraj Singh Thapa and Bhola Thapa
Kathmandu University

Hydropower development in Nepal is at the focus of the national priority. More than 20000 MW of hydropower projects are under some stage of development. With the forecasted domestic demand for electricity is much lower than its production within a few years, there has been a sudden surge for discussions around the sustainability of the hydropower sector in Nepal. Hydrogen to Fertilizer production is also evolving as the potential business for Nepal that could contribute to hydropower, food security, local employment, trade deficit, and many others to list.

The production and supply of green hydrogen energy from hydropower could be one of the innovative businesses for Nepal in the future. As the rest of the word is making a transition towards the hydrogen-based economy, the developing country like Nepal cannot alone remain behind. There is a need to initiate scientific exploration and research on this technology at the Nepalese academic institutions.

A Green Hydrogen Lab has been established under the Department of Mechanical Engineering, Kathmandu University. The Lab carries a vision of, "Nepalese industries specialized to produce, store, transport, and use green hydrogen energy at a commercial level". The research activities are directed towards achieving a long term goal of developing a hydrogen ecosystem in Nepal with hydropower as the primary source of energy.

There is a need for a broader international collaboration for the knowledge and technology transfer to Nepal. Since the technology has achieved a much higher development stage at the global level, for Nepal the start would be knowledge transfer and local adaptation. If the initiation is taken earlier the transition period of the technology transfer will be much shorter. Intervention made by the Universities, Government, Industries, Non-resident Nepalese at present can open a new dimension for sustainable hydropower and hydrogen ecosystem in Nepal.

Geographic Information System Assessment for Identification of Pumped Storage Hydropower Potential in Nepal

[1]Rupesh Baniya, [2]Ashish Shrestha, [3]Prithvi Khadka, [4]Shashank Karki and [5]Ramesh Kumar Maskey

[1]Institute of Engineering, Tribhuvan University, Nepal

[2]Department of Electricity Development, Government of Nepal

[3]Chilime Engineering and Services Company Ltd., Nepal

[4]School of Engineering, Kathmandu University, Nepal

[5]Nepal Academy of Science and Technology (NAST)

Daily electricity demand peak during the time interval of 18:00 to 20:00 hours, at dry as well as wet seasons, is a typical load scenario of the Nepalese power system. It has been an effort of the Nepalese Government to manage the electricity demand through the implementation of the ten-year action plan (within 2025) to achieve 15000MW installed capacity. Of which 30-35% shall be contributed by storage and pumped storage scheme. However, identifying potential sites for the development of such projects is relatively inadequate compared to the traditional hydropower schemes *viz.* Run-of-River and Peaking Run-of-River projects. At present, the Nepalese Power System is dominated by the Run-of-River projects which cover the base and intermediate power demand.

In contrast, the peak demand is shared mainly by the power import from India. Owing to highly limited potential pumped storage sites in Nepal (*two sites viz. Begnas-Rupa of 150MW and Lower Seti of 104MW*), it is expedient to identify the reasonable possibility pumped storage to meet the aforementioned envisaged objective of the Nepalese Government. The study presents the Geographic Information System (GIS) to identify such potential sites satisfying necessary technical and environmental criteria. The study demonstrated methodology through GIS to locate potential upper reservoir sites with flat land topography and lower reservoir sites in the vicinity of existing river networks, lakes/glaciers, and storage sites of current and planned hydropower projects. Multiple criteria such as minimum head, slope, storage volume, power grid proximity, road connectivity, avoidance of protected/ conservation areas, and high altitude region (elevation above 5000masl) have been employed to map potential pumped storage sites. Arc-GIS, Google Earth mapping technique, and analysis provide insights into the theoretical and technical potential of pumped storage projects in Nepal.

Keywords: Pump-storage Hydropower, Run-of-River Scheme, GIS, Conservation of Water, Water Resources, Nepal Power System, Peak Load Demand, Peaking Power Plant

Blockchain for Smart Grid: Exploring Applications in Energy Trading with Electrical Vehicle in V2G Network

Ravi Chandra Koirala, Keshav Dahal and Santiago Matalonga
University of the West of Scotland, UK

These days, automotive companies are designing electric and hybrid electric vehicles to help minimize emission and improve fuel efficiency. Nevertheless, the role of electric vehicles has been advanced by the development of smart grid concept in power grid. Smart grid technology has facilitated energy exchange between electric vehicles and the power grid in vehicle-to-grid (V2G) network. In addition to power grid regulation, this technology has enabled reduction of the high peak demand for electric vehicle charging. However, it is always a challenge enabling dynamic pricing and providing incentives to stakeholders with optimized cost and profit. The proprietor of an electric vehicle may choose to purchase energy at a low price and sell it at a higher price during peak hours. But the traditional centralised electrical trading depends on trusted third parties, and has possibility of single point failure and privacy leakage. Further, finding the best charging location comparing energy cost and time required is also not so easy. These challenges put intense pressure on the smart grid to design an efficient, secured, transparent, information-symmetrical trading solutions.

Blockchain is one of such technologies whose distinct, unique and decentralized characteristics has appealed attention to overcome aforementioned challenges in various applications including smart grid. In a smart grid, this technology could offer pioneer solutions to most of the challenges that current grids are facing in energy trading with electric vehicle. It facilitates auditability and traceability of energy transactions among stakeholders. This research explores the application of Blockchain-based smart grid in energy trading with electric vehicle, and demonstrate a framework which shows how the technology can be used to trade energy with such vehicle while optimizing cost and identifying best charging location. Stakeholders use the reverse auction process based on dynamic pricing strategy to complete the transaction, which not only improve the profit of the less competitive power seller, but also reduce the energy buyer's costs. The buyer can choose the best charging location based on cost and the time required. Smart contracts for this framework are built on Ethereum and the feasibility of the proposed scheme is verified by simulation tests and comparison with existing power-trading systems.

Development of Energy Law as an Independent Discipline: Phenomenological Study in Contemporary Practices of Energy Law

Vijay Jayshwal
School of Law, Kathmandu University, Nepal

The autonomy of the social sciences is still a subject of debate and dialogue. The independent theorization is still somehow considered a myth by many scholars in social science. It is not a value free subject and its construct are built on interrelated phenomena of society. Energy law for decades was not realized as a discipline by universities around the world. Its boundaries were not fixed, principles well not developed, weak jurisprudence analysis, reluctant of court and legislature to frame rules, laws, guidelines, norms and interpretation etc.were a pushing factor to recognize its independence and autonomy. There are ample reasons to consider energy law as an independent discipline with wider prospects and future for the academia and practitioners.With the passage of time and progress made by the international communities and forced post 1980's liberalization and privatization brought few studied in the energy sector. The countries across the world, large and small, have been utilizing various types of energies, based on their socio-economic capabilities, for their consumption and development. Some of the country has poured significant amount of work in order to recognize the subject of energy law as similar to any other subject in the university curricula.

The School of Law, Kathmandu University has kept subject of energy law as a compulsory subject with three credit hours. This is first time in Nepal, energy law has become a subject of university with due attention. KUSL has also introduced first time Master by Research in Energy and Infrastructure law in Nepal. The School of Law has given more emphasis on energy law in order to be considered as an independent discipline as similar to other social sciences. The contribution made by School of law in sector of energy law is appreciable.

This paper will attempt to review and relocate the established autonomy of energy law in and across the world. This paper will further highlight the developmental due course of energy subject and it has applied phenomenological study of research.

Cost-Benefit Analysis of Replacing LPG Stoves with Induction Stoves in Rural Households of Kavre District, Nepal

Grishma Raj Dahal[1] and Ramhari Poudyal[2]
[1]Humboldt State University, Germany
[2]Swansea University, UK

Nepal imports nearly 260,000 tons of Liquified Petroleum Gas (LPG) and other fossil fuels annually from India. This fuel dependency is one of the main reasons for Nepal's trade deficit with India. The Government of Nepal has recently started promoting electric induction stoves for cooking as an alternative to LPG. Induction stoves are pollution free at the point of use, and they are meant to reduce Nepal's dependence on LPG.

This study includes a cost-benefit analysis for replacing LPG stoves with induction stoves for households in rural areas of Kavre District, Nepal. The study involved the use of data for LPG and electricity consumption for households that use LPGand have not yet adopted induction stoves. It includes the estimated expected post-adoption (future) electricity consumption based on the cooking energy associated with the existing (pre-adoption) LPG usage.

The results show that about two-thirds of households in the study would not benefit economically from the adoption of electric induction stoves if there is no subsidy on the electricity. The amount of subsidy would depend on baseline electricity consumption and the LPG usage of the households. Future analysis of the economics of a transition to induction cooking could be improved through the collection of more precise data on LPG consumption, baseline electricity consumption, LPG prices, and the economic discount rate.

Rapid Stochastic Optimisation of Turbomachinery Using Lightweight ADT and SPH Based CFD Engine

[1]Suyesh Bhattarai, [2]Keshav Dahal and [2]Parag Vichare

[1]Aston University, UK

[2]University of the West of Scotland, UK

Analysis of the turbomachinery in a dynamic state has always been considered challenging. Trade-offs for such analysis are accepted in the engineering industry due to limiting computational resources. Such trade-offs include abstraction in the form of stationary analysis or simplfied simulation conditions. Dynamic state simulation to represent performance under rotary (working) condition can be formulated with recent advancements in computer hardware and computing algorithms. Stochastic optimisation methods can be exploited to enhance efficiency of such turbomachinery. A system that extends the application of Adapted Delaunay Triangulation (ADT) and Smoothed Particle Hydrodynamics (SPH) to optimise the Pelton Turbine bucket in rotating condition has been developed and experimentally verified.

Pelton Turbine buckets are extensively defined as Nurbs surfaces or Spline patches. These surface fitting methods discount slight variations on individual control points. Hence, minor incremental improvements obtained during optimisation is lost using these surface definition methods. The novelty of this ADT based optimisation system lies in using individually constrained coordinate points to define the bucket surface whose slightest change is reflected on the bucket surface. It also allows surfaces other than the traditional ellipsoidal while maintaining the cup shape.

This novel approach to Surface Generation, Computational Fluid Dynamics (CFD) simulation and optimisation was able to provide 1.9% increase in power output on experimental rig. Each optimisation cycle (one generation, 48 SPH simulations) with 25 surface defining coordinate points took a total of 51.68 hours to complete on a 256 core GPU. The optimisation was run with the population size of 48 individuals for 15 generations. The similar analysis with leading volume based CFD methods require 48 hours to run one single simulation with acceptable accuracy but without any optimisation. Rapid and light weight stochastic optimisation of the Pelton turbine bucket under rotating condition was achieved through this ADT and SPH based CFD engine. This method can be extended to optimise hydrodynamic or fluid response surfaces found in turbomachinery, drainage basin analysis and flood control application areas.

Modelling of RF Energy Harvester: Harvesting and Consumption Rate Balance for Energy Neutral Operation and Minimum Energy Wastage

Bikrant Koirala and Keshav Dahal
School of Computing, Engineering and Physical Sciences, University of the West of Scotland

Radio Frequency Energy Harvesting (RF-EH) system has a sustainable power supply from a radio environment by harvesting energy from RF signals for powering devices with low energy consumption. RF energy harvesting technologies are especially useful in charging an energy storing device or to power up electronic systems wirelessly in scenarios like chemical/nuclear plants, aircrafts or inside human/animal bodies in the form of implants where it is difficult to replace or recharge energy storing devices manually. RF-EH system usually incorporates 'harvest-store-use' mechanism, i.e. the harvested RF energy is first stored to an energy buffer and when the stored energy level is sufficient enough to power an application it is then supplied on to the device. The harvesting system should ensure that the application works even in the worst-case scenarios, considering both harvested and consumed energy. In addition, it should also store the excess of scavenged energy into the buffer maintaining balance between buffer capacity and consumed energy. Developing a RF-EH system model that considers Energy Neutral Operation (ENO), buffer requirements and ambient conditions is crucial in knowing the source, buffer and load relations within the context of energy neutrality and zero energy wastage. To address the above situation, we propose a model that makes use of available RF energy considering worst-case scenarios, ENO and buffer requirements. The model analysis and simulations are performed to ensure continuous energy supply to the load maintaining balance between average energy consumption and buffer capacity. Furthermore, this work also investigates the variations in energy consumption and buffer capacity for various ambient conditions.

Facilitating sustainable electricity generation, regulation and standards

Alan Michael Creighton
Northern Powergrid, United Kingdom

This presentation considers the electricity regulation framework in Great Britain and how it has adapted and developed in recent years to facilitate a transition to a more sustainable and low carbon economy.

Traditionally Great Britain (GB) has sourced most of its electricity from fossil fuels and nuclear. These types of large generation plant are typically connected to the transmission network which transports electricity to the distribution system for delivery to consumers. However, in recent years there has been significant growth in the electricity provided by renewable sources. As the amount of electricity generated from renewable resources has increased, a significant volume of smaller renewable generation has been connected to the distribution system.

In addition, the transition to a low carbon economy is expected to result in the electrification of both the transport and heating sector with the consequential impact of increasing demand on the distribution system.

The change in generation mix and the change in customer use of electricity mean that there is now a greater diversity in the way electricity is both generated and used. These changes pose new challenges to the operation of both the transmission and distribution systems.

GB has long established 'rules' set out in technical and commercial regulations, codes and standards that apply to transmission and distribution network operators and also to the generation and demand connected to them. These rules help to ensure that customers in GB benefit from a secure and reliable supply of electricity and provide a degree of technical and commercial certainty for all parties using the transmission and distribution systems. They have served the industry well for many decades, however they can be seen by some to create barriers to innovation and stifle the connection and deployment of new technologies and commercial initiatives. This presentation will provide an overview of these regulations, codes and standards, how they are evolving to address the issues currently being considered and addressed.

Cross-Border Electricity Infrastructure

Surya Lamsal
New York Power Authority, USA

Neighboring countries share electricity to ensure power availability, enhance resiliency, reduce cost and promote renewable energy resources. Countries face tremendous challenges while planning, developing and managing operations of cross-border electricity infrastructure. The electricity market requires balancing generation, market integration, transmission grid expansion and coordinated operation. The benefits of cross-border interconnectivity are widely acknowledged. However, the expansion of bilateral connectivity receives high political intervention and the process is often slow. This presentation identifies the challenges and reviews existing approaches of generation and interconnection projects, including scenarios that could account for the delays in project development. As an illustration case study, US-Canada water resource and electrical power sharing is used. Political and governance-related issues together with economics and finances would be reviewed to explain the challenges followed by very successful projects in operation. The conclusion of the treaty and operation mechanism would also be discussed.

Challenges and Opportunities for Electricity Regulation in Nepal

Ram Prasad Dhital
Electricity Regulatory Commission, Nepal

Nepal has been experiencing some improvements in the power sector recently but the sector has not yet been matured. The main reason for this is that the sectoral inherent development barriers that stem from the domestic power supply, weak governance systems, and immature regulatory provisions. In the past, electricity regulation used to be carried out by the state-owned utility, the Nepal Electricity Authority with policy support from the Ministry of Energy, Water Resources and Irrigation. This has been one of the challenging issues for the sectoral reform as an independent regulatory agency has not been in existence for many years. Having this in mind, the Nepal government on May 9, 2019, established an independent 'Electricity Regulatory Commission (ERC – N) to regulate the generation, transmission, distribution, and trade of electricity in Nepal. There are various challenges and opportunities to promote effective regulatory mechanisms in Nepal. The regulator must ensure that (i) consumers receive a service of good quality of electricity at fair prices (ii) service providers are efficient and earn a reasonable return on equity allocated to investment,(iii) generation, transmission and distribution systems are developed as per international standard following technical and non-technical aspects including health and safety (iv) disputes between licensees and or users are resolved as per internationally established practices and procedures (v) institutional governance of all sector players are enhanced, (vi) consumers' interest and rights are properly protected and (iv) fair and competitive process for issuing licenses, deciding generation, transmission, and consumer tariff and power purchase agreement between project developers and off-taker is established. This paper analyses the sectoral electricity services in Nepal and highlights the challenges and opportunities for electricity regulation in Nepal.

Energy as a Lens on Social Change and Resilience

Ben Campbell
Department of Anthropology and Durham Energy Institute, University of Durham, UK

The current pandemic has caused the world to pause. It has been a time for reflection about what makes us vulnerable. It has made us think about how dependent we have become on accelerating rates of energy consumption as the norm for desirable levels of comfort and wellbeing. In this talk I will discuss how a social scientist can use energy resilience as an indicator and a way in to consider processes of social change that have affected Nepali communities profoundly over the last forty years. Looking at the transformations and shocks that have marked this period, I draw attention to resilient social institutions through which communities have coped with environmental change, political upheavals, and disruptions to infrastructures. The presentation will look in detail at energy resilience through three pieces of research consisting of: the biomass energy transition in rural Nepal; the experience of energy systems deprivation after the earthquakes in 2015; and a study of energy access and livelihood resilience among Kathmandu's informal settlers. These different contexts for understanding energy as a lens to view social change and resilience will be used to argue that the current pandemic is revealing many systemic properties of energy relationships in directions of multiple transitions – in energy technologies, in urbanisation and in Nepal's relation to the global economy.

Reliable Ways to Develop Resilience Hydropower Energy

Krishna Kant Panthi
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In recent past the infrastructure development activities have got momentum in Nepal. Many roads are being and will be upgraded in coming years to make transport system cost effective and safe. In addition, planning is being made to develop trans Himalayan railway network to get direct access to both south and north directions. The renewable hydropower development activities are in full momentum. However, the frequently occurring natural hazards caused by monsoon rain and large- scale earthquakes have posed major challenges to complete infrastructure and resilience renewable hydropower energy in Nepal. In addition, the recent pandemic of CoVID-19 has huge impacts in these projects due to obstructed transportation and work-flow stoppage. How to overcome from such challenges are among the major issues to mountainous country having steep topographic slope and active geo-tectonic environment? The only reliable way to develop resilience hydropower energy is to enhance transport network that function in all weather and geo-hazard conditions. This is not possible to achieve without constructing tunnels so that land and rock-slide hazards are minimized. The experience gained so far from the tunnel construction projects indicate that the construction cost per of tunnels are considerably higher. This is mainly due to insufficient capacity within Nepal and dependency on foreign consultant and construction contractors who have limited knowledge on Himalayan geo-tectonic environment. Therefore, there is a strong need that a long-term reliable, safe and cost-effective solutions are the needed to be developed. This can be achieved only if the engineering design, construction methods and approaches are developed in such a way that these suits to the steep topography and challenging geological condition that our country has. This is only possible through the local capacity building, which can only be made through specialized high level education and research within Rock and Tunnel Engineering (both MSc and PhD Levels). In this view in mind, a new curriculum for MSc education in Rock and Tunnel Engineering was developed for the Institute of Engineering (IoE) with direct help received from NTNU, a university renowned in rock and tunnel engineering education and research. The new batch of MSc students are enrolled for academic year 2020/2021 and the MSc course is to start very soon.

Commercial Compressed Biogas Plant in Nepal: Challenges and Opportunities

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Traditionally, Nepal has been using Biogas as a cooking fuel, especially by the households with cattle. With a better technology, biogas can be upgraded, purified and compressed in cylinders, which could be used for electricity generation, or as transportation and cooking fuel. In recent times, Government of Nepal has also begun promoting commercial biogas production through subsidy and technical assistance. However, with new technology there are some obvious challenges that needs to be addressed, especially relating to technical and policy. This paper examines two existing projects- one that converts the raw biogas into bio-CNG, and another utilizes the biogas produced for electricity generation- to assess the challenges and opportunities of commercial large biogas projects in Nepal. High capital investment, lack of skilled human resources for smooth operation and maintenance of the system, lack of coordination among government, research institutions and industry, import of machinery and equipment, inadequate after-sales service and ensuring regular supply of raw materials have been identified as prevailing hurdles for commercial biogas projects in Nepal. The availability of a considerable amount of raw materials and the urgency to transition towards alternative clean cooking fuel provides opportunities for upsurging biogas technology. Strengthening each element of the technology supply chain (production, distribution and after-sales service), collaboration with institutions for applied research in biogas system and government support in biogas sector through policy measures are pivotal to further boost the commercial scale biogas sector in Nepal. Furthermore, tripartite coordination between Government, Industry and Academia is also key to ensuring sustainability in commercial biogas sector.

Zero-cost Framework for Accessing Nepal's Commercial Wind Energy Potential: A Case Study from Mustang

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Performing preliminary siting and tangible evaluation of wind farms is challenging for project developers in Nepal due to the high cost of licensed micro-siting software, lack of reliable ground-based wind resource data, and difficulty in assessing geographically morphed areas of the country. Areas with most promising wind resource profiles in Nepal are usually located in rural and remote regions with poor accessibility, limitation in aggregated geographical data, and often isolated from electrical grid infrastructures. Consequently, the identification of suitable locations for developing wind projects requires a complex multi-criterion analysis that involves upfront investment. This paper elaborates on a necessity-driven framework for wind farm siting and sizing that processes freely available project-specific parameters; geospatial data such as elevation and slope; and factual information such as land use, transportation route, wind resource profiles, to identify project locations along with quantitative figures for electricity generation. The framework is based on Spatial Multi-Criteria Analysis (SMCA) which combines varieties of readily available geographical reference data into a resultant decision to identify suitable wind farm locations. The framework considers multiple Wind Turbine Generators (WTGs) with different rated power capacities and blade lengths to provide flexible and site-specific energy yield estimates. Finally, a tailor-made spreadsheet tool combines secondary wind resource data and power curve of WTGs to calculate Annual Energy Production (AEP) and Levelized Cost of Electricity (LCOE) for each WTG. The final output will also have considered one of the major losses in wind-projects know as Wake Effect which is caused by inter-turbine wind vortices as a result of changes in wind speed caused by the impact of the turbines on each other. In a case study performed in Mustang, the total commercial wind power potential of the entire district was calculated as 1227MW, 676MW, and 1138MW for the three different types of WTGs.

Impact of Meteorological Parameters on Atmospheric Transmittance over Jumla

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This paper reports the variation of atmospheric transmittance with meteorological parameters over Jumla (Lat.:-29.28° N, Long.:-82.16° E and Alt.:- 2300 m above sea level) from 2011 to 2013(three years) by using CMP6 pyranometer and satellite data. The trends of monthly and seasonal variations of atmospheric transmittance, solar insolation and clearness index have been analyzed. The result exemplifies that during the study period, average value of global solar radiation, solar insolation and clearness index in study period are 19.26 ± 3.88 MJ/m^2/day , 4.95 ± 1.14 kWh/m^2/day and 0.59 ± 0.12 respectively. The average value of atmospheric transmittance during the whole study period is 0.60 ± 0.11. The average value of atmospheric transmittance of ozone , Rayleigh scattering, gas mixture ,water vapor and aerosol are 0.9830 ± 0.0007, 0.8999 ± 0.0178, 0.9875 ± 0.0007, 0.8839 ± 0.0101 and 0.7836 ± 0.0909 respectively. There is positive correlation of relative sunshine hour and negative correlation of rain fall with atmospheric transmittance. Result of this research work is beneficial for the further analysis of solar radiation at different places improving life of flora and fauna and protecting the whole environment.

Keywords: Atmospheric transmittance, clearness index, global solar radiation, meteorological parameters, solar insolation.

Technological Importance of Micro-grid in Sustainable Development

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Electricity access has become a basic need to all in the current era. In a country like Nepal, the isolated energy systems (IESs) or micro/mini-grids (MGs) with Distributed Energy Sources (DES) has played an important role to provide electricity at the rural areas. These isolated grids help to improve the living standard as well as uplift the socio-economic standard of the rural communities. With uplifting standard, the loads in such households are increases exponentially, since new appliances and technology has stepped in. In the current scenario, the MGs has also adopted the new technologies such as remote monitoring and control mechanisms, smart metering etc. However, among the thousands of MGs established in Nepal till date, only a few have access to these technologies. Because of which, efficient and reliable operation of these systems could not be achieved, resulting in reduced system production and even shutting down many of these microgrids. This paper aims to provide an overview of control architecture and management strategy that is implemented on the microgrids in Nepal. It discusses how the load control and management strategies can be implemented and/or achieved within the Nepalese MGs for their sustainable operation. This paper discusses the various technologies for the MGs that will allow easy and stable operation with lower operation workforce cost. The techno-economic challenges for the sustainable development of rural MGs have also discussed in this paper.

Comparative Analysis of Different Types of Diffuser for Micro Wind Turbine

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With the increase in demand of clean energy, micro wind turbine would be a best option for remote and also for urban residential areas. The Solar and Wind Energy Resource Assessment (SWERA) project executed by Alternative Energy Promotion Centre (AEPC), has shown a very good prospect for wind energy development in Nepal with prediction of about 3,000 MW of wind power generation in Nepal. Due to lower wind speed in most of the land area of Nepal, wind turbine is not being used. Energy produced by wind turbine is directly proportional to the cube of wind velocity. So, if we manage to increase wind speed slightly it would lead to increase in energy by significant amount. One concept to solve problems in areas that have low wind speed is the use of Diffuser Augmented Wind Turbine (DWAT). Diffuser Augmented Wind Turbine (DWAT) would have a duct surrounding the wind turbine blades that increase the cross sectional area in the stream wise direction. The pressure behind the turbine will drop due to the wind turbine being enclosed by the diffuser, thus wind velocity approaching the turbine will increase. Different types of Diffusers have been introduced till date to increase the velocity of wind. The main objective of the research is to perform comparative analysis of three different types of diffuser to increases the power output of wind turbine. The CFD simulation of Plain Diffuser, Flanged Diffuser and Collector- Diffuser is performed to find out maximum velocity each diffuser produced. With the solution from the simulation comparative analysis of each diffuser is conducted.

Estimating Solar and Wind Energy Potential with Economics of Production in Provincial Level of Nepal

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The solar and wind potential on the province of Nepal has been estimated on GIS based multi-criteria analysis. In addition we have created solar and wind development timeline and categorized in four phases: Introductory (1974-1996), Institutional Setup (1996-2001), Home System Development (2001-2017), and Upscaling (2017 - onward). The analysis has developed the geospatial supply curves for each of technologies. The country possess abundant solar potential with about 47,620 MW installed capacity potential that would generate about 7.5 times annual energy then energy that exist in country grid currently. Relatively, wind potential is found to be relatively very small with only about 1,680 MW installed capacity. The economically potential areas in the country that has average capacity factor greater than 0.15 for solar is found about 250 sq.km. While about 55 sq.km of feasible land areas, possess the wind power density greater than 300 w/sq.m. Similarly, about 8100 MW of solar energy is estimated in built-up areas. The study has shown the possibility of energy: wind and solar, resources in terms of accessibility and economy. Using the average international capital cost of the plant, Levelized Cost of Electricity (LCOE) of solar and wind found in optimal projects to be near 120 and 75 USD/MWh, respectively. Major potential project areas are found nearby the existing road infrastructures which reduces the overall construction costs. The higher solar energy potential of about 18 percent in total, is estimated in the Karnali province as it lies in high mountainous areas have the presence of good solar irradiance and large unused land area. The Gandaki province possess about of 67 percent of total wind potential. The study also analyzed the potential in reserved and protected areas. The area about 509 sq. km out of 1,563 sq.km solar and 93 sq.km out of 144 sq.km wind potential sites lies in protected and reserved areas of country. About 30 sq.km of feasible land area is found to be suitable for both solar and wind power plants. The sensitivity analysis has shown that the cost of the energy depends on Discount rated, capital cost and capacity factor. The information provided in the study would be useful for policy and decision makers and unlocks door for further study.

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2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S13: Sustainable Environment

9-11 October 2020

Online Event

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Program & Abstracts

S13

Sustainable Environment

Nepal faces unique challenges in designing science based sustainable stewardship of natural assets such as healthy soil, fresh water, clean air and diverse fauna and flora with healthy ecosystems for the prosperity and well-being of her citizens. The challenges lie in designing the transformation pathways to achieving socially acceptable sustainable stewardship of natural resources underpinning human well-being and environmental sustainability. Rapid and unplanned development activities in the recent past and several regional global climate changes have degraded Nepal's important and sensitive natural capitals faster than in any period in history, and hence, exposed Nepal's vulnerable citizens to serious risks. Nepali diaspora community needs to work together with key stakeholders and practitioner communities in Nepal to understand the opportunities and challenges and rejuvenate the sustainability researches, innovations and policy framework. Together we can generate the multifaceted science based scientific knowledge, skills and technologies to design solutions for complex and intricately intertwined environmental, societal and development challenges. This will help to accelerate the transformations contributing to broader socioeconomic development goals of Nepal with sustainable environment. This symposium aims to discuss these pertaining issues.

Coordinators

Dr Gopi Upreti
Professor, Tribhuvan University, Nepal

Dr Puru Shrestha
NRNA High Level Committee on Corona Pandemic Mitigation, USA

Program

Session:	S13: Sustainable Environment				
Date/Time:	11 October 2020, 14:30 - 19:00 (Nepal Standard Time)				
Room 4:	https://bit.ly/2EONfH7 (925 9086 2548)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators:	Dr Gopi Upreti, Medani Bhandari and Puru Shrestha				
Moderator:	Gopi Upreti				
Session Chair:	Dr Krishna Prasad Oli				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 16: 35	S13A: Invited Talks				
14:30 - 14:35	Gopi Upreti	Session Introduction			
14:35- 14:55	Dr Rejina Maskey Byanju	Invited Talk	Professor & Head of the Department	Department of Environmental Science, TU	Air Pollution
14:55- 15:15	Bishwo Parajuli	Invited Talk	Country representative, India	United Nation World Food Program	Climate Change and Food Production System
15:15 - 15:35	Dr David Molden	Invited Talk	Director General	International Centre for Integrated Mountain Development (ICIMOD)	Mountain Environment and Climate Change
15:35 - 15:55	Dr Gopi Upreti	Invited Talk	Professor	Tribhuvan University	Environmental Sustainability and Development Ethics
15:55 - 16:15	Dr Mohan B. Dangi	Invited Talk	Professor	California State University	Solid Waste Management
16:15 - 16:35	Dr Krishna Prasad Oli	Session Chair	Member, Planning Commission	Nepal Government	National Environment Strategy
16:35 - 16:45	Break				
16:45 - 18:00	Panel Discussion				
	Moderator: Gopi Upreti	Session Introduction			
	Dr Bishwa Nath Oli	Panelist	Secretary, Ministry of forest and Environment	Government of Nepal	Government Policy on Environmental Management
	Prof Dr Madan Koirala	Panelist	Professor and former Dean, Tribhuvan University	Tribhuvan University, Kirtipur, Nepal	Development and Environmental Sustainability
	Dr Keshab Poudel	Panelist	Medical Doctor, patron and former president, NRNA USA	Patron, NRNA USA	Impacts of Air Pollution on Human Health

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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
14:30 - 16: 35	S13A: Invited Talks				
	Prof Dr Durga Poudel	Panelist	Professor	University of Louisiana at Lafayette, Louisiana	Sustainable Natural Resource Management
18:00 - 19:20	S13 B: Contributed Talks				
18:00 - 18:05	Moderator: Medani Bhandari	Introduction to the Session			
18:05 - 18:14	Santosh Chaudhary	Contributed Talk		Kathmandu University, Dhulikhel, Kavre	Spring Water Sources Assessment And Forest Area Coverage Dynamics in Roshi and Melamchi Water
18:14 - 18:23	Durga D. Poudel	Contributed Talk		Asta-Ja USA	Asta-Ja for Sustainable Environment and Prosperity
18:23 - 18:32	Medani P Bhandari	Contributed Talk		Akamai University, USA; Sumy State University, Ukraine	Environmental Management and Climate Change Vulnerability - in Nepal
18:32 - 18:41	Amod Karmacharya	Contributed Talk		Clean up Nepal	Precious Plastic: A Small-scale Recycling of Plastic Technology
18:41 - 18:50	Kabindra Shakya	Contributed Talk	Department of Geography & the Environment, Villanova University, PA, USA	Department of Geography & the Environment, Villanova University, PA, USA	Understanding Air Pollution in Kathmandu
18:50 -18:59	Bhubaneswor Dhakal	Contributed Talk	University of Otago, Christchurch, New Zealan	University of Otago, Christchurch, New Zealan	Strategic Policies to Manage Land Resources for Addressing Social, Economic and Environmental Problems in Mountain Areas of Nepal
18:59 - 19:08	Hemant Tiwari	Contributed Talk	Safe & Sustainable Travel Nepal (SSTN)	Safe & Sustainable Travel Nepal (SSTN)	Impact of Urban Transportation on Air Quality (A case study of Kathmandu Valley
19:08 - 19:17	Basanta Gautam	Contributed Talk	Arbonaut Ltd., Finland	Arbonaut Ltd., Finland	Establishing a Biomass Pellet factory: a Clean Energy Solution for Nepal
ICC Representative	Himal Gurung	Vote of thanks	Youth Coordinator	NRNA	

Abstracts

Emission Factors for Air Pollution Sources: Ways to Achieve Clean and Sustainable Nepal

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Vehicular exhaust, open burning of crop residue and wastes, and enteric fermentation from cattle are very important but poorly characterized sources of ambient air pollution in Nepal. Nepal lacks comprehensive emission inventory studies from these air polluting sources but are required for quantifying the amount of pollutants emitted. Moreover, some past research on air quality indicate that diesel vehicles make a substantial contribution to the ambient pollution but emission factors from these sources are lacking. Hence, it's important to identify cost-effective measures for reducing their emissions. Moreover, the gridded inventory reported by Global Fire Emissions Database for biomass burning including open burning of crop residue are of coarse resolution, and may not be appropriate for a simulation in Nepalese scenario. Similarly, the country lacks estimate of the country-specific enteric methane (CH_4) emission factors and the net CH_4 fluxes for the local and improved cattle breeds in Nepal. In this context of lack of these metrices and gaps, we attempted to determine the emission factors for these sources. For the purpose, our study performed roadside surveillance and exploratory emission-measurement to provide preliminary evidence that a policy of mandatory, routine maintenance of a targeted subset of the diesel fleet can systematically reduce emissions and improve air quality in the Kathmandu Valley and other cities around the world that are facing similar problems. Similarly, for determining the emission factor for open burning, our studies have developed a comprehensive high resolution (1 km ☒ 1 km) gridded model-ready emissions inventory for Nepal to understand the spatial characteristics of air pollutant emissions from open burning. The available data on agricultural production, residue consumption patterns, agricultural burning parameters and emission factors were derived from secondary sources. The findings of this study indicate substantial reduction in open field burning would dramatically improve air quality in both the Terai region and other parts of Nepal and help reduce negative health impacts associated with the open burning of residue such as premature deaths, respiratory disease, and cardiovascular disease. Additionally, using IPCC Tier 2 methodology and country-specific herd structure, morphological and feed characteristics data of cattle, emission factor for methane emission and carbon fluxes from enteric fermentation were determined. The emission factors derived from our studies will help to facilitate future discourse of emissions and air pollution scenario of Nepal. Building Resilience in the face of Impacts of Climate Change in the Hindu Kush Himalaya

Climate Changes and Food Security

Bishow Parajuli
United Nation World Food Program

I would like to highlight four key points within this topic: a) Food Security and Global Situation b) Climate Changes and its impact on food and nutrition security c) Situation in South East Asia and Nepal d) the Way forward

Food Security and Global Situation

The good news is that with the continued advancement of science and green revolution efforts, there is enough food for everyone in this world. Food production has substantially increased globally and there is enough surplus food stock to feed everyone. Unfortunately, the situation has deteriorated in several countries including Nepal. Compared to other neighbouring countries such as India and Bangladesh, which are becoming self-sufficient in Food production inspite of huge population sizes, Nepal's dependency on import has increased. Also, the bad news is that, some 690 million people are estimated not to get enough to eat globally. Over half of this population are in Asia. About 10 million more people are added each year to the total number of hungry people and a total of 60 million in last five years.

COVID pandemic has affected beyond health and has become a major food security and livelihood threat to millions. WFP estimates that due to COVID crisis, the number of acute food insecure people across the globe will double to 270 million in 2020/21. Continued neglect in agriculture and combined effect of climate changes is making Nepal food insecure. Child hunger is expected to rise. Mere availability of food supply is not enough to address hunger. Crucial is the affordability of adequate food with adequate nutritional needs.

Climate Changes, Impact on Agriculture, Food and Nutrition Security

Climate Change can act as a high-risk multiplier exacerbating drivers of food security.

Climate changes can decrease crop production and changes in the frequency and intensity of climate related hazards, which can result in more humanitarian and food security crisis. It is anticipated and estimated impacts of climate change are becoming more and more visible – and some sectors are more intensely affected than others. Many countries are witnessing years after year, severe droughts and floods and cyclone increasing population dependent on social services. The interlinked factors of temperature rise, changing rainfall and weather patterns adversely affect multiple sectors related food and nutrition security and agriculture. Climate change affects the different dimensions of food security in complex ways:

i) The **availability** of food can be affected through variations in **yields** – especially in key producing areas – due to **increasing temperatures** as well as **changes in the quantity of arable land and water available for agriculture**.

ii) Changes in **production**, in turn, can affect the ability of households to access food and as such impact on dietary diversity.

iii) Moreover, changes in rainfall and temperature patterns directly impact **livelihoods** that depend on climate-sensitive activities, such as rain-fed agriculture and livestock rearing.

Climate variability and extreme weather events are among the key drivers behind the recent uptick in global hunger.

Globally, 76 percent of population facing severe food insecurity are also affected by extreme weather events. Over 80 percent of the world's food insecure live in degraded environments that keep getting hit by extreme weather events (Storm, floods, droughts). It is estimated that the risk of hunger and malnutrition could increase up to 20 percent on an average, annually 200-300 million people are affected and about 26 million people are forced into poverty due to climate related extreme events.

Hence if the trends continue, in very near future crop losses may increase at an unprecedented rate which will substantially contribute to reduced production, spiked food prices, and it will become difficult to cope up with rising needs of growing population- thus affecting the food availability and access.

The climate change can limit the **availability of nutritious food and impact the nutritious composition of commonly consumed foods (impacting the nutritional status and utilization)**. Droughts and floods are threat to **food stability** and could bring about both chronic and transitory food insecurity. Food system are likely to become more precarious with changes in timings, intensity or rainfall. Increasing incidence of extreme events may force people to migrate giving rise to conflicts over access to scarce resources. One important climate change would be on the vulnerable groups. Their situation is likely to deteriorate- situation becoming precarious, **especially among women, children, elderly populations and disabled persons**. Their special needs will become important and role of large scale safety-nets ensuring no one is left behind will become.

Situation in ASIA, South East Asia:

South Asia region is home to some of the world's most vulnerable countries to climate change. In the past decade, half of the region's population (700 million people) were affected by one or more climate-related disasters. The World Bank has estimated that climate change could push 62 million South Asians into extreme poverty by 2030.

It is important to note, Asia is particularly vulnerable to climate change due to a combination of:

i) high reliance on climate-sensitive livelihoods,

ii) high incidence of poverty and food insecurity, and

iii) high population densities in vulnerable and areas highly exposed to climate-related hazards such as floods, cyclones and droughts, and

iv) long-term climate change such as gradual changes in monsoon patterns, glacier melt and sea-level rise. In last one and half decade, the damage caused by natural hazards costed the region worth about $150 billion.

The rise in global temperature, change in monsoon and cyclone patterns in South Asia will affect the entire region and will **result in slow down of its economic growth**- with already the new challenges posed by slow-down and COVID-19.

In last few years, the region has seen notable increase in frequency of climate related disasters- and community is challenged- as before they recover from one disaster, another one strikes, **reversing any progress made in terms of food and nutrition security or otherwise**.

The **early warning systems** are important consideration which provides regional forecasts- while the countries get the information simultaneously- **the response capacities of translating this information into action in the ground are varied.** An approach for strengthening such capacities across the countries is important

May it be the cyclonic development in Bay of Bengal, Arabian sea or melting of glaciers in Hindukush region-will affect multiple countries in the region.

i) **Take Away and Key Messages:**

i) Climate Changes is it is there to stay; it will continue to affect agriculture and food security and the poor and vulnerable will be impacted. Therefore, it must be part of the planning, policy and programme in the agriculture, food security and livelihood to have resilient programme and adapt to these situations.

ii) Preparedness, Early Warning, Adaptation, food diversification and resilience building are key in agriculture and livelihood sectors development and scientific research and planning. *There is so much can be learned from the regional and global experiences***.**

iii) Responses and Protecting the most vulnerable and the needy will be critical.

iv) The regional approaches and strategies can bring multiple benefits.

Building Resilience in the Face of Climate and Other Change in the Hindu Kush Himalaya

David Molden
International Centre for Integrated Mountain Development (ICIMOD)

The Hindu Kush Himalaya (HKH) region is home to rich cultures, high biodiversity, and is an important resource base for water, energy and food for the people of the mountains and the downstream plains. The mountains are a source for 10 river basins, home to nearly 2 billion people, serving cities, industries, agriculture, and critical ecosystems. Eight countries share this critical resource: Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan. Changes in mountain systems, will impact mountain communities, but also nations, and potentially the global community.

In spite of its importance, less than sufficient attention is given to mountain areas. Policies made in far-away cities like Delhi, Beijing, or even Washington D. C. have impact on the mountains, but these rarely take into consideration of mountain needs. Investments in science and research have been inadequate to describe, analyze and inform policies, but this has been changing in recent years, and the HKH Assessment Report produced by hundreds of scientists, practitioners and policy makers brings recent information together for the mountains around policy relevant topics.

The assessment report showed that the region is already a "hotspot" for obtaining the Sustainable Development Goals. Poverty levels at 30% and are higher than country averages. Malnutrition is quite high in mountains with an average of 50%. Still about eighty percent of people have no access to clean fuel for cooking. Over the last years, it is not surprising that there is high outmigration mostly of men, leaving women to take care of mountain communities and ecosystems. On the positive side, mountain people have shown an innate resilience, and high adaptive capacity. Gains were being made toward the SDGs, but unfortunately, these gains were reversed with the Covid-19 pandemic that will drive more people toward poverty and adequate nutrition will be a challenge.

Mountain socio-ecological systems are changing rapidly from economic development, increased connectivity, migration, urbanization and environmental degradation. In a more globalized world, change outside of the mountains sets an important context. Interacting with these changes is climate change. Understanding and development of policies for sustainable mountain development has to take into consideration of this complex web of changing dynamics.

The HKH region is highly vulnerable to climate change with temperatures rising faster in the mountains than on the plain. If the world could limit temperatures to 1.5 degrees, temperature rise in mountains would rise to around 2 degrees, and at present emission trends, the increase could go up above 5 degrees. Glaciers provide a direct climate change signal and have been retreating and thinning, and analysis shows that we would lose 1/3 of our HKH glaciers by 2100 in a 1.5 degree world, and 2/3 with present emission trends. However, there are many more changes and impacts that will be experienced including changes in rainfall patterns, hydrologic systems, changes in the range of plants and animals including disease vectors, and changes in agricultural systems. Moreover, these climate change impacts are exacerbated by local air pollution impacts which have a tendency to increase temperature and glacier and snow melt as well as decrease agricultural yield, in addition to their health impacts.

The changes in hydrologic regimes are being felt by mountain communities, and some are already losing their water source, or highly vulnerable to disasters like glacier lake outburst floods. Moving downstream, communities in the mid-hills are increasingly reporting drying up springs and changing agricultural systems with more heat and erratic rainfall. Hydrologic

regimes are changing and this will pose challenges to the densely populated plains, already at risk from increasing flood events. The demand for water is growing and meeting the demands will be challenging with a shift in hydrologic regimes.

Resilience building in the face of such changes will be critical to lessen the social and economic impacts of a range of changes. Resilience building will require the ability to absorb a range of shocks – from disasters to changing agricultural systems. It will require the capacity to adapt systems to such changes. Change can also be an important trigger for transformation which can ultimately build resilience mountain systems will change and transform.

Some examples of resilience building in the HKH include flood early warning systems at various scales. Community based flood early warning systems show promise to protect communities. Similarly, regional early warning systems working across borders can avert large scale damage.

Rural mountain communities, most dependent on agriculture, are highly vulnerable to climate and other changes. One way to build resilience is to identify a range of alternative livelihood options co-creating resilient mountain solutions with communities. Different approaches include "climate smart" agricultural systems, and also systems that promote high valued and nutritious products, with a strong marketing link. Eco-tourism, hit hard by Covid-19, is an opportunity for mountain people, and rebuilding tourism to be more sustainable will be an important option.

Cooperation is needed at all scales from community, to national level, to the HKH region, and globally for resilient societies. In the HKH region, the cost of non-cooperation between countries is already to high – with disasters striking across borders, trade and cultural and scientific exchange at sub-optimal levels, and the potential for conflict. ICIMOD plays a special role working across countries, and we find there is a tremendous desire for cooperation – in the areas of science, ecosystem management, disasters, and more. ICIMOD works between countries to promote more science based dialogue and solution development, which will go a long way to build resilience.

Environmental Sustainability Requires Pragmatic Environmental Ethics

Gopi Upreti
Manteck International Corporation, USA

Environmental destruction and degradation that have occurred in the planet Earth can be attributed largely to the current neo-liberal economic development paradigm that considers Nature as simply the resource to be extracted and processed for human consumption. This paradigm does not consider the values of life support-services, goods and material inputs of the natural ecosystem in the economic valuation system and, therefore, maintaining a healthy and productive natural ecosystem becomes simply outside its analytical framework. It is fundamentally important to understand how our values are determined and shaped by the dominant paradigm within the framework of which, we perceive and interpret the worldly phenomena around us. The most important question that needs to be embedded into any development model or framework is the question of *values*. If the assumptions of the current economic development model are not restructured and the ecological facts and values are not integrated into the economic development model, humanity will inevitably face existential crisis on the planet Earth. In this regard, development ethics certainly has an important role in critiquing, reshaping and reforming the *dominant development paradigm* to integrate ecosystem values and facts into its analytical framework.

Economists consider only the tangible benefits, the commodity values determined by market forces, and consequently overlook the ecological values of the life-support services and processes provided by the diverse biotic community in the ecosystem even though the planetary ecosystem is the source of all the material inputs, processes and services for the production of man-made goods and services. The life support-services and material input processes of the natural ecosystem must be considered the part of the economic production and valuation system. Entire ecosystems should be valued for the processes, goods and the services they produce. The fact that the health of socio-economic system which encompasses human happiness and well-being is intricately interlinked and connected with the health of ecological system makes it clear that humanity's policies and valuation approach must consider the ecological laws, processes and the values of protecting and maintaining the health of the ecological systems.

It is argued here that *ecosystem health* should be the central concern of any policy and management strategy to guide ecologically understood environmental management and all public values such as human health, economic, aesthetic and moral should depend on protecting the processes that maintain the health of ecological systems on which depend the well-being of human being. Therefore, environmental protection, conservation and its sustainable uses must become the centerpiece axis of the modern development endeavor which requires an ethical value based development approach that can reconcile satisfaction of basic human needs with nature conservation and help humanity to live within planetary means.

The scientific epistemology that embodies ecological principle of *diversity, ecosystem resilience* and *interconnectedness, self-organizing complexity* and *life sustaining environmental services* provides the basis for building social and environmental sustainability. This necessitates the need for the integration of environmental ethics into the development framework and the guiding principle for human behavioral conduct. The professional conservationists argue for the efficient long-term utilization of natural resources and recognize only the *instrumental values* whereas eco-centrists argue for the preservation of *intrinsic values* inherent in nature. It is argued in this paper that there is a need for a pragmatic ethical paradigm that can integrate both the *instrumental* and *intrinsic* values in nature and promote *eco-civilization* and lay the foundation of *sustainable development*. Recognizing our fundamental *interconnectedness* with other life forms, *self-organizing complexity* of the living system and the

interdependent nature of our existence, it behooves that development must be pursued with a pragmatic environmental ethics that recognizes both the *instrumental* and *intrinsic* values in nature. The functional integrity and resilience of the planetary ecosystem and the beauty of this shared and embodied existence of which humans are an important component in itself provides sufficient basis for *intrinsic value*. Human actions and behavior that tend to sustainably use, conserve and preserve such values *(instrumental and intrinsic values)* in nature should be considered not only ethical but also necessary for the existential survival and continuation of all life forms including *Homo sapiens* in the planet Earth.

I propose an ethical framework called **Ecosociocentrism** that integrates both instrumental and intrinsic values from **ecosphere** (biosphere or planetary ecosystem) and **sociosphere** (sphere of human social, economic and cultural system). The term, *ecosociocentrism* has been derived by blending two related terms, ecocentrism (nature-centered system of values) and sociocentrism (social or human-centered system of values or anthropocentrism). Sociocentrism has been interchangeably used with anthropocentrism or humanocentrism. Ecosociocentrism integrates ecocentric and sociocentric (anthropocentric) values and recognizes intrinsic properties both in ecosphere and sociosphere. Ecosociocentrism claims to provide a pragmatic ethical framework for human behavioral conduct to live sustainably in good stewardship with planet Earth paving the way to the new era of **eco-civilization.**

Key Words: ***Intrinsic and instrumental values, interconnectedness, resilience, dominant paradigm, environmental ethics, ecosystem health, ecosphere, sociosphere, ecosociocentrism***

Pace of human well-being in Nepal: Upholding the balance between environment and development

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Using current literature and more than a two-decade-long educational training and capacity-building effort in Nepal, the author will discuss the importance to the ordinary citizen of economic development, preservation of the environment, emerging environmental challenges including waste management, and what is included in these topics. While the history of organized effort in environmental protection in Nepal may not be that long, its rapid development and implementation is noteworthy to mention. Nepal has made some significant progress in a few sectors and improvements in other segments, but the overall results have been mixed. In the 1950s, there were only a few kilometers of motorable roads in Kathmandu Valley and *Tarai* (plains) regions of Nepal. People had to cross the Indian border to travel between one Nepali town to another. In 1951, Nepal had 376 km of roads, life expectancy was 28 years, the literacy rate was at 2%, 321 primary schools in the country taught 8,500 students, two colleges graduated 300 students, and the per capita income was $30 a year. In 2018, Nepal had 13,447.61 km of blacktopped, graveled, and earthen roads, the life expectancy of Nepali was 70.5 years, the literacy rate was 67.91%, 3,970,016 students were enrolled in 35,211 primary schools, 1,866,716 students attended 15,632 lower secondary schools, 970,720 students attended 9,416 secondary schools, 370,824 students were enrolled in higher education, and per capita GDP was $1,033.91. While these figures lead to some optimism about the pace of development in Nepal, there are scores of reports and expressions of public sentiments that doubt the progress. Together with presentation of the observable progress in Nepal, the author will use his own experiences and discoveries from his research and education, and professional pursuits in Nepal and the U.S. to identify methods and measures to explain the progress in human development that has occurred in Nepal. The relationship of this progress to environment and national and international policies will be discussed. The author also will talk about domestic efforts through various national plans and highlight the function of the international community as Nepal strives to meet the Sustainable Development Goals (SDGs) 2030. While the paper will briefly lay out Nepal's attempts to tackle 17 SDGs and the efficacy of long-term plans in Nepal, it will emphasize policy recommendations in waste management in the country.

Sustainable Environment in the Context of Nepal

Krishna Prasad Oli
National Planning Commission, Nepal

Over the past 4 and half decades we have been talking about the sustainability of our environment. In the contemporary world it is not just limited to talks time and again, it has to stay at the heart of every beings to safeguard the future of humanity and generation. It is important to understand how critical it is that all of us learn how to live our lives in a way that cares for our community and the environment we all share at local national regional and global level. We have been talking about nature based solutions but what we have to clearly envision is what have we done in protecting and restoring our environment? How much dedicated resource and manpower is allocated by the government, private sectors and Nepali diaspora to address the solutions which is right in front of us.

Over the past two decades, many countries have prepared their national action agendas for sustainable environment and development and are continuing their economic activity business as usual way. For example, assessment of biological resources including agro biodiversity, what is its current state and how it will contributes to food and agriculture, including components of biodiversity that support food and agricultural production by providing services such as pollination, pest control, soil formation and maintenance, carbon sequestration, purification and regulation of water supplies, reduction of disasters threats, and the provision of habitat for other beneficial species. Atmospheric scientists have measured the accumulation of key elements that have negative impacts on climate change and ongoing negative impacts ranging from specific location to larger global scale and temperature rise. Despite all these efforts, the mounting evidences suggests that the environment is under severe threats including all the components of biodiversity, water resources and others. There seems to be an urgent need in changing the human consumption pattern from fossil fuel based energy system to clean and green energy mechanism. Acknowledgement of this has been made in various international policy agenda with the promulgation of UNFCC and its Parish agreement, sustainable development goals among others. Despite all this, human greed has superseded all those efforts so far and there seems to be a danger in that the sustainable goals might be buried into the deep hole of modern highly consumerist economic frame work.

In this context what have we been doing in case of Nepal? Our constitution of 2015, inter alia, address all the goals and components of SDG and protecting the environment in its core. In order to implement the constitution, various legal provision have been made and amended including environment protection, biodiversity conservation and sustainable use, land protection from degradation and water resources conservation and use. We have chartered SDG road maps with indicators well identified and estimate has been made One of our objective in 15th five year plan is to increase the use of hydro and other alternative clean energy resources to ensure the energy sustainability and gradually reducing emission and cutting down the use of fossil fuel. Similarly the agriculture sector will be transformed towards sustainable expert oriented, competitive where adaptation to climate change is given in its core. Augmenting soil fertility with emphasis on bio fertilizer resources, judicious use of pesticides in vegetable production system(vegetable farmers use to apply 85 % of total shipment of pesticide in 2015) and use of natural pesticide is promoted, identification various crop genetic resources including draught and disease resistant varieties and establishing community agriculture knowledge centers at the local level.

Nepal is rich is biodiversity, but its richness has not been harnessed sustainably. Within the small country we have over 118 ecosystems, over 11000 plant species and over 11000 animal species so far identified. For the biodiversity conservation at its core we have allocated 20 protected areas, 10 Ramser sites, 11 botanical gardens and over 22000 community forests user groups are engaged in the management of forests along with the government institutions. In addition over 10000 other community forests and private forests groups have managed the protection of green natural resource and environment in within almost

45 % of the land in Nepal. However in recent years there is perverse challenges on this environment from development of infrastructure, urbanization and migration of people. Our main objective in this sector is to sustainably augment the productivity of this resources with a view to enhance the environmental services and promoting nature based tourism.

Nepal is facing challenges due to global warming. With the average increase of Temperature 0.06 degree Celsius per decade, Nepal Himalaya has been highly vulnerable to climate change impacts particularly to biodiversity and water resources environment. The Central Himalayas which lies in Nepal and Tibetan plateau shows a sharp warming trend of approximately 0.04 to 0.09 per year and 0.03 to 0.07 per year respectively. Consequently, the number of glacial lakes are increasing creating extra concerns due to possibility of GLOF. Already 4 High altitude lakes are raising concerns in Nepal and more are appearing. Too much and too little water will be the pressing in future. Due to temperature rise and erratic rainfall and draught, drying of water resources and immense flooding, high rate of runoff are the major Impacts. In future our ROR based energy generation system will have perverse impacts due to temperature rise. Similarly, vehicular and industrial pollution has made city areas almost inhospitable. Thus, the present government has brought policies to curve such issues through massive agroforestry plantation greening of urban areas and use of clean energy driven vehicles, cooking and irrigation, water purification schemes. Although the contribution of Nepal in global GHG emission is miniscule, we are now party to UNFCC and we therefore have the obligation to abide. In this context the Nepali diaspora outside the country can bring immense benefits from their knowledge, technical knowhow and investment to make a sustained and environmentally robust country where we can live in Harmony with Nature.

Key tasks now include are addressing the drivers of environmental deterioration, forces behind unsustainability, strengthening the recently constituted federated governance institutions in effective resources management measures and increasing the uptake of management practices that promote the contributions to Natural environment to evolve into a sustainable environmental system.

Spring Water Sources Assessment And Forest Area Coverage Dynamics in Roshi and Melamchi Water

Santosh Chaudhary[1], Govinda Baniya[2], Kumud Raj Kafle[1], Suman Shrestha[1], Ek Raj Sigdel[3], [2]Rajiv Giri, and Bim Prasad Shrestha[1],

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+Spring water sources assessment and forest area coverage dynamics were carried out in wards of Dhulikhel and Melamchi Municipality which lies in the Melamchi and Roshi watersheds. For this study, eight wards in Dhulikhel Municipality and four wards in Melamchi Municipality were chosen. For the purpose of forest mapping in Melamchi and Roshi watershed, satellite data (Landsat 8) was used. With the help visual interpretation of the satellite data, GIS and using supervised classification, forest and other land features were separated.

It was found that most of the water sources were located in Ward No. 9 and 10 of Dhulikhel Municipality. The spring types are depression, fractured and contact and occupied by 51.55%, 22.24%, 19.21% respectively with variation in area of recharge watersheds. The spring outlets are made of 22 spring boxes and 4 wells in Ward No. 9 whereas 15 spring boxes and 10 wells in ward No. 10. In case of Melamchi Municipality, the spring types are depression, fractured and contact and occupied by 14.22%, 22.34%, 28.44% respectively with variation in area of recharge watersheds. Amongst these, ward No. 6 is rich in water sources in comparison to other wards which were selected for study. There were total 39 spring water sources out of which 12 spring boxes were found as outlets. Similarly, forest land has occupied 45% in Melamchi 50% in Roshi watersheds. The trend of decreasing forest area has been identified after comparison of data with LULC prepared by ICIMOD in 2010.

Land cover on the study areas have been continuously changing due to natural and anthropogenic activities. The influence of existing geology and hydro-meteorological condition is important. On other hand, the natural water sources as groundwater resources can be preserved by the study of spring water sources and forest mapping. Preparing its database will be the helpful for the sustainable management in spring recharge watershed and for efficient uses of these spring water in local community. Hence, the proper management of forest area especially on recharge watershed area of respective spring is required in the coming days to preserve the groundwater resources.

Asta-Ja for Sustainable Environment and Prosperity

Durga D. Poudel
Asta-Ja USA

Twelve years ago, I founded a groundbreaking Asta-Ja Framework for sustainable environment and socio-economic transformation of Nepal. Asta-Ja Framework includes eight "Ja", Nepali letter "Ja" [Jal (water), Jamin (land), Jungle (forest), Jadibuti (medicinal and aromatic plants), Janashakti (manpower), Janawar, (animals), Jarajuri (crop plants), and Jalabayu (climate)] and eight principles (community awareness, capacity-building, policy decision making, interrelationships and linkages, comprehensive assessment, sustainable technologies and practices; institutions, trade, and governance; and sustainable community development and socio-economic transformation. Based on Asta-Ja Framework and Nepal's current socio-economic and environmental challenges, Nepal Vision 2040 has been published, which demands, strengthening of National Planning Commission for highly integrated, comprehensive, and long-term planning and development. Nepal Vision 2040 identifies nine themes for development. These themes are: 1) food self-sufficiency, 2) reliance on renewable resource energy, 3) thirty million tourists annually, 4) export of organic foods, medicinal and aromatic plants, and other products, 5) corruption control, 6) infrastructural development, 7) community resiliency, 8) social services, and 9) Asta-Ja resource conservation, utilization and development.

The Asta-Ja Framework complements heavily to the recent United Nation's global Sustainable Development Goals (SDGs), declared at the UN's New York Convention on September 25-27, 2015. The 17 SDGs are: 1) End poverty in all forms, 2) End hunger, achieve food security and improved nutrition and promote sustainable agriculture, 3) Ensure healthy lives and promote well-being for all, 4) Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, 5) Achieve gender equality and empower all women and girls, 6) Ensure availability and sustainable management of water and sanitation for all, 7) Ensure access to affordable, reliable, sustainable and modern energy for all, 8) Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, 9) Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, 9) Reduce inequality within and among countries, 11) Make cities and human settlements inclusive, safe, resilient and sustainable, 12) Ensure sustainable consumption and production patterns, 13) Take urgent action to combat climate change and its impacts, 14) Conserve and sustainably use the oceans, seas, and marine resources for sustainable development, 15) Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss, 16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels, and 17) Strengthen the means of implementation and revitalize global partnership for sustainable development. While Goal 1 through 8, 12, 13, 15, and 16 directly relate to Asta-Ja Framework's principle 8 (sustainable community development and socio-economic transformation) and principle 6 (sustainable technologies and practices), Goal 9 and 11 relate to principle 2 (community capacity-building) and Goal 10 and 17 relate to principle 7 (institutions, trade and governance). Therefore, it is prudent for the Government of Nepal in adopting Asta-Ja Framework as its developmental platform and working closely with UN agencies for next 15 years on sustainable development of Nepal.

Environmental Management and Climate Change Vulnerability - in Nepal

Medani P Bhandari
Akamai University, USA; Sumy State University, Ukraine

In recent decades climate change vulnerability is highly discussed domain because of its alarming threat to human as well as to all living being's survival system. Conceptually, Vulnerability is "the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity" (IPCC, 2001:995; IPCC 2018). In Nepal, there is no proper set up of institutional architecture to address the climate change induced problems and address the vulnerability. There is still need of illuminating environment conservation theory and practice which will enable human to think the world is our house and all living beings are our relatives and neighbors "Bashudhaiva Kutumbakkam" (Bhandari 2018).

Precious Plastic: A Small-scale Recycling of Plastic Technology

Amod Karmacharya
Clean up Nepal

The issue of plastic and non-recyclable wrappers has been one of the key challenges faced by cities in developing countries to manage municipal solid waste management. Kathmandu alone uses around 4,700,000 to 4,800,000 plastic bags daily. In Nepal, 16% per cent of urban waste is plastic, which is 2.7 tons of daily plastic garbage production (Molden et al., 2018; Johannessen, 2018).

Due to the quality requirement and the subsequent high costs of recycling. At the current scenario, soft plastic does not have commercial value on the market and, therefore either are not collected for recycle purpose or are non-recyclable. The management of such plastic requires massive investments and access to technologies leading to rationalize decision: if it is not profitable, it is not worth recycling at all.

Precious Plastic initiative is a small-scale, user-friendly model that allows anyone, regardless of their experience, to start a workspace that recycles plastics and transforms them into different products. The initiative itself is an open-source platform, however, due to the variation and diversity in the chemical composition of the plastic in Nepal, Clean up Nepal evaluate the feasibility of using Precious Plastic compression technique for processing the currently not-recycled plastic waste in Nepal and gathered and build the equipment allowing to process this waste fraction and to convert it into a new product.

The two-phase research conducted by Clean up Nepal provides a comprehensive contextual knowledge to executive a small-scale plastic recycling unit in Nepal. The research resulted in finding that will help to recycle soft plastic available in Nepali market and the protocol required to recycle them. Ultimately, fulfiling Precious Plastic global goal to socially revalorize plastic to eliminate its waste altogether, reducing the demand on virgin plastic and closing its materials loop by providing localized plastic recycling technologies and knowledge.

Link to YouTube videos
Promo video: http://tiny.cc/PromoPrecious
Instructional video: http://tiny.cc/InstructPrecious

Understanding Air Pollution in Kathmandu

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Air pollutants and specifically particulate pollution are a serious concern to the residents of Kathmandu Valley. Previous studies have shown that particulate matter (PM) concentrations vary widely across the city and vary seasonally. As the PM concentrations often exceed the World Health Organization's air quality guideline, illnesses related to high PM exposure are expected to be increasing in the region. Since vehicular emission sources are one of the major air pollution sources in the valley, higher PM exposures are expected for the residents living nearby busy roads. Indoor exposures of such residents may also be very high. Citizen science using inexpensive sensors and community involvement using local organizations such as schools may bring greater awareness of air quality issues. Effective education, community awareness, and behavioral changes across the community will be critical to successfully manage and implement a sustainable management system for air quality issues and reduce the exposure level for the residents in Kathmandu Valley. We will review the state of PM exposure for near roadway residents, and discuss examples of community education projects and preventive measures.

Keywords: Particulate Matter; Roadside exposure, indoor air, outdoor air, health effects.

Strategic Policies for Managing Land Resources to Address Social, Economic and Environmental Problems in Mountain Areas of Nepal

Bhubaneswor Dhakal

University of Otago, Christchurch, New Zealan

Nepal has increasingly used its common property land resources with extreme nature-based approaches for environmental conservation. Instead of scientific management of land resources to increase productivity, the government with the advice and support of international agencies has increased more land areas in the name of endangered wild animal conservation year by year. The extreme land use measures broke-down farm-forest integrated production systems with upper-mountain and lower-mountain resource flows that local communities practiced to adapt in topographically and climatically harsh mountain regions of Nepal. Current land resource management has increased food insecurity, agrobiodiversity loss, economic hardship and social problems especially in mountain regions and affected most to the indigenous ethnic communities. It has resulted in high migration and social fragmentation of millenniums old pristine indigenous ethnic communities whose livelihood activities had enriched and conserved mountain biodiversity. The population of most tribes have now declined nationally. The pandemic of covid-19 has exacerbated their livelihood conditions. Nepal's imported food dependency especially from India is escalated. Non-cooperative behavior demonstrated by the country during the post-2015 earthquake crisis and covid19 indicates that Nepali people will suffer critically from food shortage during politically hostile years. The poor and especially the indigenous people of high hill areas are likely to suffer more seriously in adverse time. This presentation demonstrates some land resource management models which can increase agrobiodiversity, food production and local economies in mountain areas and ease coexistence of human and wild animals in the same landscape.

Impact of Urban Transportation on Air Quality (A Case study of Kathmandu valley)

Hemant Tiwari
Safe & Sustainable Travel Nepal (SSTN)

The registration of vehicles increased 33-fold in the last 3 decades and 3 fold in the last decade in the Bagmati zone (DoTM, 2018). Among which around 70% ply within Kathmandu valley. The study revealed daily 3,438,393 trips were made in Kathmandu valley per day in 2011 (MoPIT, 2011) and it is estimated to rise to about 5456 thousand trips per day in 2022. More than 79% of the registered vehicles in the Bagmati zone are motorized 2-Wheelers. Despite this rapid rise, the modal share of the public vehicles had remained the same between 1991 and 2011 and is even assumed to reduce by 3.5% till 2021. The situation is likely to worsen after the Covid-19 pandemic due to peopleâ€™s consciousness to keep distant from other and public transport in Kathmandu is crowded. With the use of low-quality fuel, low standard public transport vehicles, the extend of PM10 is found severe even inside public transport means. Thus, with this unmanaged urbanization and unprecedented growth of vehicular population, the air quality of Kathmandu Valley has been a matter of grave concern.

Past research revealed that vehicles contribute about 60% air pollutants to the environment of Kathmandu, among which 65% being contributed by old vehicles. (Shovakar Dhakal, 2006). It is concluded that the extent of emission through gaseous pollutants had a significant negative correlation with traffic speed suggesting that traffic congestion will cause higher emission. (Dhital, 2014). With congestion being the major transportation problem, air pollution is getting worst. 6464.90 human capital hour had been lost in 4 hours of morning and evening peak along the Maitighar â€“ Tinkune section of 3km due to bottleneck. (Amit, 2017). Air quality is getting worst in the last decade, particularly the quantity of particulate matter has been found on the higher side at the location of heavy traffic volume. This strongly justifies the need for proper study on the impact of the prevailing transportation system on air pollution. The government had taken some initiatives to mainstream the work towards the reduction of emission level due to transport, but still strong institutional setup and proper supporting policy are what is missing to date.

This study will analyses the present scenario of energy consumption and emission of air pollutants and carbon dioxide (CO_2) in the Kathmandu Valley associated with urban transportation. It also includes trend analysis and future scenarios to identify plausible, integrated, and sustainable mitigation measures which could include change of vehicle technology to a modal shift towards clean transport means along with walking and cycling. The recommendation helps to reduce the level of environmental impact associated with the transportation system of the Kathmandu valley and help to enhance environmentally sustainable transportation systems.

Establishing a Biomass Pellet factory: a Clean Energy Solution for Nepal

Basanta Gautam
Arbonaut Ltd., Finland

Nepal is one of the most vulnerable countries in terms of climate risk. The concept aims at reducing greenhouse gas emissions of Nepal and creating employment, revenues, good health, well-being and foster gender equality in the local communities in Sarlahi and Mahottari districts of Nepal. We will establish a biomass pellet factory, which will produce 20000 tons of pellets annually from renewable biomass. The biomass will be collected from forest under-story bushes and grasses and waste by-products of agriculture, sawmills, sugar and ply factories. A start-of-the-art technology (e.g LiDAR, Light Detection and Ranging) will be used to map available raw materials. Only 50% of the available raw materials will be collected to produce pellets leaving remaining 50% on the ground for nutrient cycling, biodiversity and local livelihood. The produced pellets will replace use of coal from industries and firewood from big kitchens and households in Nepal. Coal represents 4% of the energy use in Nepal whereas firewood represents over 70%. The concept tests a new and clean energy type in Nepal, which is in line with national bio-energy policy, and has a large replication potential. The concept mitigates the climate change by replacing use of fossil fuel energy by biomass energy. The project contributes to the emissions reduction aspiration of Nepal in line with the Nationally Determined Contributions (NDC), by removing the highly flammable biomass from the forests and using advanced forest fire management system. The proposed biomass pellet industry is expected to become a viable business after 3 years – also for local people, who will have an opportunity to get 10% equity share of the industry and employment opportunity (around 200 local people are expected to be employed by the factory).

This project is being implemented by Arbonaut Ltd. in Finland (Lead) in collaboration with Bakas Renewable Energy in Nepal. The project is funded with a Nordic Climate Facility Grant financed by the Nordic Development Fund.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S14: Sustainable Urban Development

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Program & Abstracts

S14

Sustainable Urban Development

Although an unplanned and organic growth of urban areas sometimes seem to work fine, lack of coordinated planning for infrastructure to support the growth can lead to problems. The current urban growth in Nepal is mostly happening without adequate infrastructure capacity in facilities such as roads, transit, water supply, storm drainage, and sewerage. Some plans are in place for large cities like Kathmandu, but most newly developed urban areas in the country lack adequate planning for infrastructure. This symposium will assess existing challenges and opportunities related to urban planning and development in Nepal, and recommend policies, programs and implementation mechanisms towards achieving sustainable urban development in the country. Focus areas will include review of current problems, streamlining the urbanization process, improving urban planning tools and methods, creating more efficient urban transit and transportation, planning for public open spaces, and creating resiliency related to disasters caused by climate change and earthquake. It will also review how Nepal's urban development programs are aligned with UNs Sustainable Development Goal No. 11 Sustainable Cities and Communities.

Coordinators

Dr Ambika Adhikari
City of Tempe, Arizona, USA

Mr Kishore Thapa
Urban Planner, Nepal

Program

Session:	S14: Sustainable Urban Development				
Date/Time:	11 October 2020, 09:00 - 13:30				
Room 5:	https://bit.ly/3n6ninF (958 3508 0179)			Passcode:	nrna2020
Coordinators:	Dr Ambika Adhikari and Kishore Thapa				
Moderator:	Dr Ambika Adhkari				
Session Chair:	Dr Swarnim Wagle				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 09:05	Dr Ambika Adhikari	Session Introduction	Principal Planner/ Faculty Associate	Arizona State University, USA	
09:05 - 09:25	Dr Binod Amatya	Invited Talk	Professional civil engineer	ARCADIS Global Engineering Consulting Firm, London	Kathmandu Metro Rail Vision 2040
09:25 - 09:45	Prof. Jiba Raj Pokharel	Invited Talk	Immediate Past Vice Chancellor and Academician	Nepal Academy of Science and Technology	Sustainable Tourism Development Plan of a Historic City Corridor
09:45 - 10:05	Dr Ambika Adhikari & Keshav Bhattarai	Invited Talk	Professor of Geography	University of Central Missouri, Missouri, USA	Towards Creating Smart Cities in Nepal
10:05 - 10:25	Er Jitendra Bothara	Invited Talk	Fellow of Engineering New Zealand	New Zealand Society for Earthquake Engineering and Nepal Engineers' Association	Tradition and Modernity: Towards Sustainable Disaster Risk Reduction
10:25 - 10:45	Ar Anju Malla Pradhan	Invited Talk	President	Society of Nepalese Architects (13th Executive Committee)	The Need for Better Planning as Urban Sprawl Impacts the Kathmandu Valley
10:45 - 11:05	Dr Sunil Babu Shrestha	Invited Talk	Vice Chancellor	Nepal Academy of Science and Technology (NAST)	Food Green Cities: A Pathway to Sustainable Urban Development
11:05 - 11:25	Dr Punya Marhatta	Invited Talk	Professional Planner	Canadian Institute of Planners and Ontario Professional Planners Institute, Canada	Anticipated Urban Governance: Let's do the Doable!
11:25 - 11:35	Matina Shakya	Contributed Talk	PhD Candidate	Villanova University, USA	Influence of the Land Cover Change on Geomorphic Alteration of Bishnumati River in Kathmandu Valley, Nepal
11:35 - 12:00	**Break**				

Session:	S14: Sustainable Urban Development				
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Session Chair:	Dr Swarnim Wagle				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
12:00 - 12:05	Ar Kishore Thapa	Session Introduction	Former Secretary, GoN	Kathmandu, Nepal	
12:05 - 12:25	Raj Maharjan	Invited Talk	Director	iSolutions Consultants Limited, Auckland, New Zealand	A Framework for Sustainable Planning in Nepal: Learnings from New Zealand's Experience
12:25 - 12:45	Sarita Shrestha Maskey	Invited Talk	Former, Joint Secretary	Ministry of Urban Development (MOUD)	Urbanization in Nepal: Challenges and Opportunities in Policies
12:45 - 13:30	**Panel Discussion**				
	Dr Swarnim Wagle	Chair	Chairman	Institute for Integrated Development Studies (IIDS)	Sustainable Urban Development in Nepal; Challenges and Opportunities
	Prof Pitamber Sharma	Panelist	Professor	Kathmandu, Nepal	
	Ar Kishore Thapa	Panelist	Former Secretary, GoN	Kathmandu, Nepal	
	Dr Ambika Adhkari	Moderator	Principal Planner/ Faculty Associate	Arizona State University, USA	
ICC Representative	Roshan Thapa	Vote of thanks	Africa Regional Coordinator	NRNA	

Abstracts

Kathmandu Metro Rail Vision 2040

Binod L. Amatya
ARCADIS Global Engineering Consulting Firm, London

In this paper, a conceptual plan of metro rail development in the Kathmandu Valley is presented. Five metro rail routes are proposed to integrate the eighteen municipalities of the valley. As the part of transport framework, the metro rail network is proposed as main arteries of the system supported by other modes of transport as feeders.

A need to connect the metro system with the prospective regional/national railway network is also highlighted. A few case studies are presented to demonstrate how metro rail could be used an urban regeneration tool. The valley is in a need of a strategic metro rail development plan coupled with urban regeneration program to transform the capital's economy over next 20 years.

For such deliveries, it is proposed that the government enacts necessary railway development acts, and establish a dedicated powerful government agency, for example, a Kathmandu Metro Rail Development Authority.

Key words: Metro rail, Kathmandu Valley, Transport framework, Urban regeneration

Sustainable Tourism Development Plan of a Historic City Corridor: The Case of Bhaktapur, Nepal

Jiba Raj Pokharel
Nepal Academy of Science and Technology

Nepal is well known for its tourism potential. Accordingly, Nepal had declared 2020 as a Tourism Year. Unfortunately, it had to be abandoned due to Covid 19 spreading rapidly throughout the globe.

Tourism contributes to about 2.6 per cent of Nepal's GDP. The number of tourists arriving in Nepal had reached one million last year. Nepal is seeking to increase the number of tourists travelling in the country significantly in the past. For this, it is essential to promote tourism in a planned manner. Consequently, several Tourism Development Plans have been prepared in national, provincial and local level. But a sustainable tourism development plan of a historic city corridor was not prepared so far.

The Department of Urban Development and Building Construction initiated the preparation of a Sustainable Tourism Development Plan of a historic corridor connecting two historic nodes namely Chyamasingh and Dattatraya Squares in Bhaktapur district of Nepal. In this context, case studies of Armenia and Brazil were undertaken for study. Later, four dimensions viz, economic, social, environmental and cultural, followed by seven key indicators were used for the preparation of the Plan. This paper highlights on the methods adopted for the development of the Sustainable Tourism Development of the aforementioned historic corridor.

Key Words: Sustainable, Tourism, Tourism Development Plans, Historic Corridor.

Towards Creating Smart Cities in Nepal

Ambika P. Adhikari[1] and Keshav Bhattarai[2]
[1]City of Tempe, Arizona, USA
[2]*University of Central Missouri, Missouri, USA*

The concept of smart city has been gaining popularity globally. The smart city idea follows several recent innovations in land use and urban development, specially the smart growth policies adopted by many jurisdictions in the United States in the past two decades.

A smart-city utilizes information technology consisting of sensors, robotics and auto-control configurations sometimes known as the Internet of Things (IoT) that continually manage urban functions such as traffic, energy distribution, public amenities, and vehicular parking in real time. Using real time data, a smart city can help to improve urban efficiency, reduce pollution, promote clean energy use, and improve the overall urban physical environment. Although a smart city primarily improves service delivery and efficiency, it can also help to create a more sustainable and equitable urban development.

When most Nepali cities still face may challenges related to the basic urban services and infrastructure, creating the new layer for smart cities can seem ironic. Development of a smart city being an evolutionary process, urban centers can gradually begin to adopt smart elements by adopting digital, robotic and artificial intelligence elements to manage selected urban functions. Some feasible elements for smart functions in Nepal can include the management of traffic, parking management, and energy transmission.

Key words: Smart City, Internet of Things, Information Technology.

Tradition and Modernity: A Combination for Sustainable Disaster Risk Reduction

Jitendra Bothara
New Zealand Society for Earthquake Engineering and Nepal Engineers' Association.

It is generally thought that traditional knowledge has little to offer towards disaster risk reduction. With increasing awareness that modern science alone is not able to solve issues of disaster risk reduction, a combination of traditional knowledge and modern techniques is considered important as it provides greater sustainability and resiliency. This presentation takes examples from masonry buildings that house the majority of the world population, particularly in developing countries. The wholesale replacement of the masonry buildings is not feasible despite their high seismic vulnerability due to financial, cultural, and technical reasons. Latest research shows that some traditional masonry building types in mud mortar in the mountainous region of Nepal can provide excellent seismic resilience and affordably. All they will need is some tweaks utilizing modern construction and design principles. However, these buildings are not able to fully meet the modern amenities as aspired by the residents. Hence, a combination of traditional knowledge and modern technology can provide a sustainable and efficient solution. This presentation explores how such a combination of knowledge and technology systems can be pursued.

Arresting the Unplanned Urban Sprawl in the Kathmandu Valley

Anju Malla Pradhan
Kathmandu Engineering College, Nepal

Relating UN's Sustainable Development Goals (SDG) to the context of sustainable urban development of Kathmandu valley requires an analysis of local planning and control

The design profession can contribute towards creating a more livable city if an effort is made to optimize the strength and opportunities and recognize the challenges emerging from the unplanned and haphazard sprawl of today.

What has gone wrong to date needs to be rectified in the best way possible in the core areas. Planning could be done better in the surrounding hinterland where the urban sprawl is expanding at a rapid pace without much planning intervention.

The SDGs are interrelated in terms of design, livability, biodiversity, community development and coexistence with nature. These are achievable if the right approach that encompasses community involvement is prioritized, and current planning practices are improved.

The planners and policy-makers have to find solutions and work on it simultaneously while ensuring that the environment, ecosystem, urban greenery, open spaces water sources are well protected. A climate resilient approach to design solutions is important to arrest urban sprawl and create a resilient and livable communities.

Key Words: Sprawl, Sustainability, Livability.

Food Green Cities: A Pathway to Sustainable Urban Development in Nepal

Sunil Babu Shrestha
Nepal Academy of Science and Technology (NAST)

Nepal is experiencing a rapid rate of urbanization. The major causes are rural to urban migration and addition of municipalities by merging a number of rural areas. During the restructuring of the state, Government of Nepal created 293 as municipalities among 753 local government units.

Considering the municipalities as urban areas, the official urban population has reached more than 63 percent of Nepal's total population. But many of these urban areas still have rural characteristics and insufficient infrastructures. The Fifteenth National Development Plan of Nepal has conceptualized Integrated Urban Development Plans (IUDP) that include roads and transportation, water supply, sewerage, housing, parks, green spaces, market areas and bus parks. The IUDP are expected to improve the overall urban environment and efficiencies.

Due to increasing rate of urbanization, the maintenance of sufficient open spaces, greeneries and the preservation of agricultural lands within the urban areas are becoming important issues in Nepal. The loss of productive agricultural lands has resulted in decrease of food self-sufficiency and green spaces in the cities.

To tackle this urban issue, Fourteenth National Development Plan has emphasized the concept of Food Green City (FGC) by integrating urban agriculture with urban planning. Thus, this paper will elaborate the concept of FGC and explores necessary policy intervention to realize the related policies. Based on the study of Godavari Municipality in the Kathmandu Valley, it can be seen that hydroponic technology can provide an opportunity to practice urban agriculture on roof-tops. Finally, this study recommends FGC as a pathway for sustainable urban development in Nepal and towards achieving the Sustainable Development Goals (SDGs).

Key Words: Food Green City, Hydroponics, Nepal, Sustainable Development Goals, Urban Agriculture.

Anticipated Urban Governance: Let's Do the Doable!

Punya Marhatta
Canadian Institute of Planners and Ontario Professional Planners Institute, Canada

Modern Nepal entered the global arena in the 1950's once it breathed a fresh air of constitutional monarchy with a multiparty democracy. This modernity brought about various waves of development - both good and bad. One of the visible waves observed in development sector was rapid urbanization. However, urban development could not realize its full potential due to lack of philosophical and political clarity related to the process.

Nepal was in a state of political turbulence since the past several decades. For example, internal political change of the 1950s, royal takeover of the 1960s, rise and fall of the party-less Panchayat regime, wave of democracy of 1990s, the subsequent decade long Maoist insurgency, and the ensuing peace process and federalism. For the past 70 years, Nepal continues to struggle to find a political system that serves the people well.

Urban governance refers to the decision-making mechanism set by various levels of government and the stakeholders on planning, financing and managing cities and towns. Strong governance requires political will, negotiating skills and resources to develop and nurture institutions. This is possible through only through a good urban governance.

As Nepal has settled for a three tired government: Federal, Provincial and Local, an urban governance system should function in all three levels. This paper assesses the tools used by Canadian jurisdictions for better urban management and how some lessons could be utilized in Nepal.

Key Words: Governance, Decision Making, Urbanization.

Influence of the Land Cover Change on Geomorphic Alteration of Bishnumati River in Kathmandu Valley, Nepal

Matina Shakya
Virginia Smith; Kabindra M. Shakya; Victoria Read

River systems continuously responds to environmental dynamics over time. They tend to have their incision by eroding the valley or aggregation by depositing the bed load as it reaches downstream. Geomorphological alteration can cause such erosion and deposition and it depends on factors such as rainfall, infiltration, landcover, slope etc. Such geomorphological change, caused due to the change in land cover, is studied for Bishnumati river of Nepal, which is one of the heavily unstable rivers in the Valley.

The main objective of this paper is to assess the influence of the land cover change in geomorphic alteration in Bishnumati River of Kathmandu Valley, Nepal. The study discusses how the change in land cover over two decades demands impacts sustainable development in the valley as related to river protection. Normalized Difference Vegetation Index was used to understand the loss of green spaces over time, reflecting a land cover change. Geomorphic alteration was estimated using a sediment transport morpho-dynamics application tool which was based on the surface runoff, channel hydraulic properties and sediment transport rate. The data suggests that there is a significant loss of green space over 30 years in Kathmandu valley thus leading to increase in impervious areas. The geomorphological alteration in Bishnumati river suggested that the rate of incision in the river channel have been increasing and will continue the trend if mitigation approaches are not undertaken. The increasing rate of incision and a substantial loss of permeable surface can lead to increased flooding in the future. Therefore, an urgent need for sustainable initiatives and land preservation approaches in the valley are suggested by the study.

Key Words: Geomorphology, Bishnumati River, Kathmandu Valley, Permeability, Land Cover.

A Framework for Urban Management in Nepal: Learnings from New Zealand's Experience

Raj Maharjan
iSolutions Consultants Limited, Auckland, New Zealand

Urban planning in New Zealand is guided by an overarching legislative framework provided by the Resource Management Act 1991 (RMA). At the philosophical level, the sustainable and integrated management of resources is the key principle of the RMA. In practice, the RMA promotes a result-based approach and implementation method. Enabling public participation and decentralization of decision-making are enshrined by the legislation.

At the implementation level, the legislative framework of the RMA is implemented via rule books, known as the District Plans. A District Plan contains a set of topics-based (e.g., heritage, residential development, ecology) objectives, policies and rules to guide development and environmental management. It is clearly stipulated by the RMA that local governments are the custodians of the planning process and District Plans. Other than a few national-level matters, almost all functions of planning are devolved to the local or regional government level. Though not without problems, at an overall and national level, the resource management approach to urban planning, guided by an overarching legislative framework, seems to have been working in New Zealand since the inception of the RMA.

In Nepal's context, due to the fragmented approaches and overlapping jurisdictional responsibilities, the limited efforts towards a managed urban development has met with limited success so far.

The RMA consolidated more than 50 legislations related to town planning and resource management. New Zealand's experience of "coordinated, streamlined, and comprehensive" approach to resource management to guide urban development may be a good reference for the initiation of an innovative, more coordinated and result-based approach to urban planning in Nepal.

Key Words: Urban Planning, Resource Management, Devolution, Coordination.

Urbanization in Nepal: Challenges and Opportunities in Policies

Sarita Shrestha
Ministry of Urban Development (MOUD), Nepal

Nepal's current level of urbanization has doubled in comparison to the level of the 2011 census. Since the formation of new municipalities and upgradation of old cities in 2017, extreme pressure is felt on the existing urban infrastructure and services which are already inadequate and sub-standard. Some favorable conditions like political stability, the formation of three tiers of governmental institutions, youth-dominated demography, increased expertise, and the availability of in-country professionals provide ample opportunities to manage the challenges posed by the rapid urbanization in the country. Whether the country is capable of leveraging its urbanization for gains in productivity and prosperity still remains a big question.

After the promulgation of the new constitution and the restructuring the state, the urban governments and agencies have been extensively involved in revising and formulating their plans and policies to address the changed context of urbanization.

Further, the advent of the COVID 19 pandemic has added unprecedented challenges and opportunities to rethink, reorganize, and globally communicate in the subject matter. The second question arises whether these agencies are capable to reshape the country's urban landscape, and environment, and cope with the "New Normal conditions" due to COVID-19 pandemics.

This paper reviews the data, information, and views regarding the above two vital questions for addressing the policies for streamlining the urbanization process in Nepal.

Keywords: Sustainable Urban Development, Urbanization Policy, New Normal.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

S15: Vocational Education

9-11 October 2020

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S15

Vocational Education

Nepal has for long the GDP oriented development goal, primarily hoping for rapid economic development through large scale hydropower, infrastructure and industry projects to be built on borrowed money from multinational agencies and borrowed expertise from multinational companies. Meanwhile Nepal's own youth work in other countries helping to churn the GDP of those nations. Our success in bringing a GDP revolution has long been a matter of debate but where we have clearly failed is in unleashing the potential of our own natural and human endowments. Should we then start debating on how our education could be geared towards citizen engagement in continuous learning, elevating human productivity through training, and understanding the transformative potentials of its human and natural endowments? Could our education, training and scientific research be reorganized to unleash the fundamental potential of Nepal for the speedy advancement of its society and economy while being in harmony with the nature? If yes, how? This symposium aims to find answers to these questions through a discourse among global Nepali scholars.

Coordinators

Dr Uttam Gaulee
Morgan State University, USA

Dr Uma Pradhan
University of Oxford, UK

Program

Session:	S15: Vocational Education				
Date/Time:	09 October 2020, 09:00 - 13:30 (Nepal Standard Time)				
Room 5:	https://bit.ly/3n6ninF (958 3508 0179)			Passcode:	nrna2020
Zoom Support	zoomsupport@nrna.org				
Coordinators:/ Moderators:	Dr Uttam Gaulee and Dr Uma Pradhan				
Session Chair:	Dr Usha Jha				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
09:00 - 11:00	**S15A**				
09:00 - 09:05	Dr Uttam Gaulee	Session Introduction			
09:05 - 09:15	Dr Usha Jha	Session Chair	Hon. Member	National Planning Commission	
09:15 - 09:35	Dr George Boggs	Invited Talk	Former CEO and President	American Association of Community Colleges	Community Colleges for Nepal's Economic Development
09:35- 09:50	Amrita Sharma	Contributed Talk		Kathmandu University, Nepal	Enhancing Employability for Sustainable Workforce Development in Nepal
09:50 - 10:10	Rajendra Khetan	Invited Talk	Chairman	Laxmi Bank and Prime Life Insurance, Nepal Britain Chamber of Commerce and Industries	Context-driven Entrepreneurial Education in Vocational Education & Trainings
10:10 - 10:30	Dr Ramhari Lamichhane	Invited Talk	Director General	Colombo Plan Staff College	TVET for Global Competitiveness: Equipping 21st Century Skills
10:30 - 10:50	Dr Sungsup Ra	Invited Talk	Director	South Asia Human and Social Development Division, Asian Development Bank (ADB)	Inclusive Skills Development in Times of Disruptive Change
10:50 - 11:10		Q&A			
11:10 - 11:30	**Break**				
11:30 - 13:30	**S15B**				
11:30 - 11:35	Dr Uma Pradhan	Session Introduction			
11:35 - 11:55	Prof Mahesh Nath Parajuli	Invited Talk	Professor, Development Studies	Kathmandu University	A Promise at Risk: Technical and Vocational Education and Training (TVET) in Nepal

Session:	S15: Vocational Education				
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Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
11:55 - 12:15	Yogendra Shahi	Invited Talk	Hon. Member	Karnali Provincial Planning Commission	Youth Unemployment and Vocational Education in the Context of Nepal
12:15 - 12:35	Dr Shree Ram Ghimire	Invited Talk	Chief	Agriculture Information and Training Centre, Nepal	Agriculture Communication and Training in Nepal
12:35 - 12:55	Dr Tulsi Dharel	Invited Talk		Centennial College, Toronto, Canada	Online Learning & Teaching; What Benefit Nepalese Education Institutions can Achieve?
12:55 - 13:20	**Q&A and Panel discussion**				
	Dr Surya Pathak	Distinguished Panelist	Member of Parliament	House of Representatives, Nepal	
	Mana KC	Panelist	Vice President	Non-Resident Nepali Association	
	Ram Thapa	Panelist	Patron	Non-Resident Nepali Association	
13:20 - 13:30	Dr Usha Jha	Concluding Remarks	Member	National Planning Commission	
ICC Representative	Mana KC		Vice President	NRNA	

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Community Colleges for Nepal's Economic Development

George Boggs
American Association of Community Colleges

Speaking with Dr Uttam Gaulee, Dr George Boggs argues that Nepal does not need to create Harvard University. Rather, Nepal needs community colleges and polytechnics to provide access to skills necessary to engage young men and women in the local economy. American community colleges are much like the nation that invented them. They offer an open door to opportunity to all who would come, are innovative and agile in meeting economic and workplace needs, and provide value and service to individuals and communities. Little wonder that they are increasingly emulated around the world and have become the largest and fastest growing segment of U.S. higher education. For a nation like Nepal which is consolidating its democracy, empowering and engaging the young men and women in the local economy is extremely important.

Context-driven Entrepreneurial Education in Vocational Education & Trainings

Rajendra Khetan
Laxmi Bank and Prime Life Insurance, Nepal
Nepal Britain Chamber of Commerce and Industries

The prosperity of a country is closely associated with the productivity of its citizens, and productivity, in turn, can be enhanced by imparting knowledge and skills. Investment in Vocational Education and Training (VET) is therefore crucial to address the socio-economic challenges facing a country and help make it prosperous. Thus, vocational Education and training is offered throughout the world to students of various educational backgrounds and career aspirations in an effort to create a skilled workforce. The structure of VET varies greatly across different fields and countries with high-growth, low-growth, and transitional economies. However, a common critique of many vocational institutions is that they focus on skills training without addressing related business systems. Thus, students may not understand the business strategies related to their field, which limits job readiness and entrepreneurial potential. To counter this, a more context-driven and integrated entrepreneurial approach should be integrated in vocational education and training. An entrepreneurial mind-set adds value across business, social, government, and academic sectors by promoting innovative problem identification and value creation Applying various entrepreneurial skills has led directly to observable improvement in work quality and productivity in a range of fields. Such integrated entrepreneurial and vocational training would more suitably address context-specific market needs via both practical and transferrable skills, thus helping to reduce unemployment, particularly among youth in Nepal.

TVET for Global Competitiveness: Equipping 21st Century Skills

Ramhari Lamichhane
Colombo Plan Staff College

Human resource development is the key element for the country's development. There are different ways to develop human resources. Most common ways are literacy programs, school education, university education, technical and vocational education, recognition of prior learning, training and work experience. People enriches knowledge, skills and attitude (KSA) from these ways of learning. All types of learnings are important. However, the technical and vocational education and training (TVET) is highly relevant to impart competencies for youth. TVET programs are well recognized by national system and society in the developed economy. But, it is struggling in the underdeveloped economy in both national system and social status.

While basic skills development and workforce preparation for the country are important in the Asia Pacific Region, a paradigm shift must take place recognizing that in order to be truly globally competitive, we must be globally competent. Educating young people to become global citizens will allow them to learn about the interdependence of the world's systems, believe that solutions to global challenges are attainable, and feel morally compelled to confront global injustices and take responsible action to promote a just, peaceful and sustainable world. Global competency skills are necessary so that young people can invent a future that appropriately addresses global challenges. In line with other education program, TVET programs need paradigm shift to make our youth fit for global market with adequate competencies for global competitiveness.

Inclusive Skills Development in Times of Disruptive Change

Sungsup Ra
South Asia Human and Social Development Division, Asian Development Bank (ADB)

The world is undergoing unprecedented change and disruption arising from factors such as globalization, corona pandemic, ICT, growing use of robots and artificial intelligence. Such change has a major impact on the dynamics of labor markets and skills development. Developing countries need to bring skills development systems up to speed in the rapidly evolving context and address widening gap between the haves and the have-nots. The presentation briefly analyzes challenges and opportunities in times of disruptive change and recommends rapid, integrated responses in the skills development system in Nepal.

A Promise at Risk: Technical and Vocational Education and Training (TVET) in Nepal

Mahesh Nath Parajuli
Kathmandu University School of Education

TVET in Nepal is often described as the supplier of the workforce for national development, a means for productive employment, an inclusion and equity measure, a strategy for individual enhancement, and many more. Some data show growth is taking place in the sector – the number of students, programs, organizations, and activities are on the rise, and a policy hype is there. But the other side of the story is different. In this context, this paper tries to explain the gap between expectations and reality. The paper draws mainly from some research works that were carried out under a comprehensive multi-country research study that has the overarching research question of "under what conditions can TVET improve the income of the youth?" and some other research and study reports. The research findings show that TVET actually could never be a priority area in Nepal – neither from the government nor from the public. Government investment in the sector has remained stagnant or has even decreased during the period of 2007/08 and 2016/17 when seen in terms of the percentage of national budget allocations. The linkage between the TVET and the employment sector, one of the pre-conditions for a successful TVET, is at a very low level showing the concerns over the relevance and quality of the programs offered. It has been now five years that the country has adopted a federalized system with the three levels of governance – federal, provincial, and local. Unfortunately, this has only created problems, confusion, and conflicts among multiple actors at different levels. Such a situation is because so far the country has failed to carry out necessary preparations that would include, among others, institutional, financial, psychological, and cultural aspects, for this new form of governance. Finally, the paper tries to answer the conditions under which the TVET could contribute as expected.

Youth Unemployment and Vocational Education in the Context of Nepal

Yogendra Shahi
Karnali Provincial Planning Commission

Nepal just crossed the stage of population dividend in 2015 with highest youth population in demographic history of Nepal. Every year more than five hundred thousand youth are entering into labor market are basically unskilled. Huge number of youth in Nepal are in NEET (Neither for Education nor for Training). The dropout ratio in school is still higher. Total student enrollment in technical education is still low (five percent according to youth vision 2025). Those young people often prefer to go India and abroad for employment. The country is still sending 74 percent unskilled, 24 percent semi-skilled and just 2 percent skilled labor in foreign labor market. Youth Vision 2025 had planned to reduced non-skill manpower to zero in ten year. Sending only skilled manpower abroad, our remittance will increase at least by 50 percent. There is positive development of reducing unskilled youth going abroad in Nepal but more progress is needed.

The limited vocational institutions such as in Jumla, Jiri etc established with Swiss assistance has generated a higher input-output ratio.

In developed countries polytecnical institutions were established more for industrial demands. But countries like Nepal it is also crucial for migrant workers and self employment. As so far for internal labour market, there is already labor demand in particular sectors such as bakers, plumbers, housekeeping, skilled construction workers etc. So, the demand based vocational education is very crucial for Nepal.

Unemployment ratio among the graduates in Nepal is also higher particularly in general education. The employability of junior technician is impressive with above 90 percent whereas unemployment can be seen even among higher technicians such as doctors and engineers.

The government has extablished some vocational technical instutions with foreign help but not enough good institutions. Some afiliated private instituions are mosrooming with deteriorated quality but expensive. Thease are also not established with market analysis.

So, given the youth demography, labor market and industrail demand, self-employment target in failure situation of general education, the establishment of quality vocational institutions through government and private sectors is time demanded in Nepal.

Agriculture Communication and Training in Nepal

Shree Ram Ghimire
Agriculture Information and Training Centre Nepal

The communications and trainings being two major pillars for effective agricultural extension and technology transfer covers the scope from personal interaction to satellite technology. The agri- extension communication modules used in Nepal are interpersonal, group and mass communications which are accomplished through radio, television and various publications in the form of sound, written or spoken words, symbols and gestures by which one's mind affects another's in various potential degrees. The coverage of technical service and related agricultural inputs delivery to farming household is about 20 percent but more than 80 per cent of farming community has been covered directly by these means of agricultural extensions and communication means. The established network of already existed agricultural extensions and communications from center to local units got disturbed after recent restructuring of state. Agriculture Information and Training Center has been launching the "Kisan Call Center (KCC), a program of direct phone call from farmers to Agri_expert with a toll free number every day from Sunday to Friday during 11:00 am to 16:00 pm. Month wise farmers free sms services being launched and already telecasted agri program can be viewed in you tubes.

Agricultural trainings have been practiced in Nepal to create self awareness, interpersonal skills, degree of positive motivation, fruitful behavioral attributes, professionalism and culture learning. Agricultural trainings in Nepal are being organized along with the steps of pre-training (planning), during training and post training exercise and practice. The major agri_trainings that AITC conducts on the basis of felt needs of agricultural technicians and farmers are Service Induction training, in- service training, specialized high level technical training, tailor made type training, coordination and facilitation service to the trainings conducted by other Institutions and special training coordination with International organizations. The effectiveness of various agricultural trainings has not been strong enough due to the various limitations.

Enhancing Employability for Sustainable Workforce Development in Nepal

Amrita Sharma
School of Education, Kathmandu University

The discourse of employability is being emerged in the last few decades. It is considered important to enhance employment, and prepare a sustainable/ innovative workforce for the development of a country. Relevant policies and supporting strategic intervention are imperative to enhance employability. However, the global and local discourse of employability is hardly visible in the existing plans and policies of Nepal. Although the promotion of employment is one of the primary agenda of Nepal, the employability- the major notion to promote employment- is not in the priority of the government. The present initiation from the universities and several development partners such as I/NGOs/POs are not enough but requires a paradigm shift in the existing way of thinking and working. With the review of the existing policies, regulations, practices, government plans from the federal to the local level and relevant interventions and targets of development partners for employment generation, this paper presents the existing gaps in the policy and practices in our objective to integrate and mainstream employability concerns in the education and labor systems for generating/ promoting employment in Nepal.

Key Words: Employability, Employment, Sustainable Development, Labour Force Development

Online Learning & Teaching; What Benefit Nepalese Education Institutions can Achieve?

Tulsi Dharel
Centennial College, Toronto, Canada

Online or learning from distance has been a new phenomenon for the higher education in the world. Due to the Covid-19 pandemic the whole world is seeking different approach to teach/learning system in the educational institutions. Nepal is also facing similar type of situation and approaching their learning/teaching methods either online or learning from distance. This is for sure a great opportunity to connect global education system in Nepalese higher education as well. Many Nepalese diaspora are teaching in many universities/colleges in different countries. As a part of the same field, I feel very fortunate to teach many students in Nepal on line though I live and teach in Canada.

Key words: On-Line Learning, Learning form Distance, Nepalese Diaspora in Educational Profession, Learning/teaching opportunities

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

SP1: Networking among Nepali and Diaspora Experts

9-11 October 2020

Online Event

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Program & Abstracts

SP1

Networking among Nepali and Diaspora Experts

Since the inception of Non-Resident Nepali Association (NRNA), reversing the outflow of Nepali expertise beyond its border back inside though skill, knowledge and innovation transfer has been at the center of its global movement. Due to lack of enthusiastic participation of diaspora expertise, the genuine aspiration of NRNA was not seeing palpable momentum. NRNA realized that a connected effort is essential to galvanize the diverse pool of diaspora skill to meaningfully mobilize it for the development of Nepal. As a result, NRNA deliberately decided to organize the 1st NRN Global Knowledge Convention. In this convention 166 experts presented their papers, 78 distinguished panel members gave their input on wide subjects. More than 500 participants from more than 20 countries took part in this convention. This historic participation of diaspora and resident Nepali experts on this global platform attested to the fact that given the continuous improvement and expansion of this platform, diaspora experts will be excited to play a constructive role. This led to organization of the 2nd NRN Global Knowledge Convention in 2020 and hopefully many more.

In addition, the first Convention was inaugurated by the Prime Minister of Nepal Rt. Honorable KP Oli. Foreign Minister, Minister of Education, Science & Technology, Minister of Agriculture and Livestock Development, Minister of Labour, Employment and Social Security addressed the 1st Convention. Member of Parliament, former ministers, government officials, policy makers, university leaders, academicians and private sectors participated in the 1st Convention. This reflected the interest shown by the Nepali stakeholders in collaborating with NRNA in its efforts to help Nepal advance towards knowledge-based economy. We are confident that the current convention will demonstrate that the mutual collaboration between NRNA and Nepali counterparts is expanded and solidified.

The Convention has received an assurance that the outcome and recommendations of these conventions will be fed into long-term planning such as five-year development plans of Nepal. Furthermore, we have observed that there are many opportunities to collaborate with the constituent authorities of the Government of Nepal, such as Brain Gain Center (BGC) at Ministry of Foreign Affairs, Policy Research Institute (PRI) of Nepal, Nepal Academy of Science and Technology (NAST), and so on. NRNA has been closely working with NAST for several years. It would also like to expand collaboration with other institutions like BGC and PRI. For example, platform like the NRN Convention can help accomplish BGC's goal of expanding diaspora skill directory. Similarly, Policy Institute of NRNA, which is in the making, can directly collaborate with PRI in conducting research on policy fronts. What is lacking currently though is a common structure and mechanism through which the expertise and efforts of Nepali diaspora experts could meet the interest of Nepali counter parts in a more frequent manner. The session on Networking among Nepali and Diaspora Experts is being organized to brainstorm on these and topics of similar scope.

Coordinators

Dr Hem Raj Sharma
Chair, 2nd NRN Global Knowledge Convention

Dr Hari Dahal
Co-Chair, 2nd NRN Global Knowledge Convention

Program

Session:	SP1: Networking among Nepali and Diaspora Experts				
Date/Time:	09 October 2020, 19:00 - 20:30 (Nepal Standard Time)				
Room 1:	https://bit.ly/36qL5J1 (830 6622 0017)			Passcode:	nrna2020
Zoom Support	zoomsuport@nrna.org				
Coordinators/ Moderators	Dr Hem Raj Sharma/Dr Hari Dahal				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
19:00 - 19:15	Dr Hem Raj Sharma/Dr Hari Dahal	Coordinators	General Secretary/ Member	Non-Resident Nepali Association	In Search of a Platform for Wider Collaboration between Nepali and Diaspora Experts
19:15 - 19:30	Dr Bishnu Raj Upreti	Invited Talk	Executive Chairman	Policy Research Institute (PRI) Nepal	Partnership between PRI and NRNA in the Policy Research Front
19:30 - 19:45	Santosh Gautam	Invited Talk		Brain Gain Center (BGC), Ministry of Foreign Affairs	BGC Initiatives and Nepali Diaspora's Role
19:45 - 20:25	Panel Discussion				
	Session Coordinators	Panelist		2nd NRN Global Knowledge Convention	
20:25 - 20:30	Conclusion	Dr Ambika Adhikari	Urban Planner	City of Tempe, Arizona, USA	

Abstracts

In Search of a Platform for Wider Collaboration between Nepali and Diaspora Experts

Hem Raj Sharma and Hari Dahal
International Coordination Council, Non-Resident Nepali Association

Since the founding in 2003, NRNA is partnering with the Government of Nepal (GoN) in supplementing its soci-economic developmental efforts. As time passed, NRNA expanded its scope of activities in Nepal and its organizational networks outside Nepal. In doing so, NRNA has identified new areas of collaborations with different stakeholders of the development of Nepal. In addition, it also understood the vast treasures stored within Nepali diaspora around the globe. That treasure is the skill, knowledge, innovation and expertise possessed by the diaspora. A robust platform was needed to effectively collate this knowledge pool, and hence the NRN Global Knowledge Convention was born.

With the experience of organizing two global conventions, although we now know that Nepali diaspora can definitely assist Nepal in achieving faster economic growth, we still have not completely figured out an efficient way of working together in implementing the recommendations of the knowledge conventions. It appears that the implementation can be executed at multiple levels. At the higher level, experts can collaborate with the Government of Nepal and its agencies such as National Planning Commission to provide input in reforming the policies of the government and its development plans target to various sectors. NRNA experts are already working with Nepal Academy of Science and Technology in the area of science and technology research promotion. The collaboration can grow wider and deeper down to the state and local levels. But these collaborations are being done in some sort of ad hoc basis due to the lack of a well-defined structure. So, there is a need to form a framework that can help streamline the collaboration between NRNA and the stakeholders of Nepal.

On the other hand, till today, the diaspora Nepali experts do not have a common platform to brainstorm ideas and come up with a concrete action plan, expect for the platform of Global Knowledge Convention. One of the limitations of the convention is that it is going to be organized once in two years. We need an institution which remains live and active throughout the calendar.

In our presentation, we would like to propose a view point on a possible institute via which we can develop a strong collaboration with the Government of Nepal and among the diaspora experts. The idea for such an institution, known as NRNA Policy Institute, is already conceived in NRNA constitution and concrete scope of it is spelled out. We are going to shed light on how the implementation of the recommendations of knowledge conventions can potentially be facilitated via this institution.

Possible Partnership between PRI and NRNA in Policy Research Front

Bishnu Raj Upreti
Policy Research Institute, Nepal

As the existing normal modus operandi in economy, education, health, tourism to daily life of individuals and social order is completely altered. This crisis has also exposed the limitations of existing practice of market and globalization. This crisis has also well exposed the inequality persisted in the world: be it in private health system or education system almost collapsed. Global intergovernmental and multinational organizations became almost dysfunctional. In this context, the existing knowledge generations, dissemination process became ineffective and the society encountered unprecedented risks and incalculable challenges. Combination of these two factors (risks and challenges) created total disaster in humanity if not able to innovative ways of dealing it. The major challenge for all of us academics & researchers, professionals, planners & policy makers, political decision makers, private sector leaders, thinkers and pragmatists is how to appropriately deal with this situation.

Now, academics, researchers, planners and policy makers have started debating on 'post-pandemic world order' or 'post pandemic new normal'. However, as an alternate view, it will be logical to talk about 'post-pandemic world disorder' or 'post pandemic new abnormal' with the speculation that there will be abnormalities and manipulations from the powerful in the situation of gap created from broken down of the old system and lack of establishment of new system.

Even though the combined effects of risks and challenges place the world into extremely complicated situation, every nation and individual now have to move ahead by exploring resilient ways and means, building on experiences gained from living with the pandemics for so many months, utilizing the inner hope and aspiration of human being.

Nevertheless, we have also observed some of positive aspects of COVID19 such as family bonding and care of seniors, we-feeling in community, use of indigenous knowledge and experiences, behavioural change in consumption, efficient use of resources, etc. These could be point of departure for minimizing 'post-pandemic world disorder' or 'post pandemic new abnormal' and moving ahead.

In this context, each and every country, organizations and individuals have to collectively think and act in different ways to address the complications arisen from the combined effects of risks and challenges posed by pandemic discussed above.

Like other countries and governments, the Government of Nepal has also to deal with this complex situation discussed above and contribution of all actors is necessary. As a consequence, many existing policies may need revisions and many different new policies may require to address the challenges brought by pandemic. In this context, role of the Policy Research institute (PRI) will be prominent as it is established to provide evidences from research to the government to effectively implement policies or bring new policies.

Currently, PRI is developing strategy to harness the best and useful knowledge and skill available in the PRI areas of work. Nepali diaspora and the members of Non-Resident Nepali Association (NRNA) are one of the important depositories of knowledge, skills and experiences required for the nation. In this paper, I am presenting some of the possible areas of collaboration between diaspora and PRI in the following section:

a) Using diaspora's knowledge and skills in research, review and analysis of mutually agreed areas,

b) Sharing research findings of diaspora to PRI

c) Scholars spending sabbatical at PRI to conduct study in the mutually agreed topics,

d) Participate in policy dialogues, workshops and symposiums organize by PRI and vice versa

e) Contribute to the flagship annual publication of *Nepalese Journal of Public Policy* and other knowledge products and or engage in reviewing the research papers.

f) Contribute to PRI's aim of developing global networks to share and cross fertilize ideas, expand knowledge-base and keep itself abreast of cutting-edge innovation on policy research.

g) Other areas of mutual interests.

In conclusion, there is great opportunities for diaspora and NRNA to bring their knowledge, skills and experiences for the benefit of Nepal to deal with post-Corona pandemic challenges and PRI can provide important space for that by collaborating in mutually agreed areas.

BGC Initiatives and Nepali Diaspora's Role

Santosh Gautam
Brain Gain Center (BGC), Ministry of Foreign Affairs

Brain Gain Center is a unit at the Ministry of Foreign Affairs established as a formal response to the desire of Diaspora Nepali experts to be associated with the national welfare in one way or the other. The state policy of Nepal as enshrined in the constitution has recognized the need to "utilize knowledge, skills, technology and capital of the non-resident Nepalis in the national development." Accordingly, the BGC aims to support the sustainable transformation of the nation by facilitating meaningful connections between Diaspora Nepali experts and their counterparts and various other agencies at home.

In this presentation I will inform the audience about the mission and current activities of the center, inspire them to add their names to the initiative and highlight some of the key principles that guide the Center's mission at this time.

2nd NRN Global Knowledge Convention

Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario

SP2: Reports of NRNA ICC Regional Conferences

9-11 October 2020

Online Event

knowledge.nrna.org

Program & Abstracts

SP2

Reports of NRNA ICC Regional Conferences

Non-Resident Nepali Association reaches to its constituents through its direct operation in six regions, namely, Oceania, Asia Pacific, Middle East, Africa, Europe and Americas. Prior to organizing the global convention, NRNA also started to organize knowledge conferences at the regional level. This year such conferences were successfully organized in Oceania, Asia Pacific, Europe and Americas regions. These conferences play important role in energizing participation of diaspora experts in these regions. The first regional conferences were organized in 2018 in onsite mode. Due to COVID-19 associated circumstances, they were organized in all online mode this year. NRNA utilized COVID-19 challenges as an opportunity where by Nepali experts also contributed to these conferences via technology-assisted remote participation. Even though these conferences were organized in regional level, they were enriched by global participation. We firmly believe that the outcomes of these conferences will complement the skill, knowledge and innovation transfer to our country of origin. We are incorporating the reports of these conferences in program and abstract booklet of the 2nd NRN Global Convention, and are presenting the summaries in this session. The declarations of these regional conferences will also be integrated in the NRNA's recommendations to the Government of Nepal at the conclusion of the 2nd NRN Global Convention.

Coordinator

Mr Narayan Ghimire
Americas Regional Knowledge Conference

Program

Session:	SP2: Reports from Regional Knowledge Conferences				
Date/Time:	10 October 2020, 17:00 - 18:00 (Nepal Standard Time)				
Room 2:	https://bit.ly/33kL4oe (972 23247938)			Passcode:	nrna2020
Zoom Support	zoomsuport@nrna.org				
Coordinator/ Moderator	Mr Narayan Ghimire				
Time	**Contributor**	**Contribution**	**Designation**	**Affiliation**	**Title of Presentation**
17:00 - 17:15	Dr Laxmi Pathak	Report	Coordinator	Americas Regional Knowledge Conference	Summary and Recommendations of Americas Regional Conference
17:15 - 17:30	Dr Devi Basnet	Report	Coordinator	Asia Pacific Regional Knowledge Conference	Summary and Recommendations of Asia Regional Conference
17:30 - 17:45	Hom Nath Pandey	Report	Regional Coordinator, NRNA ICC	Oceania Regional Knowledge Conference	Summary and Recommendations of Oceania Regional Conference
17:45 - 18:00	Raju Aryal	Report	Coordinator	Europe Regional Knowledge Conference	Summary and Recommendations of Europe Regional Conference

Executive Summary of Americas Regional Conference

Sharing knowledge and experience more effectively can help solve complex problems. In these uncertain economic times, the exchange of knowledge, skills, and expertise (practicality) could be a reasonable basis of collaboration to solve complex problems. However, such a partnership requires close interactions and relationships between experts, problem solvers, and society. Diasporans and organizations like NRNA-ICC can play an essential role in facilitating and strengthening such interactions and networks. By bringing expert communities closer together, they can also help bridge the knowledge and skill gaps and pave the way for future collaborations.

Building upon the success of the 1st (2019) conference in San Francisco, USA, the Non-Resident Nepali Association International Coordination Council (NRNA-ICC) Americas organized the 2nd NRN Knowledge Sharing Convention on 04-06 September 2020 in Toronto, Canada.

The NRNA-ICC's second knowledge-sharing conference's goal was to bring together a great diversity of people and key stakeholders from the Americas and Nepal and exchange knowledge, experience, skills, and opportunities to strengthen the science and technology, human resources, entrepreneurship, policies, and practices in both regions. The second objective was to build meaningful relationships between scholars, professionals, institutions, industry practitioners, entrepreneurs, problem-solvers, and the for-profit and not-for-profit sectors in Nepal and the Americas. And the third objective was to pave the way for future collaborations to solve some of our most challenging problems in Science and Technology, Health and Medicine, Education, Economy, and Equitable Development (including gender-equitable development), Engineering, Infrastructure Development, Public Safety, and Energy, and the Environment.

The conference centered on sharing applied diaspora knowledge while identifying required suitable and applicable tools, methodology, and concepts. The convention was divided into eight sessions:

1. COVID-19 Impact in Economy
2. Public Health and Medicine
3. Innovation, Entrepreneurship, Technology, and Knowledge Sharing
4. Entrepreneurship Development in Agriculture and Allied Sector
5. Engineering, Infrastructure Development, and Public Safety
6. Knowledge and Skills in Nursing Practice
7. Energy, Environment, Science & Technology
8. Education, Social Empowerment, and Equitable Development

Fifty abstracts were accepted for discussions, including keynote talks and oral presentations. Each presentation emphasized transferable skills, knowledge, and values as a new piece of take-home information/message for the targeted audiences. This interaction helped to understand the priorities in different sectors. In the current and post COVID-19 pandemic context, the convention also identified new tools and techniques for practical knowledge sharing among all stakeholders.

The conference presenters and attendees were Innovators, Scientific Communities, Academicians, high-level officials from the Government of Nepal, including the Ministry of Education, National Planning Commission, Nepal Academy of Science and Technology, Universities, Research Centers, International Organizations, Private Sectors, Industries, Startups and Knowledge Incubators. Many participants from different countries and diverse sectors also participated by zoom and on the web—Facebook live.

The convention observed that some of the ideas and approaches discussed require further research, but many could be implemented immediately. The program could be implemented through the Government, non-government, or private sector. Some programs could also be implemented through NRN Foundation. The convention also acknowledged that Nepal's existing policies might need revision, and many different new policies may require addressing the challenges brought by the pandemic. However, there are ample opportunities for diaspora and NRNA to bring their knowledge, skills, and experiences for Nepal's benefit to deal with post-COVID-19 pandemic challenges. The convention concluded with a call for collaboration as the key to "Prosperous Nepal and Happy Nepali."

The actual white paper booklet containing program details and presentations have already been published on the convention website at http://bigyabhela.com/cms_menu/call-for-abstract.

Recommendations

Based on the knowledge shared through presentations, panel member inputs, and expert views on participant questions, the convention organizing committee submits this conven- tion report to Non-Resident Nepali Association and the Government of Nepal. It contains the summary of all presentations and detailed recommendations. Below we present those recommendations in the concise form.

1) COVID-19 Impact in Economy

1. Defer payments on loans and interests; waive certain taxes and fees; establish better coordination between the local, state, and central governments; and provide other necessary supports.
2. Extend time-bound support for a year or two to overcome the situation.
3. Provide utility price concessions for a limited period.
4. In the big and medium industries, most of the labor is from outside. The government and industries should take initiatives to skill the local labor befitting the industrial requirements.
5. Continue productivity improvement drives in cooperation with appropriate agencies like APO.
6. Consider increasing wages by considering the need, inflation, and productivity effects.
7. Increase synergy and partnership with Local Governments and local NGOs/ CSOs to optimize resources, for better coordination and efficient and effective delivery.
8. The support to Returned Migrant Worker, MSMEs can be divided phase-wise into

    a. Relief: Focusing mostly on psychosocial counseling, cash or in-kind support, and paycheck protection program.

    b. Recovery: Knowledge enhancement of LGs, MSMEs, and CSOs, providing access to finance, cash or in-kind support for self- employment programs, job search support, connection with the formal economy, implementing government protocol for the COVID epidemic, and in restarting businesses post lockdown.

    c. Resilience: Building resilience through economic empowerment, especially that of youth, women, and marginalized community, by supporting them in meeting new demands, expanding supply chains, development of a working relationship with financial institutions and open lines of credit, tailored insurance facilities, and working on enhancing the digital economy and supporting policy environment.

2) Public Health and Medicine

1. Integrate mental health in Primary Health Care and use mid-level health workers to provide care and support.
2. Promote and leverage tele-mental health.
3. Explore innovative approaches to mitigating and minimizing stigma and providing alternative approaches to mental health counseling and services.
4. Innovations in curricula & pedagogy, while maintaining the minimal standards, are the call of the hour. Government should promote, emphasize, and reward innovations in preparing health professionals in higher education training and education.
5. Leaderships remains at the center of these ongoing reforms to address Nepal's 21st century needs in the health workforce and professionals.
6. The curricula and training need to be dynamic and updated periodically. The public health academic institutions in Nepal should harness public health professionals' expertise from the Nepali diaspora.
7. Government should prioritize providing (with budget allocation) 'Primary Burn Care' training to many doctors and nurses working in the emergency department of hospitals in all districts.
8. Kirtipur Hospital (Nepal Cleft & Burn Center) has already developed the curriculum and teaching-learning materials in collaboration with the National Health Training Center, Ministry of Health and Population, which could be used by other centers.
9. The Nepal Ambulance Service 'central dispatch' center needs to be upgraded with better IT and support staff. This will help make the NAS the 'center for excellence' in providing emergency medical technician (EMT) training to expand ambulance services.
10. More emphasis needs to be placed on public-private partnership (PPP) with more effective communication (i.e., regular and better inter- and intra-departmental communication).

3) Innovation, Entrepreneurship, Technology, and Knowledge Sharing

1. Nepali worldwide (both resident and non-resident) should work together to strengthen short-and long-term developmental plans, policies, and implementation frameworks of Nepal.
2. Develop synergistic effects of collaboration between Nepali experts living in the homeland and diaspora
3. NRNA could play an important role in bringing diaspora communities together and fostering meaningful collaboration between resident and non-resident communities in creating a culture of research, innovation, and development in Nepal.
4. Valuable natural resources (e.g., medicinal plans) available in Nepal could be developed into commercially successful products with high economic values so that the country can maximize the benefits from her resources.
5. Exploring the country's unexplored lands: about 2/3rd, which is currently covered by forest and other lands, to grow medicinal plants and other living organisms. Such high-value plants and organisms could then be developed into commercially successful products with high economic values so that the country can maximize the benefits from her resources.
6. Few innovative efforts being carried out in developing diagnostic kits for different diseases (measles, dengue, etc.), including COVID-19. As reliable diagnostic kits would be critical to control infectious diseases such as COVID-19 and keep the countries well prepared to handle such pandemic situations, local efforts are expected to lead development of test kits that are accessible at a much more affordable cost.

7. We now live in threatened every moment by ill-intentioned hackers. A novel solutions to cybersecurity threats is required to fight against those threats.
8. Active research and development would be essential for safeguarding personal and nation's interests against Cybersecurity threats.
9. Countries like Nepal should also be prepared to fight against such cyberattacks
10. A successful entrepreneur in digital age would encourage all innovators and entrepreneurs in the Americas back in Nepal and worldwide.

4) Entrepreneurship Development in Agriculture and Allied Sector

1. Business to business trades are prefer to promote trade in agri-food, food processing, energy, and infrastructure areas.
2. Quality of life of local residents can be improve by integrating local / traditional knowledge with innovative technologies. For instance, the study introduced *Amako Jato*, a tool developed in which IoT and AI (Artificial Intelligence) are used to enhance the efficiency of traditional stone grinder found in remote village.
3. IoT and AI-based solutions can help in re-defining the vision and concept of Society 5.0 in terms of the Nepalese socio-economic context.
4. Testing laboratories equipped with qualified resources.
5. Medicinal plant and its' genetic diversity need conserve . Capacity building in ethnomedicinal knowledge while maintaining skills of older generation transfer to the younger generation is required.
6. GPP and NPP's science may contributes to the production of wood, herbs, and other plant products in Nepal. More accurate data on TCR night helpful.

5) Engineering, Infrastructure Development, and Public Safety

1. Remarkable progress in expanding the road network need align with sustainable upgrading and creating road assets providing emphasis on efficiency, reliability, and safety at service levels.
2. Strategic road network can maintained to appropriate standards most cost-effective manner through capacity building of government and private sector stakeholders.
3. Nepal and other developing countries should regularly revise the existing engineering standards and codes to prioritize public safety.
4. The project construction report must be prepared by the project manager to identify future projects' improvements at the end of the project.
5. The project owner's must-have performance review systems established for both engineering design consultants and contractors.
6. Nepal could benefit by testing different ratios of Hempcrete composition suitable for its climate.
7. Nepal could implement sustainable water supply operations through a monitoring system, preventative maintenance, condition assessment, collecting quality data, coordination, and knowledge sharing.
8. Government of Nepal should provide incentives for cities, municipalities, and village municipalities to invest in research and development to foster smart cities.
9. Government also needs to offer tax incentives to encourage private firms to spend more on research and development

related to smart city technologies.

10. Biosand filter technology is a low-cost household water treatment device that has shown potential in improving the accessibility of clean water for the poor in Nepal.

6) Knowledge and Skills in Nursing Practice

1. Nepal Nursing Council should make continuing professional development mandatory for all nurses seeking re-licensure to demonstrate continuing competence.
2. Demonstration of continuing competence should cover the knowledge, skills, attitudes, judgment, abilities, experience, and professional ethics necessary for nursing's safe and competent practice.
3. Standardized nurse-patient ratio to overcome work overload.
4. Provide continuing education for nurses already in practice. Continue education and training on cultural competence, active listening and empathetic communication skills, and emergency/crisis preparedness can boost nurse's morale and confidence.
5. Define the scope of practice and formulate policy, protocols, guidelines, and job descriptions applicable to different nursing practice areas.
6. Proper monitoring and quality assurance of nursing practice based on the code of conduct and standards outlined by the regulatory body.
7. Follow policy, protocols & nursing guidelines and be up to date on knowledge and skills to provide quality health services.
8. Be compliant with the guideline and protocol of the institution and the regulatory body.
9. Frequent handwashing and consistent use of personal protective equipment (PPE) appropriately and minimize nurses' exposure to COVID patients by clustering nursing services.
10. Prepare guidelines, protocol, policy, and procedures and orient staff on time.
11. Ensure the availability of PPE, proper cleaning and sanitization of surfaces, and restrict visitors.
12. Adequately train staff by holding elective procedures that can be postponed and deploying staff in needy areas.
13. Prepare national strategy, guidelines, protocol, policy, and procedures and allocate resources to apply them to prevent transmission and provide services safely in the community and care settings.
14. Make testing services for disease identification available everywhere.
15. Travel restriction and testing and quarantine of suspicious visitors at the entry point.

7) Energy, Environment, Science & Technology

1. In partnership with local and provincial governments, the Nepali diaspora can connect with Nepal and share knowledge, experiences, skills, and other resources.
2. The Diaspora scientists and technologists can connect with Nepal through NAST's Brain Pooling Program and Science Diplomacy program.
3. NAST is also planning to expand its activities to all the country's seven provinces by establishing a center of excellence for Research of Development on different disciplines. The Diaspora scientists and technologists can connect with such programs in a province of their choice.

4. Small satellites can help with Nepal's development. The government should show leadership in promoting small satellite technology made by the Nepali engineers in Nepal and launch into space.
5. The SanoSat-1 (Nepal-PQ1) Satellite is complete and ready for launch; however, the projects need about €25,000 of funding to launch it on the space. The government and citizens could help speed the launch of the satellite by contributing financially or through donations.
6. ORION Space provides a platform for the next generation to work in space technology in Nepal. Thus, there is a lot of opportunities for youths to participate in this program.
7. It is cheaper to cook on electricity than LPG; however, it depends on LPG consumption (cylinders per month) and the baseline electricity consumption (kWh/month). Households would not benefit economically from adopting electric induction stoves if there is no subsidy on the electricity. To overcome this, the government should provide some subsidies for the use of electricity for cooking.
8. The cost of cooking on commercial fuel or stove depends on thermal efficiency. Allowing high energy-efficient induction cookstoves in the market could save people money and help reduce the consumption of electricity.
9. There is an urgent need to implement strict regulatory policies to monitor and control air pollution in major Nepalese cities.
10. The government should start experimenting with pollution sucking devices/Smog Tower/ Air pollution purifiers to minimize air pollution in the town or communities.
11. The regional government needs to establish a source apportionment lab in all the regions. Such labs will help identify sources of air pollution in the region.
12. The NAST could benefit by opening the Pyramid or the Everest-K2 National Research Council (Ev-K2-CNR) center to study transboundary air pollution research in Nepal.
13. NRNA should take more initiation to foster collaborative research and funding researches in Nepal.
14. Innovation is critical in today's "conceptual economy."
15. Competitive advantage relies on insight, imagination, and ingenuity.
16. Three-quarters of the fastest-growing occupations require significant mathematics or
17. science preparation. By 2018, there could be 2.4 million unfilled (U.S.) STEM jobs.
18. Early STEM (Robotics and Computer Science) Education can turn Nepal's Economy into a Knowledge-Based Economy.
19. The Carnegie Mellon University - Carnegie Mellon Robotics Academy (CMRA) and (CS-STEM Network) Robotics STEM program focuses on Technology and Engineering, Namely "Robotics Computer Science."
20. Carnegie Mellon Robotics program for K-12 is affordable and could be implemented in different parts of Nepal.
21. Upon completing the course and completing the online test, the participants also get a certificate from CMRA with grades.

8) Education, Social Empowerment, and Equitable Development

1. Identify general and focused goals and objectives with “New Deal” intervention implementation timelines (short, medium, and long term) that prioritize the weaker and target the family or household rather than individual and seek to collaborate and partner with the various governmental, non-governmental, civil society and philanthropic organizations.
2. The federal government plays the role of the norm and standard-setting, the provincial government plays the

coordination role, and the local government plays the implementation role in government service and program deliveries.

3. Enhance public spending on basic goods, social security, and capacity development.
4. Integrate public service approach to interventions and program delivery, such as health and education for synergy and effectiveness.
5. Enhance proper coordination and policy development and implementation among the levels of government.
6. Develop an education system that affords student competency in learning and achievement rather than an academic mark or score.
7. Establish government regulation, monitoring mechanisms, and guidelines for the public and private education sectors built on common or shared standards that enable effective and continuous assessment of student learning outcomes and monitoring educational target achievements of the various government levels.
8. Enhance equal opportunity and reduce all kinds of discrimination in learning by focusing on universally inclusive education and equitable access to educational infrastructure, learning opportunities, incentives, qualified teachers, and optimal teacher-student ratio.
9. Timely review and revision of curriculum, teaching methods, teacher motivation, and learning environment that foster adoption or adaptation of new and practical approaches and methods of teaching and learning, consequently enhancing student learning outcomes and competency.
10. Institutionalize the minimization of corporal punishment in schools to foster a positive student learning environment.
11. Micro-level research studies at the local levels to understand the challenges and issues and their amelioration.
12. The government should initiate a curriculum amendment by instituting high investment in education and involving practitioners from both the public and private sectors.
13. Make education innovative that addresses the urgent need to improve the national school education system to make it student empowerment-focused that fosters and promotes skillful and knowledgeable human resources and eminent future leaders.
14. Make the teaching profession reputable and respected. The teaching community needs the commitment to update professional knowledge and skills to become better equipped in teaching and make the learning process student-centered and interesting that allows experiential learning without discrimination.
15. Involve parents in children teaching and learning process. Parents' involvement in their children's learning and school operation is essential to improve the educational system that fosters recruitment of qualified teaching staff members and student learning, enabling them to become critical and analytic thinkers and problem solvers.
16. Develop new educational institutions or reorient the existing university system (cross-faculty collaboration) that integrate Entrepreneurship development in the learning assessment framework for entrepreneurship movement in the higher education sector is essential.
17. Create a one-stop-shop and business mentoring and incubation for entrepreneur development.
18. Provide the government-sponsored loan (like in Canada), and negotiate with donor agencies to address entrepreneurial aspirations.
19. Introduce policies to unlock potentials vested with the NRN community is essential.
20. National curriculum Design 2019 needs reviews and revisions to provide adequate autonomy to the concerned stakeholders working for provincial/local education boards/governments.

21. Institute need-based curriculum reformation that affords autonomy to school boards in certain areas for educational enhancement and post-secondary institutions to develop courses to address the gaps between the national and local levels.
22. Incorporate local/indigenous content locally developed curriculum to foster the production of well-trained human resources.
23. Overall, given the nascent stage of distance learning and its potential in the Nepalese context, formulation, and implementation of regulations, policies, and programs to address the identified challenges, gaps, and barriers in distance learning are essential to institute the needed paradigm shift and enhance its accessibility, effectiveness, and productivity.
24. The rules and regulations that were developed for the conventional higher education must be revised to account for the online teaching and learning methods for fostering and enhancing the distance learning educational system's effectiveness.
25. Institutionalized affiliation of faculties with the university is essential to make distance learning an effective way of education for career enhancement, program growth, productivity, and sustainability.
26. To address the weak synchrony of higher educational development and economic development of country, it's essential to have political stability and an institutional framework that integrates relevant sectors (such as health and education) for synergy and political stability which are catalytic and foster enhanced returns to education.
27. Institute policies that promote attraction (brain gain) of the educated Nepalese diaspora significantly lost to brain drain.
28. Prioritize education sector by significantly enhancing the very low government expenditure, measured as a percentage of GDP, on education at all levels, namely, primary, secondary and tertiary.
29. Build and strengthen the public-private partnerships to foster capacity building and improving the deprived public education system.

The convention observed that some of the ideas and approaches discussed require further research, but many could be implemented immediately. The program could be implemented through the Government, non-government, or private sector. Some programs could also be implemented through NRN Foundation. The convention also acknowledged that Nepal's existing policies might need revision, and many different new policies may require addressing the challenges brought by the pandemic. However, there are ample opportunities for diaspora and NRNA to bring their knowledge, skills, and experiences for Nepal's benefit to deal with post-COVID-19 pandemic challenges. The convention concluded with a call for collaboration as the key to "Prosperous Nepal and Happy Nepali."

In this second convention, the organizing committee was mostly comprised of NRN and resident Nepali experts. A significant number of GoN's representation were there and their role in management committee and as expert has aligned the conference theme with current development priorities of Nepal.

The convention has exceeded our expectations in terms of quality and quantity of presentations, quality participation and ability to bring every things in table with great visibility and drawing the conclusion on the table.

Executive Summary of Asia Regional Conference

The first NRN Asia-Pacific Knowledge convention was held on 27th of September virtually using ZOOM. The theme of the convention was **Knowledge Sharing among Nepalese People: Challenges and Opportunities for Entrepreneurs Following the COVID-19 Pandemic**. The aim of the convention was to bring together experts of various disciplines from Nepal, the Nepali diaspora and international scientific communities to explore Nepal's needs for the development not only on finance but also on knowledge-based economy. It further aimed to build ongoing networks among the scholars, professionals, institutions, industry practitioners, entrepreneurs, educators, and the for-profit and not-for-profit sectors in Nepal and in the Asia-Pacific region to open up possible collaborations for the advancement of various development sectors. This region is the home for thousands of Nepali youths (migrant workers, students, and others), large number of them may have returned to Nepal due to the current pandemic. This convention also focused on mobilization and collaboration among these youths in Nepal for entrepreneurship.

This convention was organized by the NRN community, experts of a specific domain, academicians, and researches in collaboration with the education and research institutes, private sectors, and other stakeholders in Nepal, and with the support of other well-wishers residing in the region.

The Hon'ble minister Mr. Giri Raj Mani Pokharel (Ministry of Education, Science & Technology of Nepal) inaugurated the convention. Following the inauguration, a keynote speech was delivered by Ex. Chief Information Commissioner, Mr. Krishna Hari Baskota, on **COVID 19 impact on Nepalese economy and way forward**. The speech covered almost all scenarios on the Nepalese economy, its impacts and how we can revive it after or during this pandemic.There were 12 sessions on various topics, nearly 112 professionals contributed as speakers or panelists or commenters. The summary of the sessions are as follows:

S1: Agriculture and Poverty Reduction

1. Effective implementation of existing policies/acts and regulations is needed.
2. Government policies should encourage and support subsistence, small, and under-privileged /resource-poor farmers.
3. The curriculum/syllabus of agriculture teaching/training needs to be updated to make it more practical and professional.
4. Nepal has a huge potential to increase the production and commercialization of a wide variety of medicinal herbs and agro-products that could help reduce the trade deficit and boost the national economy.
5. Uses of synthetic fertilizers/pesticides could gradually be substituted by the adoption of environment-friendly organic/biological sources such as microbial inoculants.
6. Skills and knowledge gained from overseas or within the country can be utilized for the improvement and introduction of new biotechnological services through start-up companies.

Need for the commercialization of wide variety of medicinal herbs, value-added crops and livestock products using innovative technologies while encouraging and supporting subsistence, small, and under-privileged /resource-poor farmers to reduce poverty and boost the economy of the nation. Encourage organic farming and minimize the use of chemical fertilizers by substituting with biofertilizers, biopesticides for the betterment of human health. There should be proper coordination of three-tier government as well as effective implementation of existing policies. Utilize the shared skills and knowledge among Nepalese and diaspora for the improvement and introduction of new biotechnological services through start-up companies.

S2: Sustainable Environment

1. Nepal must target high-value low volume products and engage youth, as the recent data shows that ~ 5% of the global population prefers organic products.
2. Competing with large neighbors is difficult in the case of forestry products. So, bioproducts (bamboo, honey, bio-pesticides, etc.) have high potential and are valuable from a business perspective but need good government policies. This can help our country to become a zero-carbon country.
3. The integration of laws and policies at all levels for disaster mitigation is vital for a sustainable environment. Force migration, as opposed to voluntary migration, is the only option for the people who are affected by natural disasters.
4. In the case of waste also, there is a possibility of entrepreneurship by waste management.

Nepal must target high-value low volume products and engage youth, as the recent data shows that ~ 5% of the global population prefers organic products. If the government policy is favorable, bio-products (bamboo, honey, bio-pesticides, etc.) have high potential and are valuable from a business perspective. Disaster mitigation is vital for a sustainable environment; force migration is a compulsion for the people who are affected by natural disasters.

S3: Applied health and medical science

1. Nepal is far behind in molecular diagnostic technology (COVID-19 PCR) development which was observed at COVID-19 pandemic. The pandemic has highlighted long-standing problem in chemical reagent production/accessibility required in molecular works, understaffed and under-resourced public healthcare.
2. Caesarean section trend rates over two decades has increased in Nepal therefore, successful implementation of safe motherhood program and policies with well equipped with adequate human resources is demanded.
3. Different chicken breeds show high prevalence of multidrug resistance by pathogenic bacteria in poultry farms suggesting proper use of disinfectant in farm by the producer.
4. The current Nepalese healthcare system is poorly equipped to handle molecular diagnostic technology; Nepal government could channelize NRNA to utilize the Nepalese expertise residing outside Nepal in combating the crisis in future.

Nepal's health care system is inadequately equipped to handle different health related problems. Need for the establishment of well-equipped diagnostic laboratories and research institutes with skilled human resources by channeling with NRNA. Strict measures be taken to overcome antimicrobial resistance issues that has adverse effects on human and animal health.

S4: Applied Science and Biotechnology

Based on the expertise presentation and session discussion, we conclude following point as home-take-message from the "Applied Science and Biotechnology" session:

1. Natural Bio-resources (such as plants, animals, microbial sources) are valuable assets of Nepal which could contribute for the bioeconomy growth of the nation.
2. The microbial resources in the Nepal are untouched pool of resources which can be industrialized to produce various microbial bioactive compounds.
3. In the context of Nepal, phytochemicals are considered as traditional medicines. Unfortunately, lack of introduction of modern technology for industrial production of these phytochemicals hindered the commercialization of these traditional medicines.

4. The introduction of plant-based vaccines and recombinant pharmaceutical products can be another emerging market.
5. Biotechnology and next generation technology might play a vital role to commercialization of bioresource available in the country.
6. There should be utmost collaboration between government, academics and industrial organization to make optimum utilization of bioresources.

Natural bio-resources such as plants, animals, microbial sources be industrialized to produce various microbial bioactive compounds using modern technology that could contribute for the economic growth of the nation. Collaboration between government, academics and industrial organization be strengthened to make optimum utilization of bio-resources.

S5: Pharma/Nutraceutical and Biomedical Business Opportunity

1. The current market of pharmaceutical business by Nepali pharmaceutical industries is escalating. However, more efforts are needed to achieve the target for the self-sufficiency of required medicines and related pharmaceutical products. The government needs to foster the target through suitable pharmaceutical research, innovation, and regulation and by promoting pharmaceutical companies for the export-oriented pharmaceutical business.
2. Herbal drug and nutraceuticals research and commercialization have a big opportunity. Research through academia, pharmaceutical companies, and public institutions should be optimized. Most importantly, the government should establish its own advanced research laboratory and act as a support center for related companies.
3. Innovative pharmaceutical technologies such as the Controlled Drug Release Delivery system have a big application for the development of competent veterinary and human medicines from Nepalese pharmaceutical companies.
4. Utilizing wild fruits may create a big market possibility in Nepal. As many fruits are grown up wild, these can be marketed by necessary processing. This may enhance economic development and employment opportunity in Nepal.
5. In Nepal, all the raw materials and Active Pharmaceutical Ingredients (API) for producing medicines are being imported so far. However, it is time to promote research and production of raw materials and API in Nepal by Nepalese pharmaceutical companies. The government needs to facilitate and support local businesses.
6. Integrated Community Pharmacy Network Development and business has challenges and a big opportunity for providing basic health services. If the government will facilitate appropriate regulation. Lots of job opportunity can be created along with quality and reliable health services to the Nepalese community.

Government needs to foster medicines and related pharmaceutical products through suitable pharmaceutical research, innovation, and regulation by promoting pharmaceutical companies for the export-oriented pharmaceutical business. Innovative pharmaceutical technologies such as the Controlled Drug Release Delivery system have a big application for the development of competent veterinary and human medicines from Nepalese pharmaceutical companies and hence such technologies be applied as far as possible. Integrated Community Pharmacy Network Development and business be promoted for providing basic health services.

S6: Green Energy, Energy Accessibility and Climate Change Mitigation

1. This session has significantly contributed to disseminating knowledge and information related to the promotion of clean energy, increasing accessibility of sustainability of green energy, and contributing greenhouse gas emission that ultimately assists in climate change mitigation.

2. Non-fired brick (or eco bricks) can be used instead of conventional fired brick, which will contribute in reducing environment pollution.

It has been recommended that the greenhouse gas emission can be mitigated through promotion of clean energy. For the reduction of pollution in environment, non-fired or eco-bricks utilization is recommended instead of conventional fired bricks

S7: Returnee as Creative Entrepreneur: Opportunities and Challenges for Nepal

1. Many programs for returnees are already there in Nepal but the access to them and the modality of the program do not match with the need for the returnee's resources.
2. While programs are there, we can't fit them in course with our need due to the lack of diversity of opportunities. Also, data (info) is not reliable, there is a lack of coordination among the stakeholders - Public-Private partnership is a must for a successful reintegration program both economically and socially.

Modality of existing programs to retain the returnees should be modified to match their needs. Proper coordination among the stakeholders is a must - Public-Private partnership is a must for a successful reintegration of returnees with diverse skills for employment and social welfare activities.

S8: Smart City and Advanced ICT Trends

1. The session was based around the importance of transformative power of the Science and Technology and its applications for the benefit for the Nepalese society by collaborating with young scientists, youths, and professional experts from various hospitals and universities around the globe to mitigate the spread of CoViD-19. Emphasis was given to make 'Smart and digital Nepal' through the amalgamation of innovation, R&D, and the latest technologies.
2. Conversion of villages to a 'smart village' by gathering information from public and civil servants in cooperation with the government in Nepal.
3. Importance of integration of online platform like 'Teams' from Microsoft can help during and after COVID19 in the Education sector of Nepal.
4. Security issues (higher reliability, transparency, secure storage), in financial institutions such as design, and implementation of distributed ledgers and blockchain technology were highlighted.

'Smart and digital Nepal' through the amalgamation of innovation, R&D, and the latest technologies is a necessity for converting villages to a 'smart villages' through digitalization of information using ICT. Use of ICT for teaching-learning activities, health and security issues (higher reliability, transparency, secure storage), at hospitals and financial institutions were suggested.

S9: Students in foreign nations- a shared perspective of Nepalese students and stakeholders

1. The equivalency of the earned degree from universities abroad by Tribhuwan University is a big hassle to many returnee students and should be tackled immediately by the concerned authorities.
2. Despite the willingness of a big number of Nepalese students to return home country, due to lack of better opportunities they are compelled to settle and look for professional career in the foreign countries.
3. Cultural and language barrier are the two prime factors affecting smooth acculturation, therefore familiarizing themselves with the language and culture before embarking would ease their living.
4. The importance of exchange student programme was highlighted.
5. The active role of Brain Gain Centre in recognizing, promoting, connecting, and managing external experts to work for Nepalese society.

Proper steps by the Ministry of Education and related university should be taken to ease the process of providing the equivalency of overseas earned degrees. Government should make favorable policy to retain the overseas graduates for contributing their skills and knowledge for the development of the nation. Colleges and universities in Nepal should workout in promoting exchange programs for students' exposure.

S10: Restart, Revive, and Reboot Tourism: Impact of Covid-19 in Nepalese Tourism Industry

1. COVID- 19 epidemic highly devastated the Nepalese Tourism Industry of more than 100 billion investment and more than 273 thousand employments hence, to minimize the future effects it is crucial to develop "Post-COVID" strategy to restart, revive and reboot tourism. The domestic tourism boost can be one of the recovery plans for the current context. Additionally, spiritual and agro-tourism need to be emphasized.
2. The collaboration between the government and the private sector is essential.-The government has initiated "Desh Darshan" campaign domestically to promote domestic tourism which focuses on outdoor tourism such as mountain and trekking. This campaign follows the World Tourism Organization (UNWTO) guidelines to fight with COVID-19. However, to sustain this kind of tourism campaigns our government needs unified investment from the diaspora (especially NRNA) in the tourism sector like "TOURISM INVESTMENT BOARD".

In the present context of COVID-19 pandemic, tourism in Nepal has been badly affected. To revive the industry, government should take the initiative to provide conducive environment for safe travel of domestic and international tourists through the collaboration with the private sectors such as NRNA.

S11: Pandemic, Social Development and Role of Diaspora

1. For the exchange of knowledge and technologies, implementing the television knowledge (TVET) through the NRNA network were highlighted.
2. Migrant workers with entrepreneurship, and vocational skills should be recognized and provide support for self-employment.
3. NRNA should use its wide network and vividness for the exchange of ideas and expertise between the NCC.

For the exchange of knowledge and technologies, implementing the television knowledge (TVET) through the NRNA network was emphasized. Migrant workers with entrepreneurship, and vocational skills should be recognized and provide support for self-employment. NRNA should use its wide network and vividness for the exchange of ideas and expertise between the NCC.

S12: Research and Development: current status and future perspective in Nepal

1. Ongoing research works in Nepal desperately needs potential investment or funding for improving the quality of research.
2. The universities, government institutions should provide or share their capability of research facility preset with the concerned sectors.
3. NRNs can collaborate and facilitate a different kind of research and development activities.

Ongoing research works in Nepal desperately needs potential investment or funding for improving the quality of research. The universities, government institutions should provide or share their capability of research facility preset with the concerned sectors. NRNs can collaborate and facilitate a different kind of research and development activities.

Executive Summary of Oceania Regional Conference

NRNA Oceania organized the **Regional Knowledge Convention on a theme**

"Health and Economic Consequences of COVID-19 "on the 13th September 2020 with a focus on health and economic recovery post-COVID-19. A total of 15 presentations which included 2 keynotes, 8 invited and 5 contributory presentations were made in two sessions. Oceania RC Hom Pandey and VP Mana KC have elaborated the Oceania lead role in knowledge initiatives from the beginning and contribution to knowledge investment and transfer. They also assured that there will be a continued focus and support on this area on the coming days.

The economy session included two keynote presentations by Hon. Surendra Pandey MP, Former Minister, and Dr. Minendra Rijal MP, Former Minister from Nepal. Hon. Pandey spoke on the trend of Government budget on investment and opportunity for diaspora investment in Agriculture bio-based such as medicinal plant, cardamon, Yarsha Gumba, live-stock production and processing industry, hotel, and tourism, infrastructure development as an attractive area and for a quick return on the investment and help create largely employment opportunities in Nepal. Dr. Minendra Rijal highlighted on Government inefficiency to mobilizes the resources and simplifying policies for NRNA investment, NRN Citizenship and impact of COVID on the economy and its likely impact on NRNA investment. Invited speaker's Dr. Hari KC Joint Secretary, Ministry of Agriculture highlighted the resilience of Nepal's agriculture, issues with regards to fertilizers, import and export, and COVID impact on food security. Dr. Prakash Kumar Shrestha, executive director of Nepal Rastra bank and Mr. Bhoj Bahadur Shah, Chairman of Mega Bank highlighted the Nepalese Economy's ability and initiatives to handle the COVID impact. Dr. Kamal Adhikari, Dr. Krishna Hamal, and Mr. Arun Kumar Thakur provided examples of possible agricultural opportunities in Nepal, learnings from Australia initiatives for post-COVID-19 economic recovery and the importance of automation technology for the development. The session was moderated by Dr. Binod Shrestha and Panel chair was Dr. Raju Adhikari, Member Secretary SK&TT.

The Health Session included invited presentation on Smart materials for personal protection by Dr. Rameshwor Adhikari, COVID pandemic medicine by Ms. Kabita Kandel & Mr. Samiran Subedi and NRNA Health Committee COVID-19 Initiative by Dr. Kush Shrestha. The presentation by Dr. Dilli Banjade, Bimala Khadka, Bharat Nepal, Drona Rasali shared Australia heath care response to COVID-19, health and welfare management, state of mental health issues in the Nepali community in Australia, and the Food Security book published by Nepal Agriculture professionals of Americas (NAPA. The session was moderated by Mr. Ashok KC, ICC Member and Panel chair was Ms. Bhoma Limbu, Women co-ordinator.

Both sessions included a one-hour panel discussion with the speakers and participants. In the economy session discussion, overall, the response was the concerns on COVID-19 crises situation in Nepal and difficulties to make the investment and on Government promises Oceania has already invested heavily in Nepal in Hotel, Education, and Agriculture areas and is keen to explore other opportunities and continue to invest amidst COVID-19 concern but cautiously. The health session emphasized that Nepal for innovation in R&D and need for taking a coordinated approach to deal with the crises and learn from Australia and New Zealand examples. The Oceania knowledge conference recommendations will be presented in the 2nd Global NRNA knowledge convention 9-12 the October in Kathmandu, Nepal.

The knowledge convention committee thanked all the presenters, convention team and ICC support for successfully organizing the convention.

1.1 Summary and Recommendations

1. NRNA can bring a wide variety of experience, expertise and knowledge which could help in various sector of economic development in Nepal.
2. Oceania countries like Australia, New Zealand has managed the COIVD-19 very well and those learnings would assist Nepal to combat the COVID-19 both from health and economic perspective.
3. Food security is important for many countries and it will even be more important due to COVID-19 as international travel/transport are impacted.
4. Oceania countries like Australia and New Zealand are well known for the high value agricultural products and export in many countries around the world. Nepal could learn from their experience and increase the productivity in Agricultural sector.
5. Nepal Rastra bank is already doing some policy level changes to help for the economic impact and more could be done by closely monitoring the challenges faced by people and business in this pandemic.
6. Banking have a very important role to play to assist business and community by assisting to manage their cash flow during this difficult time.
7. Banking industry in Nepal would be able to assist the community and business better if they apply some changes that developed courtiers have done to combat the pandemic impact on economy.
8. Australia have an association of Nepalese doctors "ANMDA" who have been serving Australian community in both public and private sector. Setting up collaboration mechanism between Nepal and Australia would assist to exchange knowledge in this area effectively.
9. Mental health is a big risk which may grow significantly due to health and economic impact due to COIVD-19. Government needs to be prepared and provide necessary support to manage this surge working with both Government and Non-Government agencies.

1.2 Plan of Action

1. NRNA to work closely with Banking industries of Nepal and exchange knowledge and best practices that have played vital role in reducing the economic impact due to COVID-19.
2. NRNA and GoN policy maker to discuss and come up with improvements that can be achieved in Agricultural sector for the food security of Nepal.
3. NRNA and GoN to exchange ideas for utilising the automation technologies to improve productivities in manufacturing, transport and agricultural sector.
4. NRNA to work closely with GoN and exchange knowledge and best practices that have worked well on developed counties where spread of COVID-19 infections is well controlled.
5. NRNA health professional to work closely with Hospitals and health professionals of Nepal and exchange knowledge and best practices that have helped to manage the health and well-being of the patients by providing best medical services possible.
6. NRNA health professional specialised in Mental health to work closely with GoN and Non-Government agencies for assisting to minimise the impact to the community due to possible growing mental health issues.
7. Nepali diasporas are working in many countries as skilled human resources. They possess high level of skill and knowledge enhanced by their education and involvement challenging projects in the developed countries. NRNA and GoN to create better environment for skill and knowledge investment in Nepal to leverage from this opportunity.
8. NRNA to collaborate and identify some tangible projects with various level of government, i.e. Federal, State and Local government and have some tangible work where possible.

Executive Summary of Europe Regional Conference

NRN Europe Knowledge Conference 2020 was successfully conducted on 4th of October 2020. The Hon'ble minister Mr. Giri Raj Mani Pokharel (Ministry of Education, Science & Technology of Nepal) inaugurated the conference on Sunday at 09:00 AM central European. Due to COVOD-19 pandemic crisis, the conference was organized virtually. ZOOM was used as a webinar tool. The objectives of the NRN Europe knowledge conference 2020 were to strengthen the relationships among the Nepali Scholars/experts in the Europe and to transfer the knowledge & skill from this region for the benefit of Nepal. This conference brought together experts from Europe regions and also from Nepal to share their knowledge and expertise in order to achieve its objectives. A total of 50 experts from Europe and Nepal presented their papers in the conference including moderators in various sessions. Participants all around the world participated the conference online.

The conference covered the following topical areas:

- Health and Medical Sciences including Covid-19 effect
- Agricultural Sciences
- Energy and environment
- Natural Sciences
- Infrastructure development and construction

Based on the knowledge shared through presentations, and expert views on participant questions, following key summary of the program outcome/recommendations from each session are presented.

Health and Medical Sciences including Covid-19 effect

1. The impacts of pandemic on social-economic and mental health are long-term and we should think about this.
2. The diagnosis and treatment of cancers are also affected by COVID-19 so we have to accelerate the services for those patients.
3. The role of Nepali International charities for wellbeing of Nepali and Nepal are crucial.

Agricultural Science Session

1. Probably, the only session where all presentations are directly related to Nepal or even the researchers are done in Nepal or in collaboration with Nepal.VC of Gandaki University to be present and spread hands for collaboration is really an important step. The session touched all the components of agriculture session: Animal Science, Dairy Technology, Animal Nutrition, Soil Science, Analytic tools.
2. We will surely see collaborations at different levels in one year time from now. That can be in terms of joint scientific publication, new research proposal development and even exchange of students.
3. We strongly recommended the Nepal government to prioritize in further strengthening the close cooperation via the knowledge conference between European scientific communities and Nepalese Universities and research organizations.

Energy and Environment

Energy and environment have been moderated by Dr. Ravi K Chhetri and Dr. Nabin Aryal where six presentations were covered on the environment, energy, and water. Opportunities and challenges to collaborate with the Nepalese diaspora to advance the innovation and research activities were discussed. Technology transformation from Europe to Nepal, in particular wastewater

treatment, Biogas, and waste pretreatment for biogas production, is possible where researchers found potentials to collaborate with an academic institute such as Kathmandu University. Researchers from Nepal could collaborate with the diaspora to seek funding opportunities such as H2020 Europe and others. Immediately after the session, a consortium will be made among the researcher from Aarhus University, Denmark, Technical University of Denmark, and Kathmandu University, Nepal, to seek further opportunity funding and technology transfer on Anaerobic digestion.

Presenter from 5 countries; Belgium, UK, Norway, Nepal and Denmark have presented their knowledge on environment and energy.

Natural Sciences

1. Planning and decision-making process including transparency, innovation, prioritization is vital to promote the resource/science-based solution and to improve the livelihood and resource management in Nepal. (the motto: Knowledge is Potential and Application is Profit)
2. Land, Forest and Water Resource Development in Nepal call for courageous and visionary leadership including Short and Long-run research and Social innovation.
3. Advancements of Education, geographical variation and Economic indicators determine the population dynamics and scenarios including migration in Nepal. These factors should be prioritized for the national planning.
4. Innovation and exploitation of resources and use of technology with small-scale Pilot project should be focused for adaptive resource management.
5. Planning-implementation process and institutional arrangement (Governance, Finance, Power Play, Technocratic Control and Technical issues, Donor's Distrust) is still big questions enhancing resilience and adaptation.

Infrastructure development and construction

Infrastructure development and construction as one of the sessions of NRN European Knowledge Conference 2020 was successfully conducted. The session was chaired by Prof Krishna Kanta Panthi and moderated by Ar. Sunil Suwal. Mr. Panthi during his presentation about tunnel engineering in Nepal discussed on the scope of tunnel engineering and establishment of new Master's program in Nepal. Dr Binod Lal Amatya presented about Metro Rail Vision 2040 for the greater Kathmandu valley which showcased metro system as a solution of mass transit to address the current traffic congestion problems. Dr. Netra Timilsina discussed about the hydropower potential of Nepal in comparison to Norwegian scenario and highlighted the need of important aspects for dam safety rules and regulations in his presentation titled Overview and importance of hydropower and dam safety. The need of new digital tools, technologies and processes like Building Information Modeling (BIM) were highlighted by Er. Mahesh Karki during the presentation of Digitalization in construction: BIM as a new way of working. He furthermore discussed about different ongoing activities to promote BIM in Nepal. The final presentation conducted by Er. Bhupendra Basnet during his presentation titled Modular construction and prefabrication industry discussed on the importance and processes of element design and highlighted the benefits and problems of the industry. A short review about the about the ongoing energy and infrastructure projects were discussed by Mr. Bikash Chudal.

Infrastructure development and construction session focused on the existing obstacles and opportunities of the Nepalese built environment. Different presenters highlighted the need of new technologies and processes for better results of design and construction of such projects. As well as, the session also discussed the current approaches undertaken by the presenters like establishment of new master's course in tunnel engineering; collaboration aspects with different public and private organizations in utilization of new technologies and identified capacity building requirements for direct knowledge transfer from Europe to Nepal.

Profiles of Steering Committee Members

Chair

Dr Hem Raj Sharma

Senior Lecturer, Department of Physics,
the University of Liverpool, UK

Dr Hem Raj Sharma is a senior lecturer and a Higher Education Academy Fellow at Department of Physics in the University of Liverpool, UK. Before joining the University of Liverpool in 2007, he served as a Senior Researcher and a Postdoctoral Fellow at National Institute for Materials Science, Japan (2002-2007). He obtained PhD in Physics from Free University Berlin, Germany (2002), Post Graduate Diploma from International Centre for Theoretical Physics (ICTP), Italy (1999) and Master Degree from Rikkyo University, Japan (1998). He was honoured with the Nepal Bhushan Medal by the Honourable President of Nepal for being the 1997 gold medallist of MSc Physics at Tribhuvan University.

Dr Sharma was successful to obtain competitive international Government Fellowships such as JSPS Fellowship (Japan, 2004, 2013) and EPSRC Advanced Research Fellowship (UK, 2007). He has published more than sixty peer reviewed articles and book chapters; and supervised above thirty PhD and undergraduate students. He has chaired national and international conferences of his field.

In addition to his academic career, he is involved in social activities through Non-Resident Nepali Association (NRNA). He is the current General Secretary of NRNA International Coordination Council (ICC). Previously, he served as an advisor, the spokesperson, a member of NRNA ICC, and the General Secretary of National Coordination Council, Japan.

Co-chair

Dr Hari Prasad Dahal

Associate Editor
American Physical Society, USA

Dr Hari Dahal obtained his Master's Degree in Physics from Tribhuvan University, Nepal, and PhD in Theoretical Condensed Matter Physics from Boston College, Massachusetts, USA. He did his post-Doctoral research at the Los Alamos National Laboratory, New Mexico, USA. He is currently working at the Editorial Offices of American Physical Society (aps.org) in New York as an Associate Editor of scientific journals - Physical Review Materials, Physical Review B and Physical Review Research.

Dr Hari Prasad Dahal is an International Coordination Council (ICC) member of the Non-Resident Nepali Association (NRNA) for the term 2019-2021. He is the coordinator of NRNA Policy Institute By-laws Formation Taskforce. He served as the Member Secretary of the first NRN Global Knowledge Convention, 2018. He was also the Co-Chair of Skill, Knowledge and Innovation Committer, and a member of the Social Entrepreneurship Development Committee of NRNA ICC during 2017-2019. He is a lifetime member of NRNA National Coordination Council USA.

P1: COVID-19 Impact on Nepal's Economy & Path to Recovery

Coordinators:

Dr Bishwo Poudel
Economic Advisor
International Labor Organization (ILO)

Dr Bishwo Poudel is an economist with specialization in natural resources economics, labor economics, and economic history. He holds a PhD in Agricultural and Resource Economics from the University of California at Berkeley. Currently he is the Economic Advisor to the International Labor Organization (ILO) and a Visiting Associate Professor at Kathmandu University School of Management. Dr. Poudel is also a member of the Board of Director of Middle Tamor Hydropower Company (73MW). In the past, he served as a member of the Board of Director of Sanima Bank. His other past experiences include, among others, working as an economist with the Office of Millennium Challenge Nepal and advising the Vice Chairman of National Planning Commission. He has published articles in noted journals, and presented papers at national and international conferences. Dr. Poudel is one of the noted young economists in Nepal and contributes to Nepali media on economic issues frequently.

Mr Ranjeet Mahato
Fellow Member Association of Chartered Certified Accountants (ACCA), UK

Mr Ranjeet Mahato is presently working as a Group CFO in an investment company established as a holding conglomerate carrying out its activities through telecommunication, banking and real estate business in Europe, Asia, Africa and CIS Countries. He is representing as member of Board of Director in a number of telecom companies in South East Asia and East Africa.

Ranjeet Kumar Mahato is a fellow member of the Association of Chartered Certified Accountants (ACCA), UK and a member of the Institute of Certified Public Accountants of Cyprus (ICPAC). He is a Chartered Certified International Tax and also Analyst (CITA), qualified from Thomson Jefferson School of Law San Diego, USA holds certificate from the Institute of Directors (IoD), UK. Mr. Mahato holds Master's Degree in Business Administration (MBA) from European Cyprus University, Nicosia. He is in the last year of finishing off his PhD in FDI at Neapolis University, Cyprus.

Mr Mahato has more than 10 years of experience with one of the largest audit firm in Cyprus primarily dealing with M & A, structuring and re-structuring, international tax planning, corporate & fiduciary services and estate planning.

Mr. Mahato is a member of International Coordination Council (ICC), "Trade and Investment Promotion Nepal Committee" and "Financial Sustainability Committee" of Non-Resident Nepali Association (NRNA). He was the co-ordinator of Financial Investment Policy session organized under 1st Knowledge Convention in Nepal in 2018 by NRNA.

P2: Preparedness for Pandemic and Natural Disaster Risk Management

Coordinators:

Dr Drona Rasali

Director, Population Health Surveillance & Epidemiology, British Columbia Government's Provincial Health Services Authority, Canada

Dr Drona Rasali is Director, Population Health Surveillance & Epidemiology at the British Columbia Government's Provincial Health Services Authority in Canada since 2012. He served as Provincial Chronic Disease Epidemiologist with the Saskatchewan Government Ministry of Health from 2005 to 2012. He served as Government Veterinarian/ Senior Scientist in Nepal between 1980 and 1999. He has been an Adjunct Professor at the University of British Columbia since July 2020 and at the University of Regina from 2009 to 2019. He is currently the chair of Canadian Alliance for Regional Risk Factor Surveillance (CARRFS). He earned his PhD from the University of Manitoba, Canada. He is widely published in wide range of fields including public health, animal genetics, veterinary and life sciences.

Dr. Rasali was elected as the Deputy Regional Coordinator (Americas) in the Non-Resident Nepali Association International Coordination Committee (NRNA-ICC), 2009-1011 and also was the Advisor to the NRNA-ICC, 2011-2013.

Dr Puru Shrestha

President, GeoMinMet Consultants, Inc. New Mexico Institute of Mining and Technology

Dr Puru Shrestha is the president at GeoMinMet Consultants, Inc.New Mexico Institute of Mining and Technology. He is a member of High-level Committee

P3: Science, Technology and Innovation Policy Implementation

Coordinators:

Dr Uttam Babu Shrestha
Founding Director, Global Institute for Interdisciplinary Studies, Nepal

Dr. Uttam Babu Shrestha is the founding director of the Global Institute for Interdisciplinary Studies, Nepal. He earlier worked as a faculty member at the University of Southern Queensland, Australia. He has completed PhD in Environmental Science from the University of Massachusetts Boston, USA. He has received 7 international awards, 10 research grants and published ~60 peer reviewed papers including Science and Nature, a book, and hundreds of op-eds. He was a member of the Global Young Academy Biodiversity and Ecosystem Services (IPBES) from 2016-2019 and is a lead author for the assessments of sustainable use of wild species at IPBES from 2018 - 2021.

Dr Suresh Kumar Dhungel
Senior Scientist, Nepal Academy of Science and Technology (NAST)

Dr Suresh Kumar Dhungel works at Nepal Academy of Science and Technology (NAST) as Senior Scientist. He holds a Master's degree in Physics from TU, Nepal and Ph.D. in Engineering from Sungkyunkwan University, South Korea. His field of research varies from design and fabrication of solar cells to synthesis, characterization and application of nanomaterials in optoelectronic devices. He received Award from the President of the Sungkyunkwan University of South Korea for Academic Excellence in Ph.D. He is also the recipient of Mohandhoj Basnet Prabidhi Pragya Puraskar in 2007. He has co-authored 35 research articles in SCI journals. He led Faculty of Technology of NAST as the Chief of Faculty for 2 years.

P4: Research, Innovation and Commercialization
S6: Innovation and Start-ups

Coordinators:

Dr Raju Adhikari
Adjunct Professor, School of Science, RMIT University in Melbourne

Dr Raju Adhikari has 28 years of R&D experience in numerous research projects at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and working with biomedical start-up companies in Australia. He is one of the coinventors of Elast-Eon™ and NovoSorb™ biomedical platform technologies and an inventor of Sprayable bio-degradable polymer technology (Transpirational and SynFert) for Agriculture application. He holds an Adjunct A/ Professor at the School of Science, RMIT University in Melbourne and is the director of start-up company CRAM-Responsive Materials Pty Ltd. He has published 6 books chapters, over 100 papers in high impact peer reviewed journals and owns 28 patents (h index 37, Citation > 6700).

Dr Adhikari received his PhD from University of Delhi in 1986 and did post-doctoral work at CSIRO Division of Chemicals and Polymers, Australia in 1991 and University of Hohenheim 1993.

Dr Adhikari had worked in Nepal as Chief of Central Research Laboratory (CRL) from 1987-1991 and was the Vice president of Nepal Chemical Society 1990-1991. He is the Member Secretary of Science Knowledge and Technology Transfer Department (SK&TT) and Chair of Nepal Science Foundation Trust (NSFT), NRNA.

Prof Dr Rameshwar Adhikari
Executive Director
RECAST, Tribhuvan University

Prof Dr Rameshwar Adhikari studied Chemistry in Tribhuvan University (TU), Kathmandu; graduated from Martin Luther University Halle-Wittenberg, Germany; Fellow of International Union of Pure and Applied Chemistry (IUPAC) and Alexander von Humboldt (AvH) Foundation; recipient of POLYCHAR International Materials Science Prize; Technology Award of Nepal Academy of Science and Technology; a member of Science, Technology and Innovation Council at Ministry of Education, Science and Technology; founder president of Nepal Polymer Institute (NPI); founding Chief Editor of the journals *Applied Science and Technology Annals (ASTA)* and *Nanomaterials and Polymers Innovations (NPI)*; actively involved in several research and education related organizations and initiatives such as IUPAC, National Innovational (NIC) and Young Scientists Summit (YSS); served as Nepal Government's representative in Persistent Organic Pollutants Review committee (POPRC) from 2016-2019; Editor (co-)author of 150+ research papers in peer reviewed journals and 8 books; H-index 27 and i10-index 63; (co-)guided 15 PhD researchers (6 completed), served as visiting Professor at Rouen University (France), Mahatma Gandhi University (India), Kyoto Institute of Technology (Japan); research areas include polymers, biomaterials, nanotechnology, biomedical materials; currently Executive Director at RECAST/TU.

S1: Agriculture and Food Security

Coordinator:

Dr Jagadish Timsina
Honorary Principal Research Fellow,
University of Melbourne, Australia

Dr Jagadish Timsina is a globally respected agricultural scientist specialising on agronomy, soil management and agroecosystems sustainability. He has a wide range of experiences in Australia and a number of countries in Asia. He has worked with some of the world's most respected agriculture research institutes such as IRRI and was involved in collaborative activities with several others, including ILRI, CIP, and ICRISAT, and World Agroforestry Centre. He acted as Consultant at International Maize and Wheat Research Centre (CIMMYT) in Bangladesh. He has led a number of research projects on crop modelling, soil and plant nutrients, food security, and sustainable agricultural intensification, to name a few. He has served as a senior research fellow at the University of Melbourne, and continues to be associated with the University as an honorary Principal Research Fellow. He also holds an Adjunct Professor position with Agriculture and Forestry University in Nepal. He has published over 140 scientific papers and sits in the editorial boards of Agricultural Systems, Agronomy Journal, Global Journal of Agriculture and Allied Sciences, EC Nutrition, and Cambridge Scholars Publishing. He has also worked with CSIRO and ACIAR in Australia on various projects related to agriculture, water and nutrient management. With extensive field works experiences in Australia, The Philippines, Nepal, India, and Bangladesh, Dr Timisna brings an applied, problem-solving and community-driven research and innovation expertise critical to achieve Sustainable Development Goals on reducing hunger and terrestrial sustainability. Last but not least, he is an active academics contributing to higher and vocational education sectors in Australia.

S2: Biomedical Technologies

Coordinator:

Dr Devi B. Basnet
Senior Scientist, Medytox, Inc.
South Korea

Dr. Devi B. Basnet has been working for more than14 years as a senior scientist for a global biopharmaceutical company namely Medytox, Inc. He also got postdoctoral training at Ewha Woman University from 2006 to 2008 after his graduation in 2005. He has a dozen of national and international journals publication in his field of research. His main interest and research field is on genetic engineering and protein therapeutics development including antibody production and processing. He has good teaching experience in various colleges in Nepal after his master in organic chemistry from Tribhuwan University. He has a keen interest in the initiation and running of various projects for the welfare of the public and developing a various research institute in Nepal. He was the founder vice-president of SONSIK and NRNA-South Korea. He served as a national coordinator of NRNA-South Korea and then served as NRNA-ICC representative from South Korea for two tenures and currently, he is also the NRNA-ICC South Korea representative. He was the board of directors and then current president of BRICK Investment Pvt. Nepal. He was the Board of directors of RIBB (Research Institute of Bioscience and Biotechnology) and currently involved in various research activity of RIBB. He worked as the initiation of Open University initiated by NRNA in the past and played the important role in SKI committee and initiation of the first global knowledge convention in2018.

S3: Financial Investment

Coordinator:

Mr Anal Raj Bhattarai
Senior Banker, Nepal

Mr Anal Raj Bhattarai is a Chartered Accountant qualified in May 1995. Since then, he is involved in Banking, Corporate Advisory, and Policy advocacy. Bhattarai, has wide array of practice areas ranging from foreign investment and establishing Bank.

Over the years, ARB has established three Banks and served as Founding Chief Executive Officer of Commerz and Trust Bank Nepal Ltd, Sanima Bank and Founding General Manager of Clean Energy Development Bank. Bhattarai has served Nepal Bank Limited as Chief Manager.

Bhattarai is a National Council Member of Confederation of Nepalese Industries (CNI) and Convener of Banking and Finance Committee of CNI. His engagement includes policy dialogue and negotiation with government and regulators. Currently Bhattarai works as Senior Financial Sector consultant at different National and International organization. Bhattarai is a Certified Trainer of Microfinance (MFTOT).

In addition to this, he is instrumental in suggesting and advocating various policy reform. He also strongly believes in knowledge sharing and disseminating knowledge to the business fraternity and stakeholders, through academic presentations and publications.

Mr Ranjeet Mahato
Fellow Member Association of Chartered Certified Accountants (ACCA), UK

S4: Fintech for Economic Transformation

Coordinator:

Mr Lok Raj Sharma
Managing Director
Nepal Payment Solution Pvt. Ltd

Mr Lok Raj Sharma is a Social Entrepreneur, originally from Jumla, Nepal and working as an entrepreneur in several organizations. He has Master's Degree in International Business Management from De Montfort University in UK.

Currently, Mr Sharma is working as a board of director in Reewire International ApS which is a fintech company running in 16 countries. Besides that, he is operating International Trading IVS, Itoffer.dk and Woolliving.com in Denmark.

In Nepal, he is working as a Managing Director of Nepal Payment Solution Pvt. Ltd; which is a payment service operating (PSO) company with a strong vision of becoming a leading payment hub in Nepal. He is involved as a board of director in Builder 360 Nepal Pvt. Ltd; a construction and real estate company, board of director in Nepal investment fund Pvt. Ltd; founder and board of director of NRN Laghubitta Bittiya Sanstha Ltd. (D grade Bank), chairperson at Lower Mid Rawa Khola Hydropower Project Pvt. Ltd. He is also leading and representing Nepalese entrepreneur in Scandinavia and Asian region.

He is working as a chairperson for social entrepreneurship development committee in NRNA. He is a founder president of Ropni Youth Club, Nepal.

S5: Information and Communication Technology

Coordinator:

Dr Gyanendra Prasad Joshi
Assistant Professor, Departement of Computer Science and Engineering, Sejong University, South Korea

Dr Gyanendra Prasad Joshi is an Assistant Professor at the Department of Computer Science and Engineering at Sejong University, South Korea. He worked at Case School of Engineering, Case Western Reserve University, Cleveland, OH from March 2018 to February 2019 as a visiting assistant professor. From March 2012 to February 2018, he worked as an assistant professor in the Department of Information and Communication Engineering at Yeungnam University, Gyeongsang buk–do, South Korea. In August 2017, he was appointed as an honorary ICT consultant at the Department of Information Technology, Ministry of Science and Technology, Government of Nepal. He received a PhD degree in information and communication engineering from Yeungnam University in February 2012. He worked in Minigate co. ltd., South Korea as an IT manager after he graduated from Ajou University in February 2007. He received KRF scholarship and ITSP scholarships from the Korean government for his MS and PhD studies, respectively. He received the best research paper presentation award in ICSEM-2020, Bangalore, India. He is a senior editor of the international journal of information communication technology and digital convergence (IJICTDC), an editorial board member of The Far East Journal of Electronics and Communications (FJEC), and JP Journal of Heat and Mass Transfer (JHMT). He served as a conference chair of INCT-2012, session chair of FTRA-AIM 2012, ICIDB-2015-2019, ICACCI-2016-2020, and committee member of many conferences. He successfully organized many conferences, including ICTMHC-2016, ICACCI-2015-2020, and ICIDB-2015-2019. He presented his research results in many conferences around the world. He has more than 70 research articles published in books, international journals, and international conferences as a first or corresponding author. His main research interests include UAV localization, MAC, and routing protocols for next-generation wireless networks, wireless sensor networks, cognitive radio networks, RFID systems, IoT, smart city, deep learning, and digital convergence.

S7: Intersection in Natural Sciences

Coordinators:

Dr Tara Sigdel
Associate Professor, University of California San Francisco (UCSF) in California, USA

Dr Tara Sigdel, Ph.D.**,** is an Associate Professor at University of California San Francisco (UCSF) in California, USA. He is a chemist and a biochemist by education and a translational researcher in disease diagnostics and biomarker discovery and immunology by training. Dr. Sigdel got his postdoctoral training at Stanford University, USA where he was involved research in identifying kidney transplant dysfunction and acute rejection and other human diseases such as IgA nephropathy and Moyamoya disease. As a researcher Dr. Sigdel has more than 80 publications and has more than 10 scientific patents. Currently he is funded through NIH to work on kidney transplant research and kidney injury related to COVID-19 disease. Dr. Sigdel received Ph.D. in Biochemistry from Miami University, USA. He has M.Sc. education from Tribhuvan University.

Dr. Sigdel serves as the Chair of Science, Technology and Innovation Committee of NRNA NCC USA. Also serves as a champion for health and medical/health field of the Nepal Science Foundation Trust (NSFT) Board. He coordinated the National Knowledge Convention 2020, organized by NRNA NCC USA.

Dr. Sigdel got his school education and up to B.Sc. level education in Pokhara. Before coming to USA, Dr. Sigdel was a chemistry teacher at Budhanilkantha School and lecturer at Tri-chandra College.

Prof Dr Narayan Adhikari
Professor of Physics
Tribhuvan University Kirtipur Kathmandu

Narayan Prasad Adhikari, Ph.D., is Professor of Physics at Tribhuvan University Kirtipur Kathmandu. He has been teaching physics at Central Department of Physics Tribhuvan University from 1996 AD. He was appointed as a lecturer (Assistant Professor) in 1997. He was promoted to Associate professor of physics in 2009 and professor in 2015. He is a Senior Associate Member of The Abdus Salam International Center for Theoretical Physics Trieste Italy.

Dr. Adhikari obtained M. Sc. in physics (with distinction, Gold Medalist) in 1996 from Tribhuvan University Kirtipur Kathmandu. He did Post Graduate Diploma in Condensed Matter Physics from The Abdus Salam International Centre for Theoretical Physics Trieste Italy during 1997-1998. From 1998 to 2001 he studied at Martin Luther University Halle/Saale Germany to obtain Ph.D. in natural science (Physics). He worked as a postdoctoral researcher at Rice University Texas USA during 2001-2002. Further he worked at Rensselaer Polytechnic Institute New York USA from 2002 to 2004 as postdoctoral fellow. He carried out his third postdoctoral study/research at Max Planck Institute for Polymer Research Mainz Germany during 2004-2005.

S8: Life and Health Sciences

Coordinators:

Dr Drona Rasali

Director, Population Health Surveillance & Epidemiology, British Columbia Government's Provincial Health Services Authority, Canada

Dr Archana Amatya

Senior Technical Advisor, Save The Children, Nepal

Dr Archana Amatya is an Obstetrician & Gynecologist and a Public Health specialist. Her main interests are Reproductive Health & Maternal and Newborn Health. She has been working in this arena for two decades. She was working with the Institute for Medicine for 20 years, at present is the senior Technical Advisor at Save The Children, Nepal.

Dr Saroj Niraula

Medical Oncologist
Cancer Care Manitoba

Dr Saroj Niraula is a Medical Oncologist at Cancer Care Manitoba, an Associate Professor of Medicine at University of Manitoba, and a Scientist at the research institute of oncology and hematology, Cancer Care Manitoba. His clinical practice primarily involves treatment of solid organ malignancies at Cancer Care Manitoba where he also chairs the provincial breast disease site group. His research interests include cancer policy, clinical trial methods, global oncology, and cancer drug regulation. Dr Niraula oversees the review and approval of new cancer drug in Manitoba and has published extensively in high-impact peer reviewed medical journals. Dr Niraula's efforts in cancer research and contributions to the international community have earned him significant recognitions such as Merit Awards from the American and European Societies of Medical Oncology, Young Investigator Awards, Manitoba future 40 below 40, and top 25 Canadian Immigrants Award. In addition to training new generation of Canadian Oncologists, he has actively volunteered to mentor many cancer doctors from low-and-middle-income countries via different forums.

S9: Physical Infrastructure Development

Coordinators:

Mr Ratan Jha
USA

Mr Ratan Jha graduated with a Master's degree in Civil Engineering from University of Oklahoma (OU), Norman in 1994. He is a registered professional engineer (P.E.) in the State of Texas, and is also a businessman. Currently, he has businesses in the areas of construction and real estate development in the USA and Nepal. He is the founding President of Association of Teraian in America and has served as the General Secretary and Advisor of Non-Resident Nepali Association International Coordination Council.

Satish Tripathi, P.E.
Managing Engineer (Water Infrastructure Planning Lead), City of Houston, TX, USA

Satish Tripathi, P. E., a professional engineer and Ph. D. candidate in Water Resource Engineering who is working as a Managing Engineer (Water Infrastructure Planning Lead) in City of Houston, TX, USA. He has over 14 years of experience in water and wastewater infrastructure modelling and planning. He has extensive involvement in the process improvement, digital transformation and Smart City Initiatives. He is serving as a steering Committee Member of "Unified Geospatial Services Steering Committee" and co-chair of Science, Technology & Innovation Task Force of NRNA USA.

S10: Public Health and Pandemic Mitigation

Coordinator:

Dr Sanjeeb Sapkota
Medical Epidemiologist
Atlanta, USA

Dr. Sanjeeb Sapkota is a Medical Epidemiologist and has been working for public health for the past 20 years. After graduating from Tribhuwan University as a medical doctor, he worked in World Health Organization (WHO) for several years, and since then has been working in a number of other public health agencies including Georgia Department of Public Health. He has been the president of several national and international organizations and has served as a consultant to ministry of health of several countries in Europe, Africa and Asia. He has published several books including on pandemic. Currently he is the chair of the Health Committee of Non-Resident Nepal Association. He lives with his wife and two sons in Atlanta, in the United States.

S11: Social Sciences

Coordinator:

Dr Krishna Adhikari
Research Fellow
University of Oxford

Dr Krishna Adhikari is a Research Fellow at the University of Oxford, where he has been (co-) leading a number of social science research projects, mainly on Nepal or the Nepali cultural world since 2010. He is currently Co-investigator on a British Academy-funded project, 'The Dalit Search for Dignity', in (mid and far) Western Nepal. He is a founder of UK-based think tank, Centre for Nepal Studies UK, and currently the Chair of Britain-Nepal Academic Council. His research interests include: caste and ethnic relations and identity politics; education, employment, and social mobility; migration and diaspora communities; social capital and community-based institutions; international and rural development; collective action and the governance of natural resource management.

S12: Sustainable Energy

Coordinator:

Dr Binayak Bhandari
Assistant Professor
Woosong University, South Korea

Dr. Binayak Bhandari is an Assistant Professor and Department Chair of the Department of Railroad Engineering and Transport Management at Woosong University, Daejeon, Korea. He received his B.S. degree in Mechanical Engineering from Kathmandu University, Nepal, M.S. degree from Myongji University, Korea. Dr. Bhandari received the most prestigious Korean Government Scholarship for his Ph.D. in Mechanical and Aerospace Engineering from Seoul National University, Korea. He has actively contributed in the field of renewable energy systems design, smart materials, appropriate technology, advanced machining, design and optimization of railroad systems, machine learning and deep learning. Dr. Bhandari is also a pioneer of tri-hybrid renewable energy systems comprising hydro-wind and photovoltaic systems. Dr. Bhandari has published almost two-dozen research articles in many top international journals, majority as first or corresponding author, including in 'Applied Energy'. In addition he has written almost a half-dozen books and book chapters. At various times, Dr. Bhandari has received numerous international reputed awards including, the best teaching award, excellent oral presentation award, ministry award, and university president awards.

Dr. Bhandari has participated in numerous international conferences around the globe as a presenter and organizer and has given talks and seminars on national and international conferences.

S13: Sustainable Environment

Coordinator:

Dr Gopi Upreti
Professor, Tribhuvan University, Nepal

Prof Gopi Upreti voluntarily retired from Tribhuvan University in 2007 after 30 years of teaching at Institute of Agriculture and Animal Science (IAAS), Rampur. He served in various positions at IAAS as Chair of the Department of Horticulture, Chair of the Department of Agriculture Statistics and Campus Chief, supervised graduate students and served in the research and journal committee. Dr Upreti also served as the Chief Commissioner of Nepal Agriculture Research Council (NARC) and Advisor to the Environmental Protection Council (EPC) of government of Nepal. He has written books in Agriculture, Environment and Development issues. He has published dozens of research articles on Agriculture, Environment and Sustainable Development in national and international referred journals. Professor Upreti is the recipient of the Best Paper Award on his paper entitled "Environmental Conservation and Sustainable Development Require a New Approach" published in the Journal of Environmental Conservation, Vol. 21(18-29) by Switzerland based International Foundation of Environmental Conservation. Professor Upreti served in the editorial advisory board of The New Encyclopedia of Unbelief published by Prometheus Books, New York. He was the editor in-chief of the English magazine Humanist Voice published from Kathmandu, Nepal. Currently, Prof. Upreti is the Senior Data Scientist at ManTech International Corporation.

S14: Sustainable Urban Development

Coordinators:

Dr Ambika Adhikari
Principal Planner
City of Tempe, AZ, USA

Ambika P. Adhikari, DDes, is a Principal Planner at City of Tempe, AZ, USA heading its long-range planning division. He is also a Sr. Sustainability Scientist and frequent Faculty Associate at Arizona State University (ASU). At ASU, Dr Adhikari earlier held the positions of Research Professor at the School of Geographical Science and Urban Planning (2014-16), and Program and Portfolio Manager (2012-16). He was the Director of International Programs at DPRA Inc. in Toronto and Washington DC. His work included providing consulting services to various international projects funded by the World Bank, North American Development Bank, and Canadian International Development Agency (CIDA).

In Nepal, he was Associate Professor (Reader) at Institute of Engineering, Tribhuvan University, and later, Country Representative of IUCN (International Union of Conservation of Nature). He is a Fellow of American Society of Nepalese Engineers, Member of American Institute of Certified Planners, a certified LEED (Leadership in Energy and Environmental Design) Accredited Professional, and Project Management Professional (PMP).

He received Doctor of Design degree from Harvard University and Master of Architecture from the University of Hawaii. He was a Fellow at Special Program for Urban and Regional Studies (SPURS) at Massachusetts Institute of Technology.

Dr. Adhikari has authored one, and co-edited five books related to planning, environment and development. He has published several journal articles, reports and write ups in newspapers. He has professional experience in more than a dozen countries. He is active in many community organizations in North America and globally.

Ar Kishore Thapa
Chairperson
SAARC Association of Architects (SAARCH)

Ar Kishore Thapa, is the former secretary of the Government of Nepal with 32 years of experience in the civil service. He joined the civil service in 1983 as an Architect in the then Department of Civil Aviation. He also served as the Director General of the Department of Urban Development and Building Construction (DUDBC), Secretary in the Ministry of Urban Development, Ministry of Education, Ministry of Tourism and Civil aviation, Election Commission and Water and Energy Commission. He served for 32 years before retiring in 2014.

He has a bachelor's degree in architecture from Calcutta University and master's degree in urban planning from School of Planning and Architecture, New Delhi. He studied urban redevelopment and affordable housing in the Rutgers University, New Jersey, USA as a Humphrey Fellow. He has led Nepalese delegations in international dialogues, meetings and workshops.

Immediately after the devastating earthquake on April 25, 2015, he was appointed a Senior Adviser to the National Planning Commission for preparing the Post Disaster Needs Assessment (PDNA) and drafting the Post Earthquake Rehabilitation and Reconstruction Policy. Currently, he is one of the three Expert Members in the Steering Committee of National Reconstruction Authority (NRA).

Ar Thapa is the past president of the Society of Nepalese Architects (SONA), Immediate Past President of Nepal Association of Humphrey Fellows and currently he is the Chairperson of the SAARC Association of Architects (SAARCH).

S15: Vocational Education

Coordinators:

Dr Uttam Gaulee
Associate Professor at Morgan State University, USA

Dr Uttam Gaulee is Associate Professor at Morgan State University, USA. His research interests include the community college, diaspora studies, interdisciplinary perspectives on education policy, global citizenship, and cross-cultural issues in international development and geopolitics. An associate professor in the Community College Leadership Doctoral Program at Morgan State University, Dr. Gaulee is an advocate of community college as a vehicle for social progress and economic development in and beyond the U.S. He recently edited a volume on Global Adaptations of Community College Infrastructure. Dr. Gaulee has devoted two decades of his academic and professional life promoting solutions related to student success, workforce development, and institutional effectiveness. While serving in increasingly higher capacities of the Community College Futures Assembly and Bellwether College Consortium between 2013 and 2016, he collaborated with multiple national commissions and affiliated councils of the American Association of Community Colleges (AACC) to evaluate and promote best practices among community colleges and hosted national policy summits on workforce development, reverse transfer, and talent pipeline management. A recipient of the Fulbright (2010) and Cross Award (2016) from the Association of American Colleges and Universities, Dr. Gaulee is actively involved in promoting and developing Technical and Vocational Education and Training (TVET) sector in various developing countries. Dr. Gaulee serves as president of the Society of Transnational Academic Researchers (STAR), which advances global social mobility through innovative research and progressive advocacy efforts. Recently, STAR network is contributing to the quality enhancement initiatives at universities in the Global South.

Dr Uma Pradhan
EC Research Fellow,
University of Oxford, UK

Dr Uma Pradhan is EC Research Fellow at University of Oxford, UK. Her research explores the issues of education inequality, education governance, public provisioning of education, and minority language education. She teaches on graduate programme on Modern South Asian Studies, and convenes the course 'Education, state and society in South Asia'. She also contributes to the Core course in South Asia, History & Politics of South Asia, and Anthropology of South Asia. Uma received her PhD in Development Studies from University of Oxford. This doctoral thesis has been published by Cambridge University Press. She received the Dor Bahadur Bista prize 2015 and Nations and Nationalism prize 2018 for the articles based on this research. Prior to this, she was a Postdoctoral Research Fellow at the Department of Education Anthropology, Aarhus University, Copenhagen. Her research at Aarhus the ways in which social assistance for education, in its attempt to address inequalities faced by marginalised groups, shapes the relationship between state and citizens. This research is published as a special issue in *South Asia: Journal of South Asia Studies*. She continues to develop papers on inequalities in education systems, drawing on ethnographic fieldwork in Nepal, in peer-reviewed journals on education such as *Compare: Journal of International and Comparative Education*, *Ethnography and Education*, *Oxford Research Encyclopaedia on Educatio*n as well as such area studies journals as, *South Asia: Journal of South Asian Studies*, and interdisciplinary journals such as *Nations and* Nationalism. Before joining academia, Uma worked in the development sector for several years and consulted for UNICEF and World Bank.

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