2nd NRN Global Knowledge Convention 2020

SUMMARY AND RECOMMENDATIONS

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2020

Summary and Recommendations

Non-Resident Nepali Association (NRNA)
Kathmandu, Nepal

This report is submitted to the Government of Nepal, National Planning Commission, Provincial Governments, and Research and Educational Institutions of Nepal.

23 January 2021

FOREWORD

Knowledge economy imposes new demands and imperatives. To achieve a sustainable competitive advantage today means to achieve primacy in knowledge. Therefore, it is not surprising that the move towards knowledge-based competitive advantage has become an imperative, not only for individuals, but also for organizational and national strategies.

2nd NRN Global Knowledge Convention with the theme *"Diaspora for Innovation and Prosperity in Nepal: Post COVID-19 Scenario"*; aimed at presenting the great importance of knowledge as vital strategic resources for development was very well coordinated and successfully organized due to the resilience, relentless efforts, the dedication and teamwork of the scientific committee; even during the COVID-19 pandemic. The convention was flawlessly organized; virtually, amalgamating the Sustainable Development Goals set by the United Nations and the 15th five-year plan of the National Planning Commission of Nepal to shape its objectives and goals.

I believe that the Convention has highlighted knowledge as product and tried to blend it with constant innovation, the necessity of managing intangible assets, and the free flow of knowledge through knowledge sharing in overarching themes such as In-house Innovation for Societal Changes; Science, Technology & Innovation Policy, Startups and Commercialization and Digitalized Economy. The Convention not only sought to provide knowledge that adds value but special attention was paid to the concept/s of knowledge management focusing on right knowledge at the right place at the right time that provide competitive advantage.

This Convention provided a great platform to meet and exchange ideas with the intellectuals from Nepal and Nepali Diaspora around the globe. I believe that the focus was to work at bridging the gap between Nepal's development needs and the knowledge pool of the Nepali Diaspora that enable our strategic partners to tap into the knowledge pool of the Nepali Diaspora experts and hold dialogue on the challenges and opportunities.

I humbly thank the scientific organizing committee, the presenters and panelists for their insightful and evocative deliberations and sacrificing their valuable time in preparation and convening this convention. I also would like to thank the Brain Gain Center of MOFA, National Planning Commission, Kathmandu University, the NRNA secretariat staff and all that have contributed in making this Convention fruitful. Finally, I thank the Chair, Co-chair and all intellectuals involved in preparing this Position Paper on the 2nd NRN Global Knowledge Convention.

This Convention will only be meaningful when we are able to involve and work together with all the stakeholders; including the Nepal Government and the declaration of convention are given due importance during implementation.

Sincerely,

Kumar Panta
President
International Coordination Council,
Non-Resident Nepali Association

PREFACE

We are delighted that despite the insurmountable obstacle created by the COVID-19 environment, the Non-Resident Nepali Association successfully completed the organization of the 2nd NRN Global Knowledge Convention (2ndNRNGKC) on 9-11 October 2020 in all online format. A short outcome report was released right after the conclusion of the convention; here we share a full report with a more comprehensive summary, recommendations and plan of action from the four plenary and fifteen symposium sessions. In addition, prior to organizing 2ndNRNGKC, NRNA organized Regional Conferences in Oceania, Asia Pacific, Europe and Americas Regions, and this document has also incorporated the outcome of these conferences.

Through the organization of the first and second conventions, NRNA has shown confidence that it can effectively collate the skill, knowledge, expertise and experience of Nepali Diaspora, and channelise them to support Nepal move towards knowledge-based economy. It has demonstrated that it can efficiently collaborate with all stakeholders of Nepal, including the Ministry of Education, Science and Technology, National Planning Commission, Nepal Academy of Science and Technology, Provincial Governments, Local Governments, Public and Private Universities, Research Centers, Private Sectors and Industries, Policy Makers, Academicians, Educationists, Entrepreneurs and students. Moving forward, NRNA intends to expand the scope of this convention and its reach, and start directly collaborating with these stakeholders for greater outcomes.

We believe that the actual impact of this convention will be measured by the extent to which its recommendations are implemented in the fabric of the development of Nepal. We request the government of Nepal to seriously consider integrating these recommendations in its short- and long-term development plans as much as possible. NRNA is committed to play its role in facilitating such implementation at the Federal level to the local levels.

The organizing committee is thankful to all convention contributors: session chairs, session moderators, invited speakers, talks and poster presenters. It was a pleasure to collaborate with the NRNA Secretariat office, especially the IT department; without its support the convention would not have flowed seamlessly.

Dr Hem Raj Sharma
Conference Chair
On Behalf of the Organizing Committee

EXECUTIVE SUMMARY AND RECOMMENDATIONS

Encouraged by the success of the first convention and the enthusiastic support received from the Government of Nepal, NRNA organized the 2nd NRN Global Knowledge Convention from 09-11 October 2020. Similar to the first one, this convention was co-organized with the Government of Nepal. Prime Minister of Nepal the Rt. Honorable KP Oli inaugurated the convention on 09 October 2020. The Honorable Foreign Minister Pradeep Gyawali and other dignitaries addressed the inauguration session. In the current context of the COVID-19 pandemic, the entire convention was organized in all online formats.

Unlike the location of the first convention, we had decided to move the 2ndConvention venue from the expensive five-star hotel to premises of educational institutions. We had received unconditional support from Kathmandu University to organize the 2ndConvention 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 1stConvention, we expanded the scope of this Convention and its horizon through direct collaboration with crucial stakeholders of Nepal such as the Ministry of Foreign Affairs, Ministry of Education, Science and Technology, National Planning Commission of Nepal, Nepal Academy of Science and Technology, Educational Institutions, Private Sectors and Innovators. This direct collaboration is expected to reduce the barrier for implementing the recommendation of the 2ndConvention.

Unprecedented COVID-19 pandemic hit us in the middle of the preparation for this convention. Due to the resilience, relentless efforts and courage of the scientific steering committee, we collectively rise to the occasion and move forward to organize the event. The challenges brought by the COVID-19 pandemic and opportunities associated with it was made one of the central themes of the Convention. The convention also used Sustainable Development Goals set by the United Nations and the 15th five-year plan of the National Planning Commission of Nepal to shape its objectives and goals.

The focus of the convention was guided by four overarching themes:

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

The convention was organized in four plenary sessions, fifteen symposium sessions and three special sessions. A total of 210 papers were presented and 90 experts commented on the papers. The presentations were delivered over 80 hours. Twenty-Five experts from the international scientific community from sixteen countries and diaspora experts from thirty countries presented their papers. Experts from several ministries of Nepal, such as, Ministry of Foreign Affairs, Ministry of Science, Education and Technology, Ministry of Finance, Ministry of Women, Children & Senior Citizen, Ministry of Health and Population, Ministry of Agriculture & Livestock Development, Ministry of Energy, Water Resources and Irrigation, Ministry of Forest and Environment, and Ministry of Urban Development contributed to the convention. Similarly, experts from the World Health

Organization, International Labor Organization, Asian Development Bank and World Food Program also contributed to this convention.

Prior to the 2ndNRN Global Knowledge Convention, four regional knowledge conferences were organized in Oceania, Asia Pacific, Europe and Americas regions.

The detailed reports of the global knowledge convention and regional conferences will be submitted to the Government, and archived on the Convention webpage. A quick review, summary, and recommendations of the convention are presented as follows.

1. With Covid19, the ability of the government of Nepal to spend has been reduced and there is a real likelihood that many people will be pushed into extreme poverty. It has become imperative to mobilize local, diaspora, and foreign investments to meet our Sustainable Development Goals.
2. Covid19 crisis may bring opportunities in the long run via raised awareness, technical improvement including in the Information Communication Technology sector, decentralization and reverse brain gain, among others. A research environment friendly to the returnee diaspora professionals will help speed up the brain reversing process.
3. Covid-19 has highlighted various gaps in the healthcare system, especially regarding surveillance, quarantine, contact tracing, coordination and capacity of healthcare facilities. Restructuring of the health care system with the formation of the Public Health Department at the Federal and Provincial levels is recommended.
4. The Covid-19 pandemic exposed that Nepal is not prepared to deal with the magnitude of the problems and the suffering that migrant Nepalis face, including the GCC countries. A disaster preparedness framework needs to be drawn up and preparations made in relation to foreign labour migration, so that there is no confusion when disasters such as the COVID pandemic strike. Risk reduction strategies need to be incorporated into migration planning, such as diversifying destinations, improving the skills of migrants so that they are not unemployed and have the possibility of self-employment on return to Nepal. Enhancing the position of local government by equipping them with resources and capacities in responding to challenges faced by the migrants including facilitating their mobility.
5. NRNA is responding to mitigate the pandemic crisis through the formation of a High-Level Committee on Coronavirus Pandemic Mitigation Response. It is recommended to form a permanent high-level disaster management structure and mitigation funds to fight against current and future disasters.
6. Rapid Medical Team within the Health Committee of NRNA has played a critical role in several previous disasters and is ready to be deployed in future disaster areas within 24 hours.
7. Patenting innovation is a very important tool for sustainable development especially for least developed countries and young entrepreneurs. Nepali innovators are recommended to start collaborating with diaspora and international experts who have successfully registered patents to get guidance in this direction.
8. Resident Nepali entrepreneurs and returnee professionals are looking for opportunities to establish startups and commercialize their inventions. There is a strong need that the Government and NRNA set up funds to promote innovation and commercialization. NRNA should also collaborate with private sectors for for-profit innovation and commercialization endeavors.

9. Food security is one of the serious challenges facing Nepal. Agriculture policies need to promote cost- effective technologies to increase yield. Returnee migrants should be encouraged to play a crucial role in food production. Underutilized and indigenous species of crops, livestock, and fruit needs to be conserved using community seed banks and dry chain technologies.

10. Digitalization helps developing countries like Nepal to achieve sustainable development goals. However, Cybercrime has become a serious issue. The Nepal Government should form an integrated national research and action center to counter cybercrime. Diaspora IT professional can help enhance cyber breach countermeasures in Nepal. Since the process of digitalization is inescapable, the Nepal Government should introduce ICT-based national development curriculum in school education.

11. The internet cost is much higher for the people living in Nepal's remote areas. Return on investment for private sector involvement is not encouraging. The government and NRNA need to invest in this sector to decrease the digital divide.

12. The 7th goal of the United Nations' Sustainable Development Goals emphasizes on ensuring access to affordable, reliable and sustainable energy for all by 2030. To achieve this goal, Nepal too is taking initiatives for power generation by switching to clean energies. Though the emphasis is on renewable energies, dependence on biomass and imported petroleum fuels is not reduced. There is an urgent need to focus on increasing per capita electricity consumption in various service sectors. Nepal currently faces massive energy losses that can be addressed by using Smart Grids. For a successful smart-grid program, initiatives must be prioritized at the policy, regulatory, industry, institutional, and standardization level. Innovative business models using a public-private partnership should be explored. Nepal should also develop capability on Information Technology applications and system integration.

13. Nepal faces unique challenges in designing science-based sustainable stewardship of natural resources. Nepal needs to adopt an integrated development planning approach to replace the current sectoral development planning to leverage the synergy generated by available natural resources. A rapid high economic growth at the cost of environmental degradation and resource depletion will be suicidal in the long run. This necessitates the integration of environmental ethics into the development framework to achieve the United Nations' sustainable development goals. Environmental education and community awareness programs at schools and community level are critically important to motivate citizens participation in environmental management.

14. Domestic investment alone is not enough to regain the pre-COVID economic growth and to realize the aspired double-digit growth rate in Nepal. Foreign and diaspora investment needs to be immediately channelized to refuel Nepal's economy. Nepal needs to revise its financial policies to catch up with the pace of FinTech development and adoption in other economies.

15. Due to COVID-19, economic growth is estimated to contract in the Fiscal Year 2020-21. A belief in science is the only solution to today's impacts on poverty levels. Nepal's revised Science, Technology and Innovation Policy has envisioned scientific and technological interventions necessary in different sectors. Rapid implementation of this policy can help to fulfill the sustainable development goals.

16. Biomedical science and technology are advancing the delivery of high-quality health care. Unfortunately, most of the research and innovation in this area is pursued in a developed economy, and the resulting technologies are very expensive. There is a unique opportunity for emerging economies like that of Nepal in doing research and innovation in the local market so that the cost will be lower and increase the affordability.

17. The current urban growth in Nepal is mostly happening without adequate infrastructure capacity. Good governance, planning tools and mechanisms must be developed to achieve sustainable urban development. Community involvement should be strengthened. International best practices in urban governance can be reviewed for possible application in Nepal. Elements of smart city approaches should be adopted by the Nepali cities.
18. Resident Nepali and Non-Resident Nepali Experts need to come together for networking, knowledge- sharing, and collaboration on a regular basis. Such Knowledge sharing can facilitate the aspiration of Nepali citizens for knowledge-based economic development.
19. NRNA should take initiative to the development of end-of-life (palliative) carein Nepalas a continuation of Briddha Ashram (Abode for Elderly) Program initiative which was started in the beginning years of NRNA activities.
20. Expanding education opportunities to technical and vocational education and training schools will support citizens in continuous learning, elevate productivity through training, and bring light to the transformative potentials of our human and natural endowments. When countries seek to redefine their education, the idea of community colleges offers a powerful connective solution to building a strong community, industry, and national economies. The future is wide open for Nepali education, and we must seize it.
21. NRNA will immediately start collaborating with the National Planning Commission, Nepal Academy of Science and Technology, Labor Bank and Brain Grain Center. A Memorandum of Understanding will be signed with the Policy Research Institute of Nepal to conduct research on evidence-based policy formation.
22. The outcome of the convention and its recommendations need to be integrated into the planning, policy-making, networking, research, education, innovation, and commercialization. NRNA needs a well thought out mechanism to do so. We recommend NRNA to use the Skill, Knowledge, and Technology Transfer Department to take a lead in collating the enthusiasm of Diaspora experts and feed that into different levels of government, institutions, and private sectors.
23. Nepal should officially recognize the need for and benefits of plurality in HEI education and research, i.e. the coexistence of different types of institutions, both public and private. Increasing political interference has had a very deleterious effect on public universities. Mechanisms need to be developed that will enable universities to become fully autonomous bodies able to control their own appointments at the departmental level. There should be two national research councils, one for natural science and the other for social science and the humanities.
24. Tremendous amount of knowledge was created through the regional conferences.

    NRNA commits to continue knowledge exchange at the regional levels.

The convention was the outcome of an estimated minimum of 5000 hours of voluntary work of the scientific steering committee. We sincerely hope that NRNA and the Government of Nepal will take the recommendations seriously and try to implement them in the times to come.

Organizing Committee
2nd NRN Global Knowledge Convention 2020

CONTENTS

1 Background

Following the grand success of the 1st NRN Global Knowledge Convention 2018 in Kathmandu, the Non- Resident Nepali Association (NRNA) organized 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 was 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 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 used 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 discussed its socioeconomic impact on diaspora and resident Nepalis, and the challenges and opportunities it has brought in Nepal and around the world. The convention 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 was organized all online.

The focus of the convention was guided by four overarching themes:

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

The convention covered 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 was organized in three parts: Inauguration, Plenary & Symposium sessions. The convention was inaugurated by the Honorable Prime Minister of Nepal Mr KP Sharma Oli on 09 October 2020. It was addressed by the Foreign Minister of Nepal Honorable Mr Pradeep Kumar Gyawali. It was also addressed by the President of NRNA Mr Kumar Panta, and Past Presidents of NRNA. The inaugural session featured a keynote speech from internationally recognized expert on science and technology (S&T) research and policy formulation 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, addressed plenary sessions.

The Convention covered 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

In what follows, we present the summary, recommendations, plan of action and contributors of this convention.

2 Reports on Plenary Sessions

2.1 COVID-19 Impact on Nepal's economy and Path to recovery

Executive Summary

COVID-19 has impacted Nepal's economy especially in the tourism industry, as well as in the hospitality and service sectors; it has also affected negatively employment and exports. However, it has also opened up opportunities in other sectors such as agriculture, energy, infrastructure, health and light industries and focused attention on science, digital technology and innovation. The session focused on how Nepal's economic policies ought to change to reduce the economic impact of this and similar future disasters; more specifically, on how to support economic recovery, maintain financial stability and protect fiscal sustainability, while at the same time restoring business confidence to increase employment and productivity. This session was organized in collaboration with the National Planning Commission of Nepal.

1. In the plenary session, the keynote speaker noted that the Sustainable Development Goals (SDGs) were ambitious requiring large investments, even in the absence of Covid19. With Covid19, the ability of the government of Nepal to spend has been reduced and there is a real likelihood that many people will be pushed into extreme poverty. He believed agriculture, manufacturing, infrastructure, energy and information technology will be the major drivers for reviving the economy post Covid19. He hoped for collective efforts of the government, private sector, civil society, and the diaspora in meeting the SDGs.

2. Similarly, the speaker for the Invited Presentation, used the results of the recently concluded survey to show that, while many experts believed Covid19 would negatively affect Sustainable Development Goals (SDGs) in the short term, they also believed the crisis may help meet many of the SDGs in the long term. Short term impacts will be felt through channels such as slowdown of the economy, dilution of funds for the goals, underemployment or unemployment, disturbances to supply chains and other usual services, travel restrictions, and reduced internationally committed financial aid. Similarly, long term gains may be realized via raised awareness, technical improvement including in the ICT sector, decentralization and reverse brain gain, among others.

3. The first panelist lauded the diaspora for their expertise and willingness to discuss Nepal's situation. He felt Nepal lacks rational scientific decision making at the top of leadership which was in denial about the likelihood of large scale Covid19 contagion and its ability to wreak havoc among people in Nepal in the early stage of the pandemic. Joshi believed that the government's poor handling of disease and the relief process has pushed many into extreme poverty. Joshi believed the government lacks commitment for good governance while corruption within the

government is rampant. It also does not prioritize tasks optimally, and hence by allocating budget to wrong items, it fails to spend money on development works. These things should change from now on if the country were to embark on the path of development.

4. A second panelist believed it was the right time for the government to pursue expansionary policy, move towards digital economy, and make credit available to needy businesses. A well –designed and efficiently –implemented public investment program would be key to restoring sustainable economic growth. The crisis should also be handled responsibly: its management must be taken out of the hands of politicians and put into the hands of doctors and epidemiologists.

5. The third panelist believed the government's relief effort is poorly designed in that it ignores the heterogeneity of firms even within a particular sector. Therefore, relief must be tailored to the need of firms, not exogenously determined at the top. The government should be liberal in designing loan restructuring. The panelist also promised to help those NRNs who have innovative ideas and ready-to-start projects in the health and agriculture sector.

6. Another panelist believed our strategy should be a healthy first strategy in the short term, people centric in the medium term and pursuit of transformative ideas (such as to go light, go fast, and go green) in the long term. These strategies should be followed by the utilization of Nepal's inherent strength.

7. The last panelist noted that gender-based impact of the crisis has been serious, suicide rates among vulnerable people have increased and that the government is trying to address these issues to minimize the impact of Covid19 on the vulnerable population. She believed Nepal could still recover and graduate from LDC in 2021. But she admits that it has become imperative to mobilize local and foreign direct investments to meet our SDGs.

8. In his concluding remark, the Chairman thanked the organizers. He defended the federal government's expenditure on health and infrastructure during the pandemic. He also believed Covid19 provided a good opportunity to promote sectors such as green development and the digital economy. He believed that Covid19 demonstrated that the local governments of our federal system are working well. He also appreciated the briskness with which international financial institutes came to help countries like Nepal. Covid19 crisis demonstrated that the subnational government can work well during a crisis like this. He believed the government should further strengthen the capacity of local governments. Covid19 also provided more opportunities for collaboration with different partners of development both within and out of the country. The Chairman appreciated those International Financial Institutions which have come quickly to the assistance of developing countries.

Recommendations and Plan of Actions

1. The Government should increase its commitment to good governance and fighting corruption and to improving the budget allocation process to reflect development and social protection priorities.

2. The design of the relief effort should be improved through better targeting of expenditure on supporting viable firms and limiting the increase in extreme poverty.

3. To help income recovery and job creation and lay the foundation for sustainable growth, design and implement a program of public investments. These can be funded by the Asian Development Bank, the World Bank and by borrowing at the prevailing relatively low interest rates.

4. Pay special attention to the implementation capacity and inter-ministerial coordination for the implementation of these high impact public investments. The Nepalese Diaspora can be a source of support in this area.

5. Carefully selected public investments can be a catalyst for a sharp increase in FDI. For this to materialize, concrete and practical improvements in the business environment need to be implemented. Potential investors from the Nepalese diaspora can provide specific suggestions based on their actual experience in trying to invest.

Contributors

Former Minister of Finance Dr Yuvraj Khatiwada, chaired the session, while Dr. Biswo Poudel was the moderator of the session. There were two presentations: the first was on Impact of COVID-19 on Planning Target (Short and Long Term) contributed by Prof Dr Pushpraj Kandel, and the second was an invited lecture by Prof Dr Shobhakar Dhakal on Challenges and Opportunities posed by COVID-19 to achieve SDGs. The panelists' team included: Mr. Nabindra Raj Joshi (Former minister of Trade and Industry, Nepal), Dr Michalis Sarris (Former minister of Finance, Cyprus), Dr Upendra Mahato (Founding President of NRNA, Nepal), HE Mr. Bhim Udas (Ambassador of Nepal to Myanmar), Ms Yam Kumari Khatiwada (Ministry of Women, Children and Senior Citizen, GoN). This session was coordinated by Dr Biswo Poudel (Senior Economist, Nepal) and Mr Ranjeet Mahato (Neapolis University Pafos, Cyprus).

2.2 Preparedness for Pandemic and Natural Disaster Risk Management

Executive Summary

Disease epidemics and natural disasters can occur with hazards of large magnitude resulting in serious adverse impacts on health and wellbeing of the people that call for declaration of a public health emergency. This plenary session organized to discuss the preparedness for health emergency and disaster risk management was very timely in the midst of the current Coronavirus pandemic crisis. In most ideal preparedness for a health emergency, Nepal would need to have an integrated plan of action in place within a framework that has a permanent organizational structure to collate and mobilize resources, implement well planned programs and projects, and evaluate the outcomes and impacts on the global Nepali community. The purposes of this session was to assess the current COVID-19 pandemic response and propose a framework adapted for the preparedness for future health emergencies during epidemics and natural disasters.

The major strengths of Nepal Government's COVID-19 response currently include border closures; countrywide lockdown; activation of incident command system; decentralized contact tracing; enforcement of isolation and quarantine systems; 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 the health system. According to the keynote speaker, COVID-19 crisis has highlighted various gaps in the healthcare system, especially regarding surveillance, quarantine, contact tracing, coordination and capacity of healthcare facilities. The issues discussed were 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 the 2015 earthquake and currently in the Covid-19 Pandemic.

The session discussed the proposal for a framework that can be effectively operational in Nepal, adapting elements from the literature review as well as their relevance to, and usefulness in the context of Nepal's response to current COVID-19 pandemic and future health emergencies. The strategic plan based on the framework developed for Nepal should foresee a situation where health emergencies of various forms will be happening continuously over time, such as during large devastating earthquakes, disease epidemic, floods, landslides, and other natural as well as anthropogenic calamities, which are not uncommon in Nepal. An organisational structure and its function are proposed to support and execute the strategic plan.

Recommendations and Plan of Action:

1. It is clearly understood that Nepal has constitutional provisions as well as legal and regulatory means adequate to undertake prevention, control and mitigation measures against impacts in the face of the health emergencies of huge magnitude such as current Coronavirus pandemic and other natural disasters. They must be activated suitably and proactively to implement the plan of action in a timely manner.

2. 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.

3. High level of political will at the highest level of leadership to manage the pandemic and natural disasters is a necessary condition for success in prevention, control and mitigation of their adverse impacts. The highest level of leadership should coordinate and lead all other political forces in a transparent, non-partisan and coherent manner.

4. A restructuring of health care system with the formation of Public Health Department (PHD) at the Federal and Provincial levels, equipped with state-of-the-art technologies and a national network of highly qualified epidemiologists, and further strengthening health governance at the 753 local government levels will be necessary for a functional system to address manifold issues of public health and health emergencies.

5. Effective public health leadership as a key to identifying the problems and managing them based on the best scientific evidence, in timely, equitably and a cost-effective manner.

6. In the face of pandemic such as the current COVID-19 crisis, activation of incident command system, decentralized contract tracing, enforcement of isolation and quarantine system; population-wide clear communication about the risks, impacts and mitigation should be organized and managed in a coordinated manner under an integrated plan of action.

7. The Risk Management Committee needs to be formed at the Federal, Provincial and local level to function under the coordination of the GoN Disaster Management Council, which should collaborate and coordinate with all other national and international support systems.

8. Gaps in the health care and public health systems should be analysed reviewing the up-to-date scientific evidence based on epidemiological studies and assessment of physical, demographic and socio-economic impacts from the pandemic or the natural disasters.

9. Health and social security of the people, especially the vulnerable and marginalized segment of the population are of paramount importance during pandemic and other disasters and must be ensured with direct government benefits provided to them.

10. Economic stimulus programs for keeping the country's economy based on the economic assessment parameters such as production, government revenues & spending, exports, imports, income and employment rates.

Contributors

The session had Dr. Sudha Sharma as the keynote speaker, Mr. Gagan Thapa, a Parliamentarian from the current opposition party as a panelist, and Disaster Risk Management expert Dr. Gangalal Tuladhar, a political leader from the current ruling party who chaired the session and summarized the session. The members of NRNA High Level Committee on Coronavirus Pandemic

Risk Mitigation (Dr. Archana Shrestha, Dr. Badri KC, Dr. Kush Shrestha, Kumar Pant, Dr. Hem Raj Sharma, Dr. Sanjeev Sapkota, Dr. Alini Subedi, Dr. Drona Rasali and Dr. Puru Shrestha) contributed to technical presentations on Nepal's COVID-19 epidemiological assessment and NRNA response updates. Dr. Sarita Pandey Bhattarai moderated the session. This session was coordinated by Dr Puru Shrestha (NRNA High Level Committee on Corona Pandemic Mitigation) and Dr Drona Rasali (British Columbia Provincial Health Services Authority, Canada).

2.3 Science, Technology, and Innovation Policy Implementation

Executive Summary

The plenary session was mainly focused on ushering the ways for smooth implementation of National Science, Technology and Innovation (STI) policy-2019 through presentations and discussions in the given time frame. The session was divided into two parts. In the first half of the session there was a Keynote presentation, which was followed by two invited speakers' presentations. In the second half of the session, there was a panel discussion comprising of five distinguished panelists. The chair of the session summed up the entire session and gave his concluding remarks including the roadmap of the MoEST for STI Policy implementation.

The questions raised by attendees of the Session were answered in writing on the Q and A box as far as possible.

Recommendations and Plan of Action

1. National STI policy-2019 is the third written policy document of Nepal. Almost every 15 years, new policy documents are being brought up by the Government of Nepal for implementation but a major portion of past two policies were not implemented. The current policy in place was prepared by making wider participation of the stakeholders and hence it seems to be comprehensive. An honest and effective implementation of the policy can be the game- changer for Nepal in terms of connecting STI with everyday life of people, their consciousness, and prosperity of the country.

2. Every country in the world has its unique policy reflecting its own ground realities. Similarly, Nepal's National STI policy has its own unique features that should be implemented in innovative ways considering our ground realities.

3. The Ministry of Education, Science, and Technology, Government of Nepal has started preparing an STI implementation action plan through seven different sub-committees but STI is a cross cutting sector and hence it requires good coordination with several ministries and line agencies along with provincial and local governments of Nepal. Hence, high level political commitment and intervention is recommended to mainstream STI in the development process as an inevitable tool.

4. Governmental Research Institutions (GRIs) related to STI should be timely restructured, refueled or empowered with competent leadership that can remove the existing hurdles to make it effective and efficient as GRIs in other developed or developing countries.

5. Non-governmental Research Institutions (NGRIs) or Startups run by home-grown or returnee STI professionals should be recognized, registered, facilitated, and motivated by the state machinery by creating some mechanisms or intermediate institution, and also should be empowered by state by allocating sufficient funds through a dedicated funding agency such as NSF in USA as mentioned in policy in the name of National STI Fund.

6. Nepali institutions can be capable of achieving excellence provided they are fostered well and made resourceful to collaborate with international partner institutions.

7. Brain Circulation and attempts to make STI glamorous and hence popular are the significant tools for promoting scientific culture in Nepal for which NRNA's support can be instrumental. Therefore, GoN should engage NRNA for knowledge, technology, skills, and experiences sharing and/or transferring in whatever way possible.

8. Restructuring of universities to make them research-focused by providing research grants to their faculties, increasing share in enrolment in S&T from 15 to 30% for higher education in universities, and abolishing provision for affiliating colleges to the universities, and adopting skills-oriented curriculum can bring positive changes in our quality of education, especially in universities.

9. In order to incorporate STEM or STEAM education as mentioned in National STI as well as Education policy of Nepal, thorough revision in the curriculum, pedagogy, and teaching-learning environment is required for which materials available at no cost or low cost must be utilized as much as possible.

10. The process of implementation of STI policy should be made inclusive as far as possible to achieve desired output through synergy.

11. Nepal is heading towards acquiring a critical mass of professionals in STI to exert positive pressure to remove hurdles and hence create a conducive environment to flourish STI in Nepal. However, the process must not be interpreted as a struggle between governmental versus non-governmental agencies.

12. To sum up, National Science, Technology, and Innovation Policy-2019 is in the phase of its implementation. Though it is brought out by the Government of Nepal, all the concerned stakeholders must contribute with their best possible efforts to make it implemented smoothly and effectively for which instrumental role of NRNA is highly expected

Contributors

The session was chaired by Dr. Sanjay Sharma (Secretary, Ministry of Education Science and Technology, Government of Nepal). Other contributors are: Dr. Dinesh Raj Bhuju (Academician, Nepal Academy of Science and Technology), Dr. Ram Chandra Poudel (Senior Scientist, Nepal Academy of Science and Technology), Dr. Basant Giri (Senior Scientist, Kathmandu Institute of Applied Science) Dr. Ambika Adhikari (Principal Planner, City of Tempe, Arizona, USA), Prof. Dr. Binil Aryal (Department of Physics, Tribhuvan University), Prof. Dr. Bal Chandra Luitel (Kathmandu University, Nepal), Dr. Anindita Bhadra (Indian Institute of Science Education and Research, Kolkata), Dr. Prativa Pandey (Catalyst Technology Pvt. Ltd., Nepal). The session was coordinated by Dr. Suresh Kumar Dhungel (Nepal Academy of Science and Technology), Dr. Uttam Babu Shrestha (Global Institute for Interdisciplinary Studies, Nepal)

2.4 Research Innovation and Commercialization
Symposium S6: Startup and Innovations

Executive Summary

Plenary session with a theme on **Research Innovation and Commercialization** session discussed innovation concept, principles initiatives, policies, moral challenges and hurdles in translating innovation to technology development in general and with specific references with reference to infrastructure, agriculture, hydrology, transport and health research, and current status quo in Nepal.

The session highlighted the issue of moral dilemma in following innovation and gaps in the current Nepal innovation approach and funding scenario. The session also discussed success stories of Nepali entrepreneurship as an example leading to the establishment of a successful IT, Biotechnology and architecture companies using homegrown knowledge, resources and expertise. The role of diaspora in innovation and experiences working in Nepal was highlighted. Examples of Open University, Nepal Science Foundation as a delivery vehicle and MoU with NAST and University RECAST were highlighted as necessary steps. The MoU with Diaspora to establish a credited virology Lab and Youth R&D experience program at RECAST was acknowledged as great initiatives.

The impact of COVID on health and economy was identified as a great future challenge and the need to establish a credited Virus Research Lab and innovative approach to improve test capability and campaign on science-based information is critical to address future pandemic crises. R&D entrepreneurship and collaborative culture, support infrastructure and academy industry partnership to drive innovation was strongly recommended to deal with future biological and environmental crises and for sustainable economic prosperity. The Diaspora relief efforts and COVID R&D initiatives in Nepal is commendable but innovation through Virology R&D work was highlighted essential.

In the symposium sessions S6 with the theme on **Startup and Innovations**, the greater role of S&T institutions and collaboration with Diaspora was highlighted necessary to involve the youth scientific minds and startup ventures in Nepal to generate new ideas and products through innovation. R&D Collaboration and co-investment was emphasised as a higher priority. R&D programs focus on indigenous technology and the utilization of local resources and partnership approach with relevant institutions to address the industry needs as necessary. The linkage developed with overseas organizations should be utilized to access their knowledge source and develop long term collaboration.

National flagship projects in key priority areas should be identified in partnership with organizations like NAST, RECAST, Nepal Agriculture Research Council (NARC), National Innovation Centre (NIC) and NAMMI, Robotic Associations and overseas Government institutions like CSIRO in Australia and Startup companies. NAST initiatives on innovation and prosperity, Youth science WHOs WHO, COVID research program will provide a great forum for R&D innovation. NRNA engagement and representations in NAST and other S&T institutions should be implemented to engage diaspora early and at the policy level

Government policy needs to provide tax incentives and support to increase R&D infrastructure capacity and capability. NRNA SK&TT department should take a proactive role as an S&T partner and highlighted the significance of NAST and NRNA MoU and its representations in S&T institutions such as NAST, National Planning Commission and in Government Advisory Boards. An increase in S&T funding to 1% of the GDP and establishment of joint innovation fund $10 million recommended in the 1st GKC should be implemented.

NRNA commitment and partnership with S&T agencies of the Government of Nepal in innovation and commercialization should be translated into real projects on the ground in national priority areas to facilitate innovation, technology transfer and share global knowledge pool through global exchange programs. R&D Innovation and commercialization through scientific entrepreneurship are absolute to exploit our rich bio-diversity of high medicinal values in the field of Ayurveda, medicinal and aromatic plants and indigenous and industrial food products and in IT sectors. Innovation in China and India provides a unique opportunity to learn and link with their innovations, culture and experiences and benefit from it. NRNA and Government partnership in Knowledge investment is critical to driving innovation to support the growing industry base for export.

Recommendations

1. NRNA to work in partnership to implement Government 2030 vision and initiatives.
2. Implementation of Virology Lab in partnership with NAST
4. Implementation of Nepalese youth scientist R&D experience program with RECAST
5. Formation of a Joint technical team to implement the above program
6. Prepare a white paper of NRNA SK&TT policy
7. Conduct a six-monthly high-level meeting with NAST and RECAST to review the global conference recommendation
8. Establish NRN/GoN Innovation endowment fund
9. Develop strong linkages through the representation of NRNA SKI in Government policy and institutions
10. Implement white policy paper on NRN Academy
11. NRNA to partner with GoN MoS&T, Brain Gain Centre (BGC), NAST WHO WHO's to develop diaspora SKI inventory
12. Explore collaboration opportunities with overseas institutions like of Common Scientific Industrial Research Organisation (CSIRO), National institute of pharmaceutical education and research (NIPER) and Startup companies

Plan of Action

1. NRNA to appoint SK&TT contact person in NAST and RECAST
2. NRNA SK&TT to organize a regular follow up meeting with NAST and RECAST
3. Implement Virology Lab and R&D Youth scientist work experience program with NAST and RECAST, TU
4. NRNA and NAST to establish a technical cooperation team to implement the Virology Lab project
5. Conduct jointly scope study to identify collaborative projects in niche areas and submit report
6. Submission of selected collaborative proposal for funding to GoN or donor institutions
7. Appoint representation of NRNA SK&TT in S&T bodies
8. Implement NRNA Academy report recommendation
9. SK&TT NSFT to conduct regular online webinar and meeting and COVID program
10. Establish a joint NRNA /GoN innovation fund
11. Implementation of SK&TT database

Contributors

The plenary presentations were given by Prof Deepak Gyawali (Former Minister of Water Resources and Academician), Dr. Pramod Poudel (UGC), Mr. Ram and Lakshman Limal (Ram and Lakshman Innovation) Dr. Raju Adhikari and Dr. Rameshwar Adhikari(RMIT University/RECAST) and Panel member comprised of Mahabir Pun (NIC), Dr. Tshering Lama (Idea Studio) , Dr. Vijaya Pant (TU), Dr Shesh Ghale (CEO, MIT). The session was chaired by Dr. Sunil Babu Shrestha, VC, NAST.

Symposium S6 session invited presentations were given by Prof Andrew Parratt, MD, Cytomatrix Limited, Australia Dr. Ron Chatelier, Consultant, Universal Biosensor, Australia, Prof RP Tripathi, former Chief Scientist, CDRI, India Dr. Tim Hughes, Senior Principal Research Scientist, CSIRO, Australia and Dr. Raju Adhikari, RMIT University, Australia. Prof Pramod B Shrestha (Institute of Engineering, TU), Dr Rabinra Puri (Namuna Ghar), and included 11 contributory presentations. The session was chaired by Hon Dr. Ram Kumar Phuyal, NPC. Both sessions were coordinated by Dr. Raju Adhikari and Dr. Rameshwar Adhikari.

3 Reports on Symposium Sessions

3.1 Agriculture and Food Security

Executive Summary

Food insecurity is one of the serious challenges facing Nepal, and agriculture has an important role to play to address this challenge. Two-third of Nepal's population is engaged in farming and the sector contributes to nearly one-third of the country's GDP. Nepal's agriculture is complex and diverse due to varied agro-ecological regions and bio-physical, environmental, socio-cultural-economic, and institutional complexities, with multifarious issues and challenges for agricultural research and development. Continuous understanding of evolving farming systems as well as the changing policies and programs of the government is necessary before introducing or testing any interventions. Large numbers of Nepali diasporas (NRNs) are scattered around the globe, who are trained in varied disciplines with direct or indirect experience of Nepal's as well as global agriculture, which may be an important asset for agricultural development in Nepal. These diasporas are seriously engaged in Nepal's agricultural development efforts with full commitment and are interested in contributing to these efforts in two ways: (i) through sharing their knowledge, skills, experiences and innovations to Nepal in collaboration with national counterparts; and (ii) linking and marketing of Nepali products to the world through business initiatives in the country of their residence. NRNs are aware of the fact that the effective collaboration is not possible without the participation of national counterparts which must be based on local demand and with the direct involvement of local farming communities. Moreover, the current COVID-19 crisis has brought up new challenges, which have changed the way of thinking and practising agriculture leading to reorienting the policies to address the challenge of food insecurity at this unprecedented time.

With these issues in background, the symposium was designed with diverse speakers and topics from Nepal and the globe. The aim was to learn from each other about on-going initiatives by the government, the non-governmental organizations, and private sectors and suggest changes in government policies related to food and nutrition security during COVID-19 and its likely impacts in the future. Symposium topics ranged from an overview of country's current agriculture policy and overall food security situation specifically at the time of COVID-19 to rice; livestock, poultry, and fisheries; dry chain technologies; rubber plantations; agrobiodiversity; gender equality and the role of gender and culture in agriculture, and the role of agricultural professionals' associations and networking. Two panel discussions addressed issues related to domestic and international marketing of Nepalese products. The chosen topics emphasized the need to enhance food and nutrition security of the entire population which will also help achieve SDGs 1 (No poverty), 2 (Zero hunger), 3 (Good health and well-being), 5 (Gender equality), 12 (Responsible consumption and production), 13 (Climate change), 14 (Life below water) and 15 (Life on land).

Recommendations

Based on the findings of the scientific presentations, it is recommended that the government policies prioritize the following:

1. Providing opportunities for returnee migrants by involving them in agriculture, fisheries, commercial farming, and tree plantations and allied areas. Mobilize formal banking sector and government resources for these programs to enhance productivity, employment generation and food security using digitized systems.

2. Reducing import of foods by promoting domestic production and minimizing loss, and through optimally utilizing agricultural lands that are left fallow due to labour scarcity, small farm sizes, land fragmentation, and land degradation.

3. Maintaining local supply chain of food products including staple foods (using Dry Chain), vegetables, dairy and meat products disrupted due to COVID-19.

4. Providing formal banking loans and government support for branding and accreditation for the international market and by encouraging export of already available organic and high value speciality products such as tea, coffee, spices, herbs, and medicinal plants. Targeting of loan programs through digitization to women food entrepreneurs.

5. Emphasizing policies to prioritize research on organic farming and promote cost-effective technologies [e.g., early (Chaite) rice; integrated nutrient management with 50:50 use of organic (e.g., biofertilizers, organic matters, farm manures, etc.) and chemical fertilizers; agroforestry systems] and seed production domestically to minimize seed imports.

6. Mainstreaming agrobiodiversity research to conserve underutilized and indigenous species of crops, fruit and trees, especially in the hills and mountains, using dry chain in community seed banks. Promoting the preservation of indigenous livestock species.

7. Introducing and implementing codes and standards to maintain food safety and quality standards, especially in vegetable farming, dairy production, and meat production.

8. Promotion of natural rubber plantations for land restoration, carbon sequestration, industry promotion, job creation, and improved livelihood.

9. Policy prioritization and implementation of (i) disaster preparatory dry chain using Triple layer hermetic Super bags for storage of seed/grains to minimize postharvest losses to toxic molds and insects, (ii) integrated pest management (IPM) to minimize pesticide use in farming, and (iii) sensitive monitoring of pesticide residues to CODEX standards.

10. Preservation of local and indigenous food culture to enhance gender equity, maintain cultural identity, enhance farming efficiency, and brand development.

11. Increased emphasis for research on both inland-captured fisheries and aquaculture (e.g. aquaponics).

12. Emphasizing the need of formal recognition of the roles of agricultural professional organizations such as the Association of Nepalese Agricultural Professionals of Americas (NAPA), the Nepalese Association of Agriculture, Forestry and Environment in Australia (NEPAFE), and other business organizations established by Nepali diaspora for joint collaborations in research, education, and marketing of agricultural products in collaborations with government and universities.

13. Facilitating the government for NRN initiatives in formulating policies and building relationships (government-to-government, industry to industry, and people to people) with the foreign governments as appropriate.

Plan of Action

1. This symposium committee advices NRNA to form a high-level Agricultural Promotion/ Development Committee (APC) composed of agricultural and forestry experts and professionals representing the globe (an inclusive group by discipline, region, gender) of members to chart out possible collaborative initiatives in agriculture and forestry with the Nepal government

2. APC and NRNA officials to propose the Nepal Government (Ministry of Foreign Affairs, Ministry of Agriculture and Livestock Development, Ministry of Labour, Ministry of Finance, and Ministry of Forests and Environment) to form a high-level committee to initiate dialogue with APC to discuss on the implementation of the recommendations from this symposium and also to chart out any other initiatives (not addressed in the symposium) for long-term collaboration.

3. Prepare short-, medium- and long-term goals and plans of possible collaboration jointly by Nepal government, APC and other NRN agriculture experts and professionals and chart out action agenda accordingly. These goals should prioritize import substitution in food commodities to make Nepal a self-reliant country.

4. Prepare specific action points jointly by Nepal government, APC and other agricultural experts for possible collaborative initiatives (research-based and policy relevant) through consultation with agricultural and forestry professionals in Nepal and those engaged in various professional organizations outside of Nepal taking into considerations of the recommendations from this symposium.

5. Based on the National Agricultural Development Strategy (ADS), prioritize action initiatives for short-, medium- and long-term in various sectors of agricultural, forestry and allied disciplines.

6. This symposium advises NRNA and APC to raise funds and the Nepal Government to allocate required funds to implement above initiatives at the earliest.

Contributors

Dr. Jagadish Timsina (Australia) coordinated the symposium committee. Other members of the committee were: Dr. Prem Bhandari (USA); Dr. Purna Kandel (Canada); Dr. Kedar Adhikari (Australia); Mr. Tilak Bhandari (USA/Nepal); and Mr. Kiran Ojha (Nepal). There were 16 presentations (invited and contributed) and 2 panel discussions. Dr. Timsina and Dr. Bimala Rai Paudyal (Honorary Member, National Assembly, The Federal Parliament and Former Member, National Planning Commission) chaired the sessions while other members of the committee moderated them. Keynote presenters were Dr. Bimala Rai Paudyal, Dr. Hari Bahadur KC (Joint Secretary, Ministry of Agriculture and Livestock Development), Dr. Peetambar Dahal (Retired Food Scientist, USA), Dr. Megh Nath Parajulee (Professor, Texas State University, USA), Dr. Devendra Gauchan (Country Manager, Bioversity International, Nepal), Dr. Madhav Shrestha (Chairman, Center for Aquaculture-Agriculture Research and Production), Dr. Banshi Sharma Neupane (Director General, Department of Livestock), Mrs. Yamuna Ghale (Council Member, Nepal Agricultural Research Council and Gender Specialist), and Mr. Bhola Man Singh Basnet (Rice scientist). Dr. Purna Kandel facilitated the panel discussion, “Leveraging export/import on industry and business of high value agricultural products for economic prosperity and food security” and Mr. Yubaraj Gurung facilitated the panel discussion “MUNAA agriculture market: Scope and potential from home to abroad”.

3.2 Biomedical Technologies

Executive Summary

Biomedical technology has advanced markedly over the past few decades and it is supporting 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 for which they often lack experts. Nevertheless, developing countries are also trying to develop 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 innovation represent the most important factors that limit the biomedical research and development in developing countries. This symposium has provided 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.

The primary goal of this session was to update and exchange state-of-the-art knowledge on biomedical science and technology by bringing together academics, researchers and experts in the field of Biomedical Technology. This would promote scientific information exchange between researchers, developers, engineers, students, and medical practitioners in Nepal and abroad.

In the first session we had lined up great speakers from different sectors of science, pharmaceuticals, photonics, immunotherapy and public health, all focusing on their application in biomedicine. Speakers shared exciting findings of their on-going studies and explained their potential application in biomedicine.

In this session, the development of new and sustainable technologies that modify the existing multi-step process to a few-step synthesis for expedite drug manufacturing was presented. New directions in drug synthesis and future perspectives were discussed. Intervention strategies to control Toxoplasma Gondii infection, one of the public health threats for community, were presented. Exciting data from ongoing research in development of low-cost on-chip optical coherence tomography imaging technology for endoscopy was also presented. Application of spectroscopic system to identify bacteria and pesticides in biological samples was discussed. An exciting research on development of Chimeric Antigen Receptor (CAR) - engineered T cell therapy against the commonest type of brain tumor, Glioblastoma was discussed. In addition, development and application of modern biomedical technologies such as Tissue Engineering, Artificial Intelligence, Nanotechnology and Deep Learning was highlighted. Tissue Engineering with the focus on 3D bioprinting and its potential towards organ regeneration and disease modeling was also highlighted. A talk on Artificial Intelligence (AI) and Medical Imaging with the focus on contribution of AI on healthcare, particularly in radiology was presented. It showed that even with

relatively small investment for new infrastructure, computational science and machine learning can contribute to fundamental research and innovation in biomedicine. Application of nanotechnology in tissue engineering, implant technology, molecular imaging, cancer diagnosis, and target-specific drug therapy was presented.

Application and importance of Deep Learning Algorithms in the medical field was highlighted. More specifically, importance of convolutional neural networks for computer-aided detection or diagnosis of diseases with the focus on skin cancer was highlighted.

Finally, this session in Biomedical Technologies ended with the panel discussion among moderators and panelists. Panel discussion was focused on biomedical technologies for diagnosis of COVID-19 infection. We discussed technologies that are available and feasible to use in developing countries like Nepal for diagnosis of COVID-19.

Recommendations

1. The drugs from natural resources related to small molecules can be explored. The Nobel framework of the small molecule can be used to generate the library for identification of new drugs. Modern drug synthesis can be improved based on novel small molecules.

2. Nepal still hasn't grown enough to perform innovative biomedical technologies and it has to depend on imported technologies. Although highly expensive technology is hard to afford, low-cost and highly effective technology can be developed which can be used at a local level.

3. The research work on technology such as low-cost on-chip optical coherence tomography imaging technology for endoscopy, AI for medical imaging, application of deep learning algorithms that have been done in Nepal by young scientists should be promoted and encouraged.

4. Nepal GoN should work jointly with NRNs aboard who are working on many advanced biomedical technologies and want to develop/promote them in Nepal to fill the technology gap.

5. Schools/Universities should include such courses in their curriculum so that they are aware of the technology developed around the globes.

Plan of Action

1. Running awareness sessions in Nepal for technology advancement around the world which not only explores new areas of research but also work as a platform fors knowledge exchange.

2. Open the possibility of collaboration with research groups in Nepal and abroad on biomedical technology.

Contributors

Prof. Ramesh Giri (Department of Chemistry, The Pennsylvania State University), Dr. Indira Tiwari (Department of Infection Biology, Wonkang University School of Medicine, S. Korea), Dr. Ashim Dhakal (Chief scientist, Phutung Research Institute, Nepal), Dr. Deepak Upreti (The Century Therapeutics and McMaster University), Dr. Wang Di (Harvard Medical School, USA), Dr Bishesh Khanal (Nepal Applied Mathematics and Informatics Institute for Research), Sagar Regmi (RECAST, Tribhuvan University), Dr. Ajit Karna (Center of Health and Disease Studies Nepal), Mrs. Jyoti Acharya (National Public Health Laboratory) Dr. Sunita Gautam (Shikhar Biotech and Kathmandu University).

This symposium session was chaired by Dr. Devi B. Basnet from Medytox, Inc. south Korea. The sessions were moderated by Dr. Roshan Lal Shrestha from National cancer institute National institute of health, USA; Dr. Shushila Maharjan from Harvard Medical school USA and Dr. Nitesh Aryal from MD internal medicine, Qatar.

3.3 Financial Investment

Executive Summary

The symposium session was mainly focused on investment prospects and challenges in Nepal, explored incentives and facilities given to investors by the Government of Nepal, and aimed to recommend a number of changes needed in investment laws, especially in Foreign Investment and Technology Transfer Act - 2019, to attract enough investments. It also investigated existing financial laws and suggested necessary improvements that can facilitate economic growth of Nepal through presentations and discussions in the given time frame. The session was divided into two parts. In the first half session there were five invited speakers' presentations and three contributed presentations. In the second half of the session, there was a panel discussion consisting of four distinguished panelists.

The questions raised by attendees of the Session were answered in writing on the Q and A box as far as possible.

Recommendations and Plan of Action

1. Domestic investment alone is not enough to regain the pre-COVID economic growth and to realize the aspired double-digit growth rate in Nepal. Foreign and diaspora investment needs to be immediately channelized to refuel Nepal's economy. Nepal needs to revise its financial policies.

2. Some policy and legal infrastructure has been developed for NRN to enter into the 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.

3. Nepal is moving forward for economic development with political stability soon, considering such a scenario many investors from the different parts of the world are observing this land as a better place for investment with greater opportunity. The Government of Nepal should consider the below factors to achieve better results.

    - Innovative way of marketing different areas of investment to the global investors.
    - Creating a peaceful and investment friendly environment
    - Vocational training and skilled labour /manpower
    - Development of basic infrastructure

4. Firm's quality of Carbon Management System is positively associated with its financial performance measured by return on assets (ROA). This result holds when adopted alternative

performance measures and model specifications and control for sample-selection bias. Further analyses show that a better-quality CMS is especially associated with higher revenues, greater margin and higher R&D expenditures.

Contributors

Mr. Bhisma Raj Dhungana (Chairman, Securities Board of Nepal), Mr. Sushil Bhatta (CEO, Investment Board Nepal), Mrs. Urmila Shrestha (CEO, Salt Trading Corporation Nepal), Mr. Abhishek Basnyat (US Embassy, Nepal), Mr. Sandeep Kumar Mahanty (Pricewaterhouse Coopers Pvt. Ltd, Management, India), Mr. Eknath Khatiwada (Chair, NRNA Foundation Committee), Mr. Dila Kharel (Social Entrepreneurship Development Committee, NRNA), Mrs. Pramila Shrestha (Carbon Management System and Corporate Financial Performance), Mr. Anup Raj Upreti (Pioneer Law Associates), Mr. Jiba Lamichhane (Patron and Past President, NRNA), Mr. Vishnu Agrawal (Senior VP, Confederation of Nepalese Industries, Nepal), Mr. Bhuvan Dahal (Sanima Bank Ltd, Nepal).

The session was coordinated by Mr. Anal Raj Bhattarai (Senior Banker, Nepal) and Mr Ranjeet Mahato (Neapolis University Pafos, Cyprus).

3.4 Fintech for Economic Transformation

Executive Summary

The symposium session was mainly focused on Fintech prospects and challenges in Nepal. Financial technology (Fintech) seeks to improve the delivery of financial services by utilizing advanced algorithms in electronic platforms such as cloud computing, personal computers and smartphones. Due to the 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 slowdown 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. The full potential of Fintech for financial inclusion may be realized with a strategic framework of the underlying infrastructure and an enabling policy and the regulatory environment from the government to support digital financial transformation. Fintech is penetrating deep into the financial markets of both developing and developed economies

The session was divided into two parts. In the first half-Session, there were Eight invited presentations and One contributed speakers' presentation. In the second half of the session, there was a panel discussion consisting of all the invited speakers. The questions raised by attendees of the session were answered in writing on the Q&A box as far as possible.

Recommendations and Plan of Action

1. Fintech adoption is the key to transform of Nepalese economy. It may increase transparency in government and also a revolutionary increase in current unskilled-labour based remittance to skilled knowledge-based remittance. It may finally lead to an increase in our current 30 billion USD economy to 40 billion USD via digital transformation.

2. The lack of prompt regulatory initiatives from the government, the existence of a 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.

3. Government to make swift upgrading in digital policies so as to create an attractive business environment for both domestic and foreign investors.

4. Currently, internet banking penetration rate 4% and bank accounts penetration rate is 111%. However, the actual bank account penetration rate is only around 45 – 50%. It is very necessary to increase general people's inclusion rate in the digital economy.

5. Regarding infrastructure, the Nepal government is expecting 100% electrification in 2014 and internet penetration will be 80% in 2024 and 100% by 2043. It seems less and should be

accelerated more for the development of Fintech reachability of the general people.

6. Nepal Government has prepared Nepal Digital Framework 2018 that is under implementation now. The government has also approved an e-commerce development strategy in 2019.

7. Major constraints for Fintech adoption are as follows:

    a. Inadequate access to telecom and financial service

    b. Poor cybersecurity

    c. Inadequate use of ICT in public service delivery

    d. Undiversified postal service and

    e. The high cost of doing business

    f. Cyber resilience capabilities,

    g. The unregulated financial sector,

    h. Higher fees and charges,

    i. low acceptance of digital payment systems.

    j. Digital divide

8. To mitigate these above mentioned issues, all stakeholders (banking sectors, Ministry of commerce, NRB, and consumers should work together).

9. For cryptocurrency management, the Nepal government is establishing the Central Bank Digital Currency. This seems a good initiative; however, it is in the 'wait-and-see' state. It should be flexible and more open.

10. NRB is encouraging electronic settlement of commercial transactions, also working on setting up National payment gateway and simplification of foreign currency receipt on export. However, it is essential to implement without delay.

11. Followings are recommended to the government regarding the e-commerce bill:

    a. Consumer's right should be protected. Therefore, it should be very clear and concise.

    b. Although the current government has allocated some budget for cybersecurity, there should be a clear assurance from the government and NRB to the consumers, so that people can bank upon digital transection.

    c. The issues with the validity of digital transactions should be addressed.

    d. Clear policy on dispute settlement, national and international transaction, and

e. The government should enforce and implement National ID for identification and digital certificate, and using Nagarikta number should be abolished.

12. Following are recommended for Fintech adoption

a. NRB should accept e-KYC.

b. The government should work on Fintech awareness.

c. For the identification, National ID should be used as a Primary Key

d. Flexible regulatory support should be provided for Fintech adoption. There should be an easy FDI regulation to implement advanced technology in the financial section.

e. The government should increase the budget for digital transformation.

f. The Youth Start-ups and Entrepreneurs related Fintech should be encouraged by providing the resources.

Contributors

Mr. Bhuban Kandel (ED, Nepal Rastra Bank), Mr. Hem Raj Dhakal (Founder and Managing Director, IME Group), Mr. Lowell Cammpbell (Senior Digital Financial Services Specialist, International Finance Corporation), Mr. Keshav Acharya & Ms. Pratistha Swar (Senior Program Advisor, Economic Policy Incubator), Mrs. Dibyswory Dali (General Secretary, Women In Information Technology), Mr. Srijan Malla (CTO, Siddhartha Bank, Nepal), Mr. Shambhu Pokharel (Chairman, World Trade Group), Mr. Dibas Neupane (President, TrustBiz Private Limited, Nepal).

The session was coordinated by Mr. Lok Raj Sharma (NRNA Social Entrepreneurship Committee, Denmark), and Dr Gyanendra Prasad Joshi (Sejong University, South Korea).

3.5 Information and Communication Technology

Executive Summary

Digitalization has started to create complex networking, high-speed computing, and service integrated information infrastructures. This progression is affecting all aspects of our society. These advances have an impact on the way people are working and the way they are interacting, learning, educating, playing, and so on. Digitalization has many good sides for developing countries like Nepal to address sustainable development goals. For example, online education can include poor and marginalized people; telemedicine can be a boon to remote and mountainous villagers; digital governance can help the government reach out to citizens; likewise, eCommerce platforms can broaden our access to international markets. However, one thing that we need to be concerned about is the seriousness of cybersecurity risks. The consequences of a breakdown in security extend beyond the military and business organizations, to societies, and even ordinary citizens. Therefore, the question arises: Are we technically, formally, and culturally ready to cope with the emerging digital transformation. Are we capable of differentiating between good and harmful use of information? Above all, are we aware of information security as private or public agencies or responsible citizens? These are the questions that we are exploring in session 5. Based on the research outcomes the recommendations that we propose are as follows.

Recommendations and Plan of Action

1. The internet and telephone cost is much higher than the affordable range for the people living in Nepal's remote areas. The price of spectrum licensing and ICT infrastructure deployment is high compared to the return on investment (RoI). Therefore private companies are unwilling to invest in remote areas.

   The government should bring an open spectrum policy and provide analog TV frequency bands (174-223 MHz and 470-542 MHz) for opportunistic access free of cost to the private sector. The government can call for NRNA to invest in these sectors to decrease the digital divide.

2. Many countries encourage a vertical market in telecommunication to decrease environment protection, tariff rate, and the digital divide. Many developed countries have already adopted and practiced these vertical markets. The Nepal government should encourage NRNA to invest in these vertical markets.

3. E-crime, or cybercrime, whether relating to theft, hacking, or DoS attack to vital systems, has become a fact of life. Cybersecurity affects both the public and private sectors and spans a broad range of national security issues, whether through terrorism, crime, or state and industrial espionage.

   The Nepal Government should form an integrated national research and action center, including government bodies and academia. The NRNA can help enhance the cybersecurity research

center's capability to collaborate with the Nepalese engineers, researchers, or academicians living in the diaspora.

4. Since the process of digitalization is inescapable, it's important for Nepal to prepare the citizens who should be ready to understand the affordances of changing paradigm, and its application in national vis-à-vis human development. Therefore, the Nepal Government should formulate the policy to introduce ICT for national development (ICT4D) based curriculum in school education.

5. ICT4D projects are meant to contribute to national development; therefore, it is important for the government to facilitate public-private-academia partnership on research design and implementation of ICT4D projects.

Contributors

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The session was coordinated by Dr Gyanendra Prasad Joshi (Sejong University, South Korea).

3.6 Startup and Innovations

(Please refer to Section 2.4)

3.7 Intersection in Natural Sciences

Executive summary

We are living in an unprecedented time in the way we think of and do science. Rapid advancement in information technology has changed our learning tools. Natural sciences, such as math, physics, chemistry, and geology are the backbone of core knowledge that is required to understand applied sciences such as medicine, engineering, agriculture. A country with a young generation with an excellent foundation in the natural sciences is better prepared to produce citizens that are capable of leading the nation at several fronts. Luckily, there are many Nepali who are involved in natural sciences. A significant number of Nepali living outside of Nepal are engaged in teaching and research in the field of natural science. In the changed context of effective communication through electronic communication media rapid and effective transfer of knowledge can be made possible. Collaborative projects can be established, and a robust partnership can utilize knowledge within the diaspora in the benefit of improving education and research in Nepal.

Held during COVID-19 pandemic, this symposium was designed to assess the current status of science and technology education in Nepal and to discuss the challenges. The symposium was held in two separate sessions. In the first session, we discussed the changing landscape of the natural sciences and the challenges that exist in Nepal. We heard from high-ranking officials of leading academic institutes who deal with policymaking in science education and research and have been actively engaged with these issues.

In the second session, the symposium showcased research presentations of scientists from all over the world. The goal of this session was to promote collaboration between researchers from Nepali universities and developed countries. There were 8 speakers in this session, four from Nepal and four from abroad. As we had hoped, this session brought together potential collaborators in many areas of science, as there were speakers from physical, chemical, biological and mathematical sciences.

Recommendations

Based on the presentations and discussions, we recommend that the following points are implemented by the government, universities, and relevant institutes:

1. There is a critical role of science and technology education for a developing country like Nepal. The symposium recommends to put high priority in improving science education in Nepal.

2. Nepal can never be transferred into a prosperous nation without allocating a substantial amount of budget to Research and Development (R&D). We recommend that the government of Nepal allocate a significant amount of funds in establishing research centers to promote research in science and invest in improving research infrastructure.

3. We appeal to the Government of Nepal to bring policy that attracts brilliant students in science

and technology. This will help train future leaders who understand the importance of science and technology in a nations' development.

Plan of action

1. Activate Nepal Science and Technology Foundation (NSFT) to oversee quality of science education in Nepal through a science education committee (SEC). The SEC will work with the government and other stockholders to ensure science education is at par with other developing countries.

2. Direct NSFT to continue creating opportunities for collaboration among experts in diaspora in Nepal.

3. Sign MOU with different universities for supporting science education and research at the university level.

Contributors

Dr. Tara Sigdel (USA) and Dr. Narayan Adhikari (NEPAL) coordinated the symposium committee. Other members of the committee were: Dr. Rameshwar Adhikari (Nepal); Dr. Suresh Dhungel (Nepal); Dr. Rajani Malla (Nepal). There were 12 presentations (invited and contributed). Dr. Bhadra Man Tuladhar (Former Registrar, Kathmandu University), Prof. Dr. Dharma Kanta Baskota (Vice-Chancellor, Tribhuvan University), Dr. Giridhari Sharma Paudel (Vice-Chairman, Planning Commission, Gandaki Pradesh), and Dr. Nanda Bahadur Singh (Vice-Chancellor, Mid-Western University) presented Keynote Presentations. Dr. Achyut Adhikari (Tribhuvan University), Dr. Rajani Malla (Tribhuvan University), Dr. Rameshwar Pandit (Sungkyunkwan University, Korea), Dr. Bhadra Pokharel (Tribhuvan University), Dr. Bhanu Neupane (Tribhuvan University), Dr. Bikash Shakya (Stanford University), Rajendra Pangeni (City of Hope Medical Center, USA), Dr. Ghanashyam Bhatt (Tenessee State University, USA) presented the contributed talks.

3.8 Life and Health Sciences

Executive Summary

Provision of quality health services, and their affordability and equitable access to all segments of the population in Nepal are equally important for a just society in the 21st century. And, many diseases, especially, the non-communicable diseases (NCDs) that accounted for 66% of all deaths in 2016 and the health care spending of NPR 38 B with 33% out of patients' pocket expenses, carry increasingly high resource burden on the society, are preventable through health promotion and policy changes in multiple sectors. This symposium was organized to examine various physical, emotional and scientific aspects of life, health and wellbeing of the populations in the country, emphasizing prevention of NCDs and exploring the potentials for strengthening the system of health care integrating primary care, acute care, specialized care and public health. The following topical areas were discussed through presentations during the session:

1. Four presentations focusing on prevention of NCDs included, in the context of Nepal, the status of WHO regional programs and national programs, the programs of the Government of Nepal, and the Lancet NCDs and injuries among poorest Billion initiative from the national perspective; and global perspectives Noncommunicable Diseases and Injuries among the Poorest Billion.

2. Two special presentations highlighted history and development of end-of-life (palliative) care in Nepal and the potential to bridge the gaps in palliative care between the two worlds.

3. Two presentations discussed specialized topics, one, the research on mitigating disparities in cancer outcomes between high- and low-income countries, two, urgency of raising awareness and taking initiatives for dyslexia cure and prevention.

4. Two presentations highlighted the issues of emotional well-being leading to complex societal challenges and mental health and well-being during the current COVID-19 crisis.

5. Two presentations brought to light on the emerging diseases caused by Dengue Fever virus and Human Bocavirus.

6. Two presentations included a success story of community health approach to health care services and the need for adopting One-Health approach to control of zoonoses.

7. Two technology and methods related presentations included 1) a role of imaging diagnostics such as Positron Emission tomography (PET) scan in unknown primary cancer detection and gene expression analysis that could be important in health sciences.

8. Panelists of the session highlighted the burden in life and death, the need for action to make a difference and capacity building through partnership as important. Summarizing the session proceedings, Session Chair (Dr. Sudha Sharma) highlighted the importance of all the presentations, while she called NRNA to action for taking initiative to the development of palliative care, which has not been lagging behind in Nepal.

Recommendations and Plan of Action

1. It is high time to focus on "Health in All Policies" approaches to multisectoral action with increased investments for the prevention and control of NCDs and health promotion including those that address the social, economic and environmental determinants of health, with the further improvement from the current series of Multi-sector Action plans, engaging communities for action.

2. NRNA should take initiative to the development of end-of-life (palliative) care in Nepal as continuation of Briddha Ashram (Abode for Elderly) Program initiative which was started in the beginning years of NRNA activities.

3. Leveraging psycho-social factors as the utmost priority, Nepal should value emotional well-being as integral to health and the basis for the well-being and effective functioning of individuals, communities, and nations. A collective multi-faceted and pluralistic effort, using a 'whole of society approach' should be made to ensure emotional well-being at the centre of mental health efforts to leverage the well-being of populations.

4. Coronavirus is not the only virus that can cause epidemics of sporadic to pandemic level. A state-of-the-art technology national biotechnology laboratory for multi-disciplinary use with capacity for virus isolation, serotyping and genotying, genomic sequencing is needed and should be established in a public-private partnership model with the financial and knowledge investment from NRNs.

5. Multisectoral collaboration, including clinicians, public health scientists, ecologists and disease ecologists, veterinarians, economists, and others covering animals, humans and their environmental factors is necessary to be adopted for effective management of the causes and prevention of zoonotic diseases following the "One-Health" approach.

6. Collaboration on medical imaging technologies (e.g., PET/CT scan), genomics, and other advanced technologies and innovations in health sciences with the other countries such as Japan, Australia, Canada, should be promoted.

7. Definition, identification and diagnostic issues of special disabilities (e.g., dyslexia, autism, downer's syndrome, speech pathology etc) should be recognized as urgent needs. Necessary federal and provincial policies should be developed for the initiatives to increase awareness of special disabilities such as dyslexia, autism, speech pathology, and service provisioning of special needs should be developed and implemented.

Contributors

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3.9 Physical Infrastructure

Executive Summary

This symposium assessed the 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. The symposium was deliberated 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. The overall challenges in delivering large infrastructure projects was reviewed and performed 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.

Recommendations

Based on the findings of the presentations, it is recommended that the professional societies, financial institution, government and contractors prioritize the following:

- **Infrastructure Development**
    - Government of Nepal, it's federal and local units needs to focus on sustainable and strategic infrastructure development to meet current as well as future need
    - Government alone can not 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
    - Pandemic can be opportunity to focus on smaller and issues directly related to everyday life. Small scale project needs to be developed first to support future mega infrastructure
    - Urban development should consider flood management perspective in its design and implementation. Flood insurance and emergency support funding system should be developed.
- **Rail System Engineering: Academic Perspective**
    - Government of Nepal needs to collaborate with Universities to lunch focus course in Railway engineering

- Needs to prepare curriculum and study material for the railway engineering studies
- Needs to develop formal mechanism to transfer professional and academic knowledge of Nepalese diaspora in Railway engineering

- **Smart Infrastructure**
  - Government of Nepal needs to focus on data driven decision making system to plan prioritize and implement infrastructure projects. Central database needs to be built. Data collection system should be enhanced and needs to be part of new infrastructure design

Plan of action

1. This symposium committee advices NRNA to form a committee to initiate the communication between diaspora professionals who are working in infrastructure planning, designing and construction
2. Amend Standard Procurement Act (SPA)
3. Immediate start to plan and build infrastructure for small cities instead of focusing on mega structure
4. Start building central database to support smart infrastructure planning and designing
5. NRNA and GON form a expert team to transfer technology to implement smart infrastructure components in the proposed smart cities of Nepal.

Contributors

Ratan Jha and Satish Tripathi, P.E. (USA) coordinated the symposium committee. The session was chaired by Hon. Basanta Kumar Nemang, Minister for Physical Infrastructure and Transport and observed by Er. Deepak Babu Kandel, Mayor, Palungtar Municipality. Other members of the committee were: Anil Gyanwali (Chairman, Nepal Infrastructure Bank), Arun Dev Panta (CEO, Senior Architect, Design Cell), Satish Tripathi, P.E. (Managing Engineer, Water Infrastructure Planning Specialist, City of Houston,TX, USA), Prof. Dr. Sangeeta Singh (Deputy Director, Centre for Disaster Studies), Keshav Raj Gnawali, P.E. (Project Engineer, City of Kyle, TX, USA), Umesh Raj Joshi, Department of Civil Engineering Kathmandu University), Hem Raj Panta (Traction Skills Lead, Arup), Er Deepak Babu Kandel (Mayor, Palungtar Municipality).

3.10 Public Health and Pandemic Mitigation

The symposium S10 with the topic "Public Health and Pandemic Mitigation" during the Global Knowledge Convention during October 09-11, 2020 basically recognized that the pandemic did lay bare both the strength and the gaps in health care delivery systems of all nations around the globe, including Nepal.

Yet the symposium gave tremendous opportunity to identify what needs to be addressed in order to have an efficient health care delivery system that provides optimal health to every section of the population.

The symposium also recognized that the Health sector alone cannot solve the health problem and all stakeholders need to come together to prevent, treat and promote the health of Nepali.

The topics and panelists and the points they highlighted are listed below.

Health and Human Rights

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. There exists a blatant inequity and inaccessibility of health to people that needs to be on the spotlight. Nepal has multiple ethnicities and backgrounds of population. Some groups are under-privileged and are under severe poverty. Addressing the social determinants of health that impacts the vulnerable population will have a positive impact towards improving and maintaining their health. This presentation explained why health is a human right and what barriers exist in realizing these rights to the fullest.

Health Challenges and Opportunities the Pandemic Created

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 the 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 others have created CDCs in their countries. The health ministry of Nepal has moved towards creating a similar center integrating and merging several departments and divisions. It takes a significant amount of time and resources for the CDC.

Safety of Health Care Workers in Pandemic

Safety among health care professionals is paramount for the successful accomplishments in the treatment and management of the individuals seeking medical care and health care. Unfortunately, Nepali doctors and HealthCare professionals have long been facing violence in the frontline while

performing their duties, and the current pandemic has exposed such acts. The reasons including but not limited to culture, stereotype, misunderstanding, lack of regulation, lack of insurance, inadequate security creating an environment that makes health care professionals vulnerable to violence. There is no reasonable excuse for the violence against the health care professionals. This presentation helped generate discussions on factors that help or aggravate in ensuring a safe working environment for doctors and health care professionals.

Indigenous & Minority Health:

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 issues. Barriers posed by language, culture, taboos, stereotypes all amount to limiting adequate health care to these people. This presentation shed bright light on the dark side of the status of indigenous population and the factors that contribute to disproportionate access to health.

Pandemic and Nepali Migrants in the Middle East

Close to two 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 conditions and diseases that keep them from getting a good quality of life. While the migrants and citizens were treated alike by the host countries when they fell sick due to pandemic, the health care systems in each of these countries was overwhelmed with the number of people seeking health care. This situation exposed gaps during the pandemic in providing prevention and the efficient management of sick people during the pandemic.

Health of Nepali Women Globally

Education empowers women, yet a large section of them lack access to adequate education and vocational training. A large part of 8 million Nepali worldwide comprises of women. Many women face an unhealthy environment from an early age. This presentation explained regulations, policies that are conducive for the improvement and/or maintenance of women health. The presenter emphasized the need of these policies to be taken into effect to ensure that women everywhere receive the encouragement and empowerment they deserve to lead their life to the fullest.

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

Epilepsy and seizure disorders are not uncommon among Nepali community. At least 1 percent of Nepali population has this condition, totaling 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 diseases among our people. Lack of awareness and qualified professionals have deprived many

patients from getting seizure freedom in a timely manner with correct medications and treatment.

This presentation provided how stakeholders at all levels can work together to educate the 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 Corona Pandemic is due to "normal people exposed to extraordinary situation"

Mental health problems arising after the pandemic are due to "normal people exposed to extraordinary situations". This pandemic has not only affected health but has created insecurities in all aspects 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 the general population but has also affected the front liners who have been working long hours under difficult situations while facing many obstacles. This presentation discussed 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. The access to health care could also play a significant role to reduce mental health crisis during pandemic.

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

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 the unfortunate demise of people. This presentation provided introduction to the risk factors, prevention, early detection and management.

Empowering Nepalese in Africa with Health, Education & information

Health is a state of complete physical, mental and social well being, 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 is not always successful. While changing the lifestyle can prevent or delay onset of many medical conditions, public awareness of some worrying or dangerous symptoms of common serious diseases or acute conditions can help to detect diseases in early stages with chances of better outcome with smaller risk of complication and death, shorter hospital stay and less expenses. This presentation included the role of screening in the prevention of major cancers that inflicts both men and women with its merits and demerits in asymptomatic patients for some medical and surgical conditions.

Recommendations and Plan of Action

Based on the findings of the scientific presentations, it is recommended that the government policies

Prioritize the following:

1. Create a global Network of doctors of Nepali origin from around the world. Engage in strengthening the network through training, interaction and collaboration.
2. Create and rollout the global mental health team and involve psychiatrists and psychologists in developing guidelines for vulnerable populations.
3. Strengthen the recently established Regional Health Teams in Europe, Africa and the Middle East.
4. Create a global network of nurses from around the world including from Europe, Africa, Australia, United States.
5. Share the declaration on Global Nepali Health with ministries, agencies and organizations and seek support and endorsement.
6. Help promote alternative medicine including but not limited to Ayurveda, Chiropractic, not to replace but to compliment the allopathic medical systems.
7. Support 'Health for All' and Sustainable Development Goals-2030 promulgated by the United Nations.
8. Help empower women so they are better able to provide health care to family members.
9. Establish telehealth in different countries and help mobilize and coordinate.
10. Provide training on suicide prevention specially in the countries where the suicide rate is high among Nepali.
11. Help empower youth and adolescents through health education and training.
12. Support efforts to reduce and eliminate violence against the health care workers.
13. Collaborate with Nepali Medical Association, Nepal Nurses Association to better reach out to promote the rural Nepal health systems.
14. Work with governments and embassies in the countries where Nepali are concentrated and participate in the policy making that helps in maintaining and improving the quality of their health.

Contributors

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This session was coordinated by Dr Sanjeeb Sapkota (NRNA Global Health Support Committee, USA)

3.11 Social Sciences

A: International Labour Migration, Covid-19 and Impacts in Nepal

Executive Summary

In recent decades, Nepal has seen unprecedented political movements, resulting in substantial changes in sociocultural, political and economic spheres. Moreover, movements of people, particularly the rise of international labour 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 behaviours 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, the symposium on Social Sciences shared and discussed recent research and experiences that help reshape policies to adapt to the new circumstances, and make use of new opportunities in two fields of studies that are very important to Nepal at this juncture: International labour migration and higher education institution-building and research capacity. Here are some implications on the first:

Recommendations and Plan of Action

1. 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 diasporization 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. Action: (a) Nepali migration to India is a recent need for provisions of the Nepalese government regarding the protection of Nepalese workers in India. (b) Inclusion of Nepalese workers in India in NRNA.

2. During the period of Covid at the time of return to their origin, Nepalese migrants suffered much in comparison to Indian migrants in Nepal due to the longer distance of their working destination. Nepalese migrants started to return to their destinations. However, the situation is not favourable yet.

3. The Covid-19 pandemic has exposed the vulnerability of the Nepali migrants, especially the poorest migrants from the poorest regions of the country, who tend to go to India rather than elsewhere. It has also exposed the Nepal government's failure to support them.

4. There is hierarchy of the migration by the country of migration, and migration is class and (by the same token caste/ethnicity) related. The marginalized and weakest sector often depends on migration to India. What is unusual is the fact that a large number of Nepalis, who often

used to come home during major festivals and harvest time, are actually returning to their destinations despite rising Covid-19 infestation and risk. This demonstrates how little Nepal has been able to offer them in terms of economic opportunities.

5. We need to address the lack of data, including on the skill set of migrants, and this hampers what strategies to have in terms of training them to take positions in the niche markets.

6. Agriculture continues to be a last resort for many returnees to go on despite growing reluctance and lack of profitability. However, until structural barriers in the sector, including access to land and land ownership, rampant intermediaries, availability of agricultural inputs and profit margin are solved we need to think about interim solutions such as training returnees from India to take positions left vacant by Indian migrants.

7. 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.

8. The Covid-19 pandemic exposed that Nepal is not prepared to deal with the magnitude of the problems and the suffering that migrant Nepalis face, including the GCC countries. Even bilateral instruments become ineffectual. There are two main recommendations: (1) A disaster preparedness framework needs to be drawn up and preparations made in relation to foreign labour migration, so that there is no confusion when disasters such as the Covid pandemic strike. (2) Risk reduction strategies need to be incorporated into migration planning, such as diversifying destinations, improving the skills of migrants so that they are not unemployed and have the possibility of self-employment on return to Nepal.

9. There are so many pull and push factors encouraging migration -- including the ill-prepared position of Nepal to engage a bulk of unemployed people and the migrant returnees -- it is unrealistic to assume that foreign labour migration will not resume soon after the revival of global economies. The Nepali government can utilise this crisis to restrain labour out migration with focused policies for agricultural transformation while addressing the critical push factors of migration.

10. Enhancing the position of local government by equipping them with resources and capacities in responding to challenges faced by the migrants including facilitating their mobility.

B: HEIs and Research Capacity

1. Nepal should officially recognise the need for and benefits of plurality in HEI education and research, i.e. the coexistence of different types of institution, both public and private.

2. Increasing political interference has had a very deleterious effect on public universities.

Mechanisms need to be developed that will enable universities to become fully autonomous bodies able to control their own appointments at departmental level.

3. Funding for research in Nepal is a real challenge. There should be two national research councils, one for natural science and the other for social science and the humanities.

4. NGO HEIs are over-regulated, and there is an attitude of hostility, at worst, and incomprehension at best, to their activities in government circles, making it impossible or very difficult for them to raise money for their activities either inside or outside the country. Many of the rules governing the receipt of foreign funding are inappropriate for research institutions.

5. Every effort should be made to encourage a research culture to develop *within* public universities, which might take the form of enhancing the salaries of those teachers who are research active as well as devoting a definite proportion of the university's budget to research activities. At the moment, those professors who are research active tend to carry out their research activities in NGOs or other non-government venues.

Contributors

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The session was coordinated by Dr Krishna Adhikari, University of Oxford, UK.

3.12 Sustainable Energy

Executive Summary

As the 12th Symposium of 2nd Non-Residential Nepali (NRN) Global Knowledge Convention, Sustainable Energy Symposium was successfully organized which brought together policy-makers, academicians, energy experts, regulators to a common platform.

Reliable and affordable energy is one of the basic requirements of modern-day civilization. The seventh goal of the United Nation (UN)'s 'Sustainable Development Goals' emphasis ensuring access to affordable, reliable, sustainable, and modern energy for all by 2030. The goal inculcates both technical and social aspects: quantity without compromising on quality and meeting energy needs of the unreached population are highlights of the goal. To achieve this goal, Nepal is taking initiatives for power generation by switching to clean energies. Though the emphasis is on renewable energies, activities such as cooking, space-heating, and transportation still rely largely on biomass and imported petroleum fuels contributing to adverse effects on the environment and health of its users.

Today the country proudly claims that more than 95 percent of the population has access to electricity; however, 93.1% in urban and 64.9% in rural use it primarily for lighting. The inherent issues are embedded in its reliability and affordability. In 2000, 81% of Nepal's population did not have access to electricity. With the country making remarkable efforts in electricity generation and transmission over the years and many more near-completion hydropower projects in the offing. It is imminent that these projects will bring Nepal's energy crisis to an end; further, it is expected that Nepal will soon have surplus energy. This scenario sends out calls for the need to draw attention not only to enhance reliability and affordability but also to the management of surplus energy: a challenge of wide-scale for the Government of Nepal (GoN). The solution lies not only in strategic plans and policies for the effective use of surplus energy but also their concerted implementation taking into consideration both supply and demand aspects.

Recommendations

1. Dependence on imported petroleum and providing subsidy for Liquefied Petroleum Gas for cooking (more than 53%) places a huge financial burden on the country. Increasing per capita electricity consumption in various sectors like transportation, cooking, heating, agriculture, etc., which is to be met by the surplus electricity to be available on completion of the upcoming hydropower projects, needs extra attention.

2. The revised Electric Vehicle (EV) tax announced by the government on 1st October 2020 is a much-appreciated move. However, this reduction is not enough. Further reduction in the EV tax is required. It will motivate the public to switch from diesel/petrol cars to EVs which will help in curbing Carbon dioxide (CO_2), Nitrous Oxide (NOx) emission, and particulate matter (PM) and reduce dependency on imported fossil fuel.

3. The savings from the reduction in fossil fuel needs to be channeled towards promoting the use of surplus electricity for cooking especially in the rural areas, making electricity affordable for the population in the lower quintile. Additionally, the promotion of electricity use in a range of activities related to agriculture and agro-products will help achieve food security, employment, and better livelihood. Finally, there is also a need for promoting the use of electricity in the community service sector.

4. The green hydrogen era is re-emerging, and Nepal can take advantage of it. Green hydrogen is produced when water is split into hydrogen and oxygen through the process of electrolysis using electrolyser, the entire process can be powered by energy produced from renewable sources like hydropower, solar, and wind power making it a near-zero-emission system. The recent findings have shown that green hydrogen starts to become competitive if the cost falls below USD 2.5 per kilogram. Nepal produces almost all the electricity using renewable sources, the surplus electricity, increasing electrolyser efficiency, the reducing price of electrolyser makes green hydrogen production even cheaper. The government of Nepal should invest in this technology.

5. Energy consumption and energy efficiency must be monitored at different scales in real-time to minimize the massive energy losses. The basis of the smart grid concept is the extension of Information and Communication Technologies (ICTs or IT) to the existing energy infrastructure, which helps in reducing electricity cost by bringing down transmission and distribution losses, improving reliability & power quality, enhancing electricity service with safety & security, and improving the efficiency of the overall energy system. Nepal Electricity Authority's (NEA) plan of implementation of a smart electricity grid has already begun with the implementation of six smart metering pilot projects by September 2020 and further increasing it to five million smart meters by May 2025. Implementing smart metering will serve as the foundation for migration to the smart grid. For the successful smart-grid program in Nepal, several initiatives must be prioritized at the policy, regulatory, industry, institutional, and standardization level. Innovative business models using a Public-Private Partnership (PPP) should be explored to ensure the full implementation of these advanced technologies. NEA should develop capability in areas like communication technologies and metering, IT applications, system integration, etc.

6. Aging and inadequate infrastructure for power generation and distribution often result in losses to the Independent Power Producers (IPP). The government should focus on building the transmission lines to encourage the IPP to undertake new hydropower project construction.

7. The promotion of energy mix ensures access to energy for the unreached population, besides it also addresses challenges posed by geographic locations. Energy planning must take into account the availability of resources and cost-effectiveness to enhance energy access without compromising on needs for both domestic and productive uses. Resource and needs-based energy mapping must be exercised periodically.

8. Inclusive approaches in capacity building for supply and maintenance services must be inculcated in all energy projects.

9. To increase domestic consumption of electricity, the government should encourage the establishment of more industries, making necessary policy changes, and offering incentives.

Plan of Action

NRNA can help GoN in implementing the above recommendations.

1. There are many NRNA experts and specialists around the world working in the energy sector. GON can bring and use their technical expertise or transfer their expertise in diversifying energy generation, building smart transmission and distribution grid lines, and managing demand.

2. NRNA specialists can advocate and support GON for improving regulatory regime including licensing provisions, contracting arrangements, tariff setting, etc. for energy projects. They can conduct studies/researches to generate pieces of evidence and organize webinars, workshops, training events, exchange visits, investor forums to build the capacity of political representatives, government officials as well as energy sector stakeholders.

3. NRN can support in enhancing the educational system of the country to produce qualified human resources and technical experts required for the energy sector development.

4. NRNA has been playing an important role by bringing the investment to develop and scale- up the energy sector as well as other sectors of the country. NRN can mobilize more investment in hydropower, renewable energy, energy-based industries and manufacturing provided GON creates enabling policies and the environment for them.

5. NRN can support generating green employment opportunities in the country for both women and men to improve their livelihood by making investment and setting up several energy-based industries.

6. NRN can support to increase the domestic energy consumption thereby confirming the financial viability and sustainable operation of hydropower projects and other energy infrastructures by investing in the agricultural sector, tourism sector, service sector, manufacturing sector, commercial sectors, etc. in the country

7. NRN can support in drafting new policies, such as 'Master Plan for a national program for electrification of Public Transport', 'Technical guideline for Smart Grid'

8. NRN can support conducting pilot projects for innovative technologies, such as 'smart grid project', 'Green hydrogen as transportation fuel'. ,For example, a 'Centre for Excellence on Sustainable Energy' for continued R&D, demonstration, and learning, 'Green Hydrogen Lab' in collaboration between NRN, GoN, and KU for showing thought leadership in the region, conducting regular virtual webinars in sustainable energy for knowledge sharing are example activities that NRN can instantly support.

9. NRN can lead the investment in 'grid-tie renewable energy project at mega-scale', such as 3000

MW wind-solar park in Mustang.

10. NRN can help create a database preparation on sustainable energy experts
11. NRN could also be asked to invest in the most demanded energy project.
12. NRNA should be asked the government to put as a represent the expert from NRN's database
13. All these can be led or supported by NRN professionals working globally. Many of them can be expedited if GoN formulates a special action plan to bring these experts to Nepal for a special purpose (temporary and permanent) assignments.

Contributors

Professor and Department Chair of Railroad Engineering and Transport Management department, Dr. Binayak Bhandari coordinated the symposium. There were two sessions, the first session was jointly chaired by the former dean of IOE and current president of Nepal Engineers Association, Prof. Dr. Tri Ratna Bajracharya, and Gender and Energy expert Dr. Indira Sthapit Shakya. There was one keynote speech by former VC of National Planning Commission Prof. Dr. Givinda Raj Pokhrel, similarly, there were four invited talks by Mr. Sagar Raj Gautam, Mr, Krishna Acharya, MR. Guna Raj Dhakal and Mr. Bishal Thapa. Also, there were three invited talks by Dr. Biraj Singh Thapa, Mr. Rupesh Baniya and Mr. Ravi Chandra Koirala respectively.

Similarly, the second session was jointly chaired by Ms. Barsha Pandey and Mr. Kushal Gurung at The World Bank and WindPower Nepal respectively. In this session, there was one keynote speech by Mr. Alan Michael Creighton from the Northpower grid, UK. Besides, there were two invited talks from Mr. Kulman Ghising, former managing director of Nepal Electricity Regulatory, and Mr. Surya Lamsal, Professional Engineer at New York Power Authority, USA. There was one contributed talk by Dr. Ram Prasad Dhital, the commissioner at the Electricity Regulatory Commission Nepal. In addition to the aforementioned presentations, the second half of the second session had a 'Panel Discussion' moderated by Dr. Vivek Bhandari, the Principal Architect at Siemens Australia. The panel discussion had four panelists, Ms. Soma Dutta, Dr. Rabin Shrestha, Prof. Ben Campbell, and Dr. Krishna Kant Panthi. The theme of the panel discussion was, "Energy Resilience in Pandemic and Disaster'.

This symposium received a large number of abstracts which was not possible to accommodate as oral presentation thus there were 10 poster presentations where a single slide with 3-5 min recorded video played during the breaks and at the end of the symposium.

3.13 Sustainable Environment

Executive Summary

The symposium on Sustainable Environment was divided into three sessions namely, invited talks, panel discussion and contributed papers. The symposium was organized in the sequence of invited talk followed by panel discussion and the presentation of the contributed papers. There were six eminent invited speakers who presented their views and perspectives on the issues ranging from climate change impacts on mountain environment and agriculture, sustainable management of Nepal's natural resources (land, water, forest and biodiversity etc.), urban environmental pollution (air, water pollution and solid waste disposal and management) and the environmental and development ethics in the context of current market driven high growth development paradigm. The second session (panel discussion) consisted of four prominent expert panelists. The panel discussion focused on the government's pollution management policies, strategies and their implementation, management of natural resources and the planning framework for sustainable development strategy. The third session (contributed papers presentation) consisted of seven presentations on pollution, sustainable development, and the management of natural resources. The executive summary and the recommendations presented below are the synthesis of the presentation of all these three sessions.

Global warming and climate change are the biggest environmental challenge of our time. Their impacts have manifested in every aspect of human life and natural resources: land, water, air, biodiversity, food production and mountain environment. This is a critically challenging time for Nepal which has a fragile geo-morphology and mountain environment. Nepal faces unique challenges in designing science based sustainable usages and management of natural resources 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 achieve socially acceptable development with sustainable stewardship of natural resources underpinning human well-being and environmental sustainability. Climate change vulnerability is a seminal subject because of its alarming threat to humans as well as to the survival of all living beings. The interlinked factors of temperature rise, changing rainfall and weather patterns adversely affect multiple sectors including food and nutrition security, water resources, floods, drought, and land degradation. Nepal's mountain environment and agriculture are under severe threats of climate change impacting all bio-physical components of the environment including biodiversity, water resources, food production and melting of the glaciers which has rapidly increased the possibility of Glacier Lakes Outburst. The breakdown of the resilience of the mountain environment and food production system will have far reaching repercussions in the lives of people in the region in general and people of Nepal in particular. This requires a well-conceived management and mitigation national and regional strategy to minimize the adverse effects of climate change in the region. Air and water pollution, solid waste disposal and management problems especially in Kathmandu valley and the rapidly urbanizing municipalities and urban centers in the provinces of Nepal are becoming major environmental management challenges. The implementation of government's mitigation plans and strategies have not resulted in tangible improvement. Government needs to

review its current management and mitigation action plans and develop effective policy instruments, mitigation plans and strategies based on the scientifically proven available technologies and their effective implementation with expressed political determination pertaining to vehicular emission, brick kiln and cement industries, domestic cooking, transboundary air pollution, waste disposal, recycling and solid waste management.

Recommendations

1. Land, water, forests, and biodiversity are the natural capitals on which depend the very survival and the prosperity of the Nepali people. There is a critically important nexus relationship among these resource components. Nepal needs to adopt an integrated nexus development planning framework to replace the current sectoral development planning to leverage the synergy generated by the interconnected nexus relations of these resource components (water, energy, land, and food production).

2. Climate change is seriously affecting the weather patterns impacting all aspects of life including mountain environment, ecology, biodiversity, agriculture, and social structure. The problem of frequent drought, severe floods, landslides, and mixed types of effects in crops have been experienced in Nepal because of climate change. Government needs to develop an institutional mechanism to study, monitor, evaluate and manage the impacts of climate change. The institutional mechanism should focus on preparedness, early warning, adaptation, food diversification and resilience building at community level and scientific research, planning and strategies to protect the most vulnerable and the needy.

3. Nepal government should allocate at least 1.5 % of its GDP in research and innovation to generate necessary knowledge, skills and technology to address the emerging problems and issues in environmental resource management particularly, the development of climate resilient food production technology, management of the water resources, restoration of degraded lands, conservation, sustainable uses and cultivation of the herbal medicinal plants etc. Scientific environmental studies and researches must be directed towards protecting and managing Nepal's natural capitals to ensure sustainable development and the prosperity of Nepali people.

4. Nepal must develop a comprehensive plan to transition from the use of petroleum fossil fuels energy to the use of clean hydro-energy in all sectors including transportation, domestic cooking, industries and others (Nepal will have surplus hydro-energy in 2-3 years). This will dramatically reduce air pollution in Kathmandu valley and rapidly growing municipal urban areas in the country.

5. A rapid high economic growth at the cost of environmental degradation and resource depletion, however attractive it may be in the short run, will be suicidal in the long run given Nepal's fragile geomorphology and mountain environment. A trade off must be worked out between economic growth and environmental sustainability. This necessitates the need for the integration of

science based innovative environmental management practices and development ethics into national development framework to achieve the UN sustainable development goals.

6. Environmental education and community awareness programs at schools and local community levels are critically important to understand the importance of environmental impacts on human life and other life forms. Preparing the younger generation (students) from elementary school level to graduate school is critically important to produce competent human resources who can understand and deal with the challenges of environment and development issues. Development of environmental science curriculum at school and college levels is a must, Nepal's education system must not ignore.

7. NRN ICC must initiate to develop a formal institutional mechanism with the government of Nepal with the provision of a support fund for knowledge and technology transfer through collaborative research between diaspora scientists and their counterparts in Nepal. NRN ICC and the government of Nepal can jointly contribute to the creation of this fund. This will greatly motivate the scientific and professional community to develop collaborative research which will accelerate the process of knowledge and technology transfer from diasporic landscape to the motherland.

Plan of Action

1. Develop formal linkage between diaspora professionals and the National Planning Commission for an integrated nexus planning framework that can leverage the synergy generated by the nexus relations of the natural resources.

2. Establish institutional mechanisms to deal with the impacts of adverse climate change with respect to preparedness, early warning, adaptation, food diversification and resilience building at community level and scientific research, planning and strategies to protect the most vulnerable and the needy.

3. Allocate certain percentage of GDP in research and innovation to generate necessary knowledge, skills and technology to address the emerging problems and issues in environmental resource management particularly in the development of climate resilient food production technology, management of the water resources, restoration of degraded lands, conservation, sustainable uses and cultivation of the herbal medicinal plants etc.

4. Develop environmental science curriculum at school and college level to produce environmentally informed professionals who can undertake the emerging challenges of environmental problems and climate change.

5. Develop a formal institutional mechanism with the government of Nepal with the provision of a support fund for knowledge and technology transfer through collaborative research between diaspora scientists and their counterparts in Nepal.

Contributors

Prof. Dr. Gopi (coordinator of the Symposium), Dr. Krishna Prasad Oli (Chair of the session, member, National Planning Commission), Dr. David Molden (Director General, ICIMOD), Prof. Rejina Maskey Byanju (Department of Environmental Science, TU), Prof. Mohan Bahadur Dangi (California State University, USA), Mr. Bishow Parajuli (UNF, Country representative, India), Dr. Bishow Nath Oli (Secretary, Ministry of Forest and Environment, GON), Prof. Madan Koirala (Department of Environmental Science, TU), Prof. Durga Poudel (Louisiana State University at Lafayette, Louisiana, USA), Dr. Keshab Poudel (Physician, Former president, NRNA USA), Prof. Medani Bhandari (Akamai University, USA; Sumy State University, Ukraine), Prof. Kabindra Shakya and Prof. Richard Peltier, Mr. Santosh Chaudhary *et al* (Kathmandu University), Mr. Amod Karmacharya (Cleanup Nepal), Dr. Bhubaneswor Dhakal (University of Otago, Christchurch New Zealand)

3.14 Sustainable Urban Development in Nepal

Executive Summary

During the past few decades, Nepal has been witnessing a very high rate of urbanization. As of 2017, there were a total of 293 urban municipalities in Nepal which include six metropolitan cities, 11 sub-metropolitan cities and 276 urban municipalities. A World Bank Report (Muzzini, E. and G. Aparicio, 2013) states that Nepal is the least urbanized country in South Asia, yet has the fastest rate of urban growth in the region.

The urban settlements defined by the Nepali government may include areas which are not truly urban in character and may lack urban infrastructure. The Economic Survey of 2015-16 counted the population of the officially designated urban areas as 42 percent of the total. Nepal's urban population as measured by internationally comparative standards might be less than these estimates. For example, the World Bank (The World Bank 2018) data shows Nepal's urban population in 2018 was only 20 percent of the total. Thus, the assertion by the World Bank that Nepal is among the least urbanized countries in South Asia.

Although an unplanned and organic growth of urban areas can work well, lack of coordinated planning for infrastructure to support the growth can lead to serious 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.

The presenters in the symposium "Sustainable Urban Development in Nepal" assessed existing challenges and opportunities related to urban planning and development in Nepal, and recommended policies, programs and implementation mechanisms towards achieving sustainable urban development in the country. Focus areas included a review of current problems, and offering policies for streamlining Nepal's urbanization process, improving urban governance, planning tools and methods, creating more efficient urban transit and transportation, planning for public open spaces, and creating resilience related to disasters and challenges such as those caused by climate change, earthquake and pandemics. Symposium participants also reviewed how Nepal's urban development programs are aligned with UN's Sustainable Development Goal No. 11– Sustainable Cities and Communities.

The symposium "Sustainable Urban Development in Nepal" provided a platform for the diaspora and Nepali scholars, professionals and practitioners to present their research findings and experience and discuss the topics related to the urbanization process in Nepal. The main aim of the symposium was to provide assessments of the current situation, and offer practical recommendations related to sustainable urban growth and development in Nepal. The speakers and panelists of the discussion forum provided several policy guidelines to improve urban development programs in Nepal.

Policy Recommendations

This Symposium presenters and panel discussants touched on several important and timely topics related to urban development in Nepal. The following is a list of some of the recommendations made by the presenters and discussants.

1. For the Nepali urban development to be most effective, good governance, and planning tools and mechanisms, e.g., appropriate general plan, area plans, zoning, and building codes must be developed. Some examples of international best practices in urban governance, such as from Canada, can be reviewed for possible application in Nepal. For example, nearby municipalities in some areas can be administered by creating a new regional jurisdiction, so that transportation, environmental and water-related issues could be managed more effectively and efficiently.

2. Some elements of smart city approaches such as traffic and parking management, and energy transmission can be adopted by the Nepali cities. As Nepal's digital infrastructure and physical infrastructure improve, smart city concepts could be gradually integrated in the urban development and management.

3. Arrest of urban sprawl and good planning should be achieved by strengthening community involvement improving on the current planning practices.

4. The Kathmandu Valley is in need of a strategic metro rail development plan coupled with an urban regeneration program to transform the capital's economy over the next 20 years. It is proposed that the government enact necessary railway development acts, and establish a dedicated powerful government agency, for example, a Kathmandu Metro Rail Development Authority.

5. The Nepalis towns and cities should ensure that important public benefits and amenities, such as affordable housing, cultural and historic resources, open spaces, safe and walkable environment are emphasized, and incorporated in the plans and programs.

6. Creating opportunities for urban agriculture and edible landscape can be pathways for sustainable urban development in Nepal and help towards achieving the Sustainable Development Goals (SDGs).

7. Planning for resiliency. e.g., earthquake-friendly buildings, can be achieved through a combination of traditional knowledge and modern technology can provide a sustainable and efficient solution.

8. Good urban development also requires the preservation of historic and natural resources. This also supports economic development and sustainability goals. For example, preservation of Bhaktapur historic corridor will greatly improve the economy of the area. And, preservation of watershed, and flood-plain is important to ensure environmental integrity and sustainability of the Kathmandu Valley towns.

Plan of Action

1. NRNA should follow up with the concerned government and non-profit agencies and universities in Nepal to disseminate the recommendations and findings from the symposium.

2. The conference organizers should work with the contributors of the symposium to organize papers for publication in the NAST Journal, so that readers in Nepal can refer to the detailed papers.

3. Continue to do research and study on the challenges related to urbanization in Nepal, and create up to date data-base for reference.

4. Create a platform for continuous communication between the diaspora urban development experts and Nepali counterparts (including government agencies, non-profits, professional organizations, universities and professionals)

Contributors

Dr. Ambika P. Adhikari (Urban Planner, Phoenix, AZ, USA. Coordinator), Mr. Kishore Thapa (Architect, Former Secretary, GoN, Nepal. Coordinator), Prof. Jiba Raj Pokharel (Former VC, NAST, Nepal), Dr. Swarnim Wagle (Former VC, NPC, Nepal), Dr. Sunil Babu Shrestha (VC, NAST, Nepal), Ms. Anju Malla Pradhan (SONA, Nepal), Ms. Sarita Shrestha (Maskey, Architect, Nepal), Ms. Matina Shakya (Doctoral student, PA, USA), Prof. Keshav Bhattarai (University of Central Missouri, USA), Mr. Jitendra Bothara (FEngNZ, Miyamoto International, New Zealand), Dr. Punya S. Marhatta (MCIP, Canada), Dr. Binod Amatya (CEng., ARCADIS, UK)

3.15 Vocational Education

Community Colleges for Nepal: An Economic Imperative Executive Summary

Transforming Nepal through TVET

Nepal stands at an opportune moment to leverage its demographic advantage by expanding technical and vocational education and training (TVET) opportunities as the most important mechanism to achieve economic independence and strengthen its democracy. Nepal needs to open community colleges and polytechnics in all states and at local levels to train a more skilled work force and to diversify its economy and to prepare the working-age youth population for a more secure life.

Not everyone can or needs to go to a four-year university in order to make a decent earning. Community colleges are more important than Harvard-like prestigious institutions because of the educational and workforce preparation opportunities that open-access institutions can provide to a broader percentage of the population.

Community colleges disrupt elitism in higher education by countering the social stratification that is created and maintained by conventional models of selective higher education around the world. At a time when countries seek to redefine their education policies towards stabilization, prosperity, and democratization of opportunities, the idea of community college offers a powerful connective solution to building strong community, industry, and national economies.

Today Nepal's youth work in other countries, helping to increase 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. Nepal needs citizen engagement in continuous learning, elevating human productivity through training, and understanding the transformative potentials of its human and natural endowments. The education, training and scientific research should be reorganized to unleash the fundamental potential of Nepal for the speedy advancement of its society and economy while being in harmony with nature.

Nepali men and women have proved their talent and resilience everywhere in the world. Now we have an incredible opportunity to be proactive and create a flexible and responsive environment of skilling and retooling, particularly with the return of a workforce that has gained many skills while working abroad. Those kinds of flexible opportunities to learn, unlearn, and relearn are provided by locally operated polytechnics.

2020 has been a hard year for all of us. But Nepali people are strong, and they are resilient. For a strategic shift of economy, an immediate task is to ensure that the workforce has the basic skills needed in the market. Singapore established a TVET center in 1964, providing value added training.

Framework of a community college system that includes important aspects, such as apprenticeship training, internships, access to the workplace, and employability was laid out.

The existing CTEVT lacks both quantity and scientific distribution. Most importantly, it is not providing training in entrepreneurship, a key to transformation with the ability to follow the market leading to economic independence.

Community colleges can provide the knowledge, skills, attitudes, and abilities contributing to the Competencies for T-VET.

South Korea focused on labor intensive training in 1970, then they shifted to a Capital intensive plan, followed by Tech-intensive plan, and are now strategizing to harness the fruit of the Knowledge-based economy. We need to learn from them.

Recommendations and Plan of Action

1. Invest in TVET
2. Maintain labor data so as to find alignment between industry and skills,
3. Remove the stigma around certain jobs by validating skills with a National Vocational Qualifications Framework
4. Develop a service sector, mainly in construction and tourism, which have huge potentials to transform Nepal.
5. Create jobs in Karnali Province for everyone in Nepal through eco-tourism.
6. Empower local institutions by creating healthy competition between them. The federal Government should play a facilitating role (not a controlling one) and.
7. Define market-oriented skills, both applied and technical,
8. Provide online training
9. Avoid the development of too many MBAs, which can be a problem!
10. Authorize colleges to grant master's degrees, when necessary for the local market
11. Avoid a mismatch in quantity and quality
12. Encourage collaboration between FCAN and other industries with government to enhance TVET
13. Develop partnerships between government and the private sector
14. Remember that industries are the employers
15. Develop advisory committees to keep ahead of advancing technologies
16. Develop effective short-term training programs

17. Encourage the NRN Community to help us build technical institutions -

18. Develop partnerships between vocational education and entrepreneurship as the road ahead.

19. Develop mechanisms for government to encourage private sector investment.

20. Learn from successes and mistakes in other countries about the proper role of government in ensuring quality and protecting against fraudulent institutions.

Contributors

Dr. Usha Jha (Session Chair, Member, National Planning Commission), Dr. George Boggs (Former CEO and President, American Association of Community Colleges), Ms. Amrita Sharma (Kathmandu University), Mr. Rajendra Khetan (Chairman, Laxmi Bank and Prime Life Insurance, Nepal), Dr. Ramhari Lamichhane (DG, Colombo Plan Staff College), Dr Sungsup Ra (Director, South Asia Human and Social Development Division, Asian Development Bank), Prof. Mahesh Nath Parajuli (Development Studies, Kathmandu University), Yogendra Shahi (Member, Karnali Provincial Planning Commission), Dr. Shree Ram Ghimire (Chief, Agriculture Information and Training Center, Nepal), Dr Tulsi Dharel (Centennial College, Toronto, Canada), Dr. Surya Pathak (Member of Parliament, House of Representatives, Nepal), Mr. Mana KC (Vice President, NRNA), Ram Thapa (Patron, NRNA).

4 Reports on Regional Knowledge Conferences

4.1 Oceania Regional Conference

Oceania Regional 2nd Knowledge Convention 2020

The conference was organized in two sessions (Economy and Health Sessions) which 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 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 were presented in the 2nd NRN Global Knowledge Convention 9-12 October 2021 in Kathmandu, Nepal.

The conference was coordinated by Mr Hom Nath Pandey, and the knowledge convention committee thanked all the presenters, convention team and ICC support for successfully organizing the convention.

Summary and Recommendations

1. NRNA can bring a wide variety of experience, expertise and knowledge which could help in various sectors of economic development in Nepal.
2. Oceania countries like Australia, New Zealand have managed the COIVD-19 very well and those learnings would assist Nepal to combat the COVID-19 both from a 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 the 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 has 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 the 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.

Plan of Action

1. NRNA to work closely with Banking industries of Nepal and exchange knowledge and best practices that have played a vital role in reducing the economic impact due to COVID-19.

2. NRNA and GoN policy makers discuss and come up with improvements that can be achieved in the Agricultural sector for the food security of Nepal.

3. NRNA and GoN to exchange ideas for utilising automation technologies to improve productivities in manufacturing, transport and agricultural sectors.

4. NRNA to work closely with GoN and exchange knowledge and best practices that have worked well on developed countries 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 a high level of skill and knowledge enhanced by their education and involvement challenging projects in the developed countries. NRNA and GoN to create a 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.

4.2 First Asia-Pacific Knowledge Convention 2020

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 of finance but also of 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), a 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 researchers 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 on Sunday at 09:00 AM Nepali time. Following the inauguration, a keynote speech was delivered by Ex. Chief Information Commissioner on **Covid 19 impact on Nepalese economy and way forward.** The speech covered almost all scenarios on Nepalese economy, its impacts and how we can revive it after or during this pandemic.

The conference was coordinated by Dr. Devi Basnet, Meditox Inc, South Korea. 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:

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 a 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 governments 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.

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.

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 problems in chemical reagent production/accessibility required in molecular works, understaffed and under-resourced public healthcare.

2. Caesarean section trend rates over two decades have increased in Nepal therefore, successful implementation of safe motherhood programs and policies 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 farms 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 have adverse effects on human and animal health.

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 to the bioeconomy growth of the nation.

2. The microbial resources in Nepal are an 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 in 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 are 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.

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 opportunities 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 opportunities 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.

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 to reducing environmental pollution.

It has been recommended that the greenhouse gas emission can be mitigated through promotion of clean energy. For the reduction of pollution in the environment, non-fired or eco-bricks utilization is recommended instead of conventional fired bricks.

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 needs 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.

Smart City and Advanced ICT Trends

1. The session was based around the importance of transformative power of 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 platforms 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 '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.

Students in foreign nations- a shared perspective of Nepalese students and stakeholders

1. The equivalency of the earned degree from universities abroad by Tribhuvan 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 a 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 the 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 universities 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.

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, the government should take the initiative to provide a conducive environment for safe travel of domestic and international tourists through the collaboration with the private sectors such as NRNA.

Pandemic, Social Development and Role of Diaspora

1. For the exchange of knowledge and technologies, implementing the television knowledge (TVET) through the NRNA network was 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.

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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 different kinds 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 different kinds of research and development activities.

4.3 Europe Second Knowledge Conference 2020

The objectives of the NRN Europe knowledge conference 2020 were to strengthen the relationships among the Nepali Scholars/experts in 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 in the conference online. The conference was coordinated by Mr. Raju Aryal.

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 the 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: Animal Science, Dairy Technology, Animal Nutrition, Soil Science, Analytic tools.

2. We will surely see collaborations at different levels in one year's 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

Six presentations were presented on the environment, energy, and water highlighting the 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 researchers from Aarhus University, Denmark, Technical University of Denmark, and Kathmandu University, Nepal, to seek further opportunity funding and technology transfer on Anaerobic digestion.

Natural Sciences

1. Planning and decision-making processes 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 national planning.

4. Innovation and exploitation of resources and use of technology with small-scale Pilot projects 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) are 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. Presentation about tunnel engineering in Nepal discussed on the scope of tunnel engineering and establishment of a new Master's program in Nepal. Metro Rail Vision 2040 for the greater Kathmandu valley showcased the metro system as a solution of mass transit to address the current traffic congestion problems.

The hydropower potential of Nepal in comparison to Norwegian scenario 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 for new digital tools, technologies and processes like Building Information Modeling (BIM) were acknowledged during the presentation of Digitalization in construction: BIM as a new way of working. He furthermore discussed different ongoing activities to promote BIM in Nepal. Another presentation about the Modular construction and prefabrication industry discussed the importance and processes of element design and highlighted the benefits and problems of the industry. A short review about the ongoing energy and infrastructure projects were discussed.

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 a 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.

4.4 America's Second Knowledge Conference 2020

Executive Summary

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.

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 the 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.

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 support.

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 programs.

    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 communities, 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 environments.

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. Leadership 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 departments 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).

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 plants) 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 threatened every moment by ill-intentioned hackers. A novel solution 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 the digital age would encourage all innovators and entrepreneurs in the Americas back in Nepal and worldwide.

Entrepreneurship Development in Agriculture and Allied Sector

1. Business to business trades prefer to promote trade in agri-food, food processing, energy, and infrastructure areas.

2. Quality of life of local residents can be improved 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 plants 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 contribute to the production of wood, herbs, and other plant products in Nepal. More accurate data on TCR night is helpful.

Engineering, Infrastructure Development, and Public Safety

1. Remarkable progress in expanding the road network needs to align with sustainable upgrading and creating road assets providing emphasis on efficiency, reliability, and safety at service levels.

2. Strategic road networks can be 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.

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. Continuing education and training on cultural competence, active listening and empathetic communication skills, and emergency/ crisis preparedness can boost a 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.

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 in 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 are 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 research 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.

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's 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. Introducing 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 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 the 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 composed of NRN and resident Nepali experts. A significant number of GoN's representatives were there and their role in the management committee and as experts has aligned the conference theme with current development priorities of Nepal.

The conference was coordinated by Dr. Laxmi Pathak.

The convention has exceeded our expectations in terms of quality and quantity of presentations, quality participation and ability to bring everythings in table with great visibility and drawing the conclusion on the table.

5 2nd NRN Global Knowledge Convention Organizing Committee

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