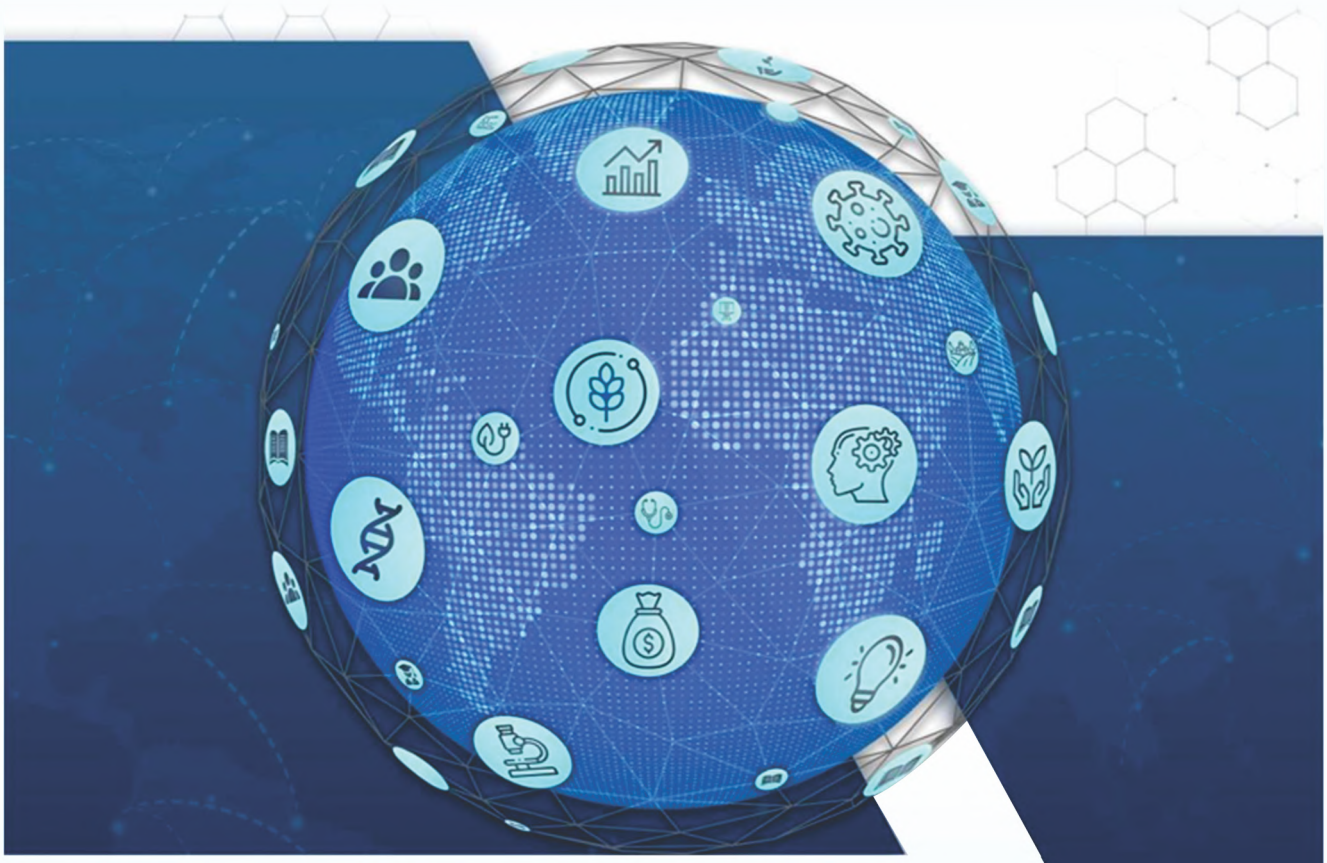
3RD NRN GLOBAL KNOWLEDGE CONVENTION

Science, Technology, Innovation & investment for Socio-Economic Development of Nepal



SUMMARY REPORT, RECOMMENDATION, AND DECLARATION

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Message from the President

The Global Knowledge Convention (GKC) was conceptualized in 2018 as a flagship program of Skill, Knowledge, and Innovation (SKI), and I am very proud of its achievements with successfully concluding three conventions in 2018, 2021, and 2023.

The conventions have created a global forum for the Nepali diaspora and scientists, as well as scientific institutions, for the exchange of ideas, expertise, and experiences, channeling them towards Nepal's development projects. It is my greatest pleasure to participate and welcome you to the 3rd convention recently. NRNA has put knowledge investment as a high priority and emphasize on the application of science, technology and innovation (ST and I) for socio-economic development of Nepal.

It is a dream come true to have this convention concluded so successfully with nine-point declarations, and now publishing this summary report. This report and declaration will provide much-needed guidelines to NRNA to formulate its Science, Technology, and Innovation (STI) policies and engage with stakeholders in Nepal, developing a strong collaboration and partnership. I express my sincere thanks and congratulations for your participation and for sharing the notion that 'Knowledge investment is key to Nepal's social-economic prosperity,' and the Nepali diaspora will play a major role in achieving this. This convention is a forum where we can strengthen this notion, reiterate it, discuss it, debate it, critically analyze it, and take our findings to the socio-economic prosperity of Nepal.

In this era of digital knowledge, GKC serves as a platform dedicated to advancing knowledge investment initiatives in an unprecedented manner. Our esteemed partners–the government of Nepal, various universities, and private sectors–embody positive characteristics, values, and a collaborative spirit reflected in the conference theme aligned with UN Sustainable Development Goals. The impact of the convention's recommendations will take center stage in shaping the policy and future direction of the Non-Resident Nepali Association (NRNA).

Looking ahead, our next convention is scheduled to take place in two years, providing a continued opportunity for interaction, listening, and the collective strengthening of interest in the knowledge investment journey together. A heartfelt thank you goes out to the GKC 23 organizing team, NRNA officials, and volunteers for their outstanding contributions to the success of the convention.

Dr Badri KC
President, NRNA

Message from The Head of SKTT Department

The Non-Resident Nepali Association (NRNA) has played a crucial role in mobilizing the Nepali diaspora worldwide to contribute to the socio-economic development of Nepal. Since its establishment in 2003, NRNA has evolved into a significant development partner for Nepal, focusing on harnessing the skills, knowledge, and resources of Nepalis abroad through initiatives such as Skill, Knowledge, and Innovation (SKI) programs.

Under the purview of NRNA, the Science, Knowledge, and Technology Transfer (SKTT) Department has been established to streamline SKI initiatives and spearhead future science, technology, and educational activities. I emphasize the department's vision and commitment to facilitating technology transfer, scholar exchange, collaboration, innovation funds, and partnerships to transition Nepal into a knowledge-based nation.

The NRN Global Knowledge Conventions serve as a platform to operationalize these visions. The conventions, organized biannually in collaboration with the Government of Nepal, aim to develop a roadmap for socio-economic development and explore the role of science, technology, and innovation in achieving these goals. It was my privilege to chair the 1st and 2nd NRN Global Conventions in 2018 and 2020 and oversee the 3rd one in 2023 as the head of the SKTT Department.

The success of these conventions demonstrates NRNA's ability to collaborate effectively with various stakeholders, including government bodies, academia, industries, and policymakers. NRNA aims to expand the conventions' scope and collaborate directly with stakeholders to ensure impactful outcomes.

The conventions' declarations and recommendations are crucial for Nepal's development agenda, and NRNA urges the government to integrate them into short- and long-term plans. NRNA is committed to facilitating the implementation of these declarations and recommendations at all levels, from federal to local.

We are indebted to the enthusiastic support of the international, national, and NRN experts for their contribution to this endeavor. Specifically, we express gratitude to the chair, co-chair, and advisors of the convention for their valuable time and expertise. We are also grateful to session coordinators, invited speakers, panelists, paper contributors, conference participants, sponsors, supporters, and well-wishers. We anticipate similar contributions in future conventions as well.

Dr Hem Raj Sharma
Vice-president and the Head of SKTT Department of NRNA (2023-2025)

About the Report

The 3rd Global Knowledge Convention (GKC) 2023 concluded successfully in Kathmandu with a nine-point declaration. This convention report covers a summary of discussions and recommendations for the Non-Resident Nepali Association (NRNA) and the policymakers of Nepal. A total of 4 plenary and 12 symposium sessions deliberations attempted to review existing policies, achievements, and failures, and provide feedback on the future roadmap of Nepal's needs, policies, and priorities in the Science, Technology, and Innovation (STI) sector. The conference also included discussions on the urgency of investments in infrastructure and human resource development sectors.

The convention endorsed the need for substantial investment in STI to support innovation and add value to Nepal's initiatives in green energy, food, agriculture, IT, smart urban planning, smart health, manufacturing, biotechnology, and biopolymer sectors. The convention also highlighted the urgency of recognizing the area of niche advantage for developing unique products targeting both local as well as global markets, steering away from reliance on conventional industries such as garments, remittance, and tourism.

The convention further emphasized the need for increased funding and the formation of new alliances and partnerships, both nationally and internationally, to access and pool local and global knowledge and resources for sustainable innovation and application. It highlighted the importance of institutional partnerships among all stakeholders, advocating for integrated and coordinated efforts to generate and retain skilled human resources. Likewise, the convention stressed the necessity of incubation hubs for innovation, to support entrepreneurship in the STI.

The convention provided insights into emerging technologies in the contemporary age of knowledge-based digital economy and highlighted the need to position Nepal to adopt and harness the potential of technology and innovation.

Emphasizing the importance of strong collaboration and partnerships among the academic, government, and private sectors, the convention also highlighted the crucial role and significance of startup companies. The need for providing greater recognition and revision of tax thresholds to encourage and sustain innovation aligned with new STI policies was also strongly advocated in the convention sessions.

The convention highlighted the need for establishing an endowment fund by stakeholders and setting up an incubation hub that can provide early support to innovative initiatives. Such efforts should be based on mutual sharing of benefits through

ownership of patents and product royalties. The representatives from the Ministry of Education, Science, and Technology (MoEST) acknowledged that the involvement of all stakeholders in developing policies and fund utilization will have a strategic advantage and will be taken into consideration while formulating future strategies and policies.

The convention further endorsed the need to engage all stakeholders in the implementation of a new STI program in 12 thematic disciplines, and the formation of a high-level STI steering committee to develop an STI positional paper through a consultative process.

It is worth mentioning here that NRNA has been an active partner of the government of Nepal in advancing knowledge investment for socio-economic development since the establishment of the Science, Knowledge, and Innovation (SKI) taskforce in 2009. NRNA has been playing a catalytic role in fostering connectivity among policymakers and professionals in the public and private sectors, establishing a robust professional alliance and partnership between the diaspora communities and institutions and professionals working in the STI sector in Nepal. NRNA has committed to help achieve the priorities of Nepal's Science, Technology, and Innovation (STI) policies, as well as expanding investment opportunities to promote collaborative research, science diplomacy, and alliances.

The GKC 2023 which was organized with the main objective of providing a common forum for both diaspora and Nepali professionals to share and exchange knowledge, innovation, expertise, and experience and create a positive environment for partnerships for Nepal's socio-economic development has remained a great success. We are pleased to announce that the convention papers will be published as a proceeding paper. NRNA has endorsed the nine-point declaration of the Global Knowledge Convention 2023 and expressed its commitment to the implementation of the recommendations of the convention. NRNA's contribution to knowledge investment was acknowledged by the Nepal Academy of Science and Technology (NAST), GoN, with the first diaspora S&T award

With these notes, I would like to express sincere gratitude to the symposium chairs, NRNA secretariat, and editorial teams for their dedicated efforts in compiling the report. I would also like to extend appreciation to the reviewers, chairs, co-chairs, and panelists for providing valuable insights and feedback.

I believe the recommendations of this report and declaration offer a clear guideline to policymakers and NRNA to develop a road map and action plan.

Dr Raju Adhikari
Chair
3rd Global Knowledge Convention

Acknowledgment

Global Knowledge Convention 2023 Organizing Committee and SKTT Department, NRNA would like to convey sincere thanks to the government of Nepal and NRNA for hosting this convention jointly and to all stakeholders for their support and contributions.

Special thanks to all Symposium Chairs/Co-Chairs, Committees viz; Management, Advisory, Steering, Volunteers, Rapporteurs, Media personnel, Sponsors, Associated partners, and individuals for their contributions which were instrumental in organizing the convention successfully.

Abbreviations

STI	Science Technology and Innovation
S&T	Science and Technology
ADB	Asian Development Bank
AICP	The American Institute of Certified Planners
AOD	Aerosol Optical Depth
ASNEngr	American Society of Nepalese Engineers
BIPPA	Bilateral Investment Protection and Promotion Agreement
BRT	Bus Rapid Transit
BSN	Biotechnology Society of Nepal
CEO	Chief Executive Officer
COP	Conference of the Parties
CSR	Corporate Social Responsibility
DNA	Deoxyribonucleic Acid
DRRM	Disaster Reduction and Risk Management
DTAA	Double Tax Avoidance Agreement
EE	Energy Efficiency
FAR	Floor Area Ratio
FDI	Foreign Direct Investment
FNCCI	Federation of Nepalese Chambers of Commerce & Industry
GAAP	General Anti Avoidance Principles
GAPs	Good Agricultural Practices
GDP	Gross Domestic Product
GEO	Geostationary Equatorial Orbit
GI	Geographical Indication
GIS	Geographic Information System
GKC	Global Knowledge Conference
GNP	Gross National Product
GoN	Government of Nepal
HYVs	High-Yielding Seeds
ICT	Information and Communications Technology
IGP	Indo Gangetic Plains
ILO	International Labour Organization
IOE	Institute of Engineering
IOM	International Organization for Migration
IPOs	Initial Public Offering
IPPAN	Independent Power Producers' Association
IT	Information Technology
KU	Kathmandu University
LEO	Low Earth Orbit
MoEST	Ministry of Education, Science, and Technology
MWU	Mid-West University

NAAMII	Nepal Applied Mathematics and Informatics Institute for Research
NARC	Nepal Agricultural Research Council
NAST	Nepal Academy of Science and Technology
NAST	Nepal Academy of Science and Technology
NDC	National Determined Contributions
NDF	Nepal Development Fund
NEA	Nepal Electricity Authority (NEA) or Nepal Engineer's Association
NID	National Identity
NMBU	Norwegian University of Life Sciences
NPC	National Planning Commission
NRNA	Non-Resident Nepali Association
NSFT	Nepal Science Foundation Trust
NSFT	Nepal Science Foundation Trust
NSO	National Statistics Office
NTA	Nepal Telecommunications Authority
NTNU	Norwegian University of Science and Technology
NUP	National Urban Policy
NUPD	National Urban Development Strategy
PEVC	Private Equity Venture Capital
PPP	Public-Private Partnership
R&D	Research and Development
RE	Renewable Energy
RECAST	Research Center for Applied Science and Technology
SDGs	Sustainable Development Goals
SEBON	Securities Board of Nepal
SKI	Skill, Knowledge, and Innovation
SKTT	Skill Knowledge and Technology Transfer
SNG	Synthetic Natural Gas
SSUDN	Smart and Sustainable Urban Development in Nepal
STI	Science, Technology, and Innovation
TU	Tribhuvan University
UN	United Nations
VC	Vice Chancellor
WEFE	Water-Energy-Food-Ecosystem

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BACKGROUND

Following the grand success of the 1st NRN Global Knowledge Convention in 2018 in Kathmandu, the Non-Resident Nepali Association (NRNA) organized the 2nd NRN Global Knowledge Convention on 09-11 October 2020 at Kathmandu University, Nepal. These conventions aimed to bring together experts of various disciplines from Nepal, the Nepali diaspora, and international scientific communities to explore Nepal's STI needs 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. The second convention endeavored to cover and expand its horizon in all possible dimensions along with the realization of the new context brought by the unprecedented COVID pandemic. The convention used 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. In the context of the COVID-19 pandemic, the convention discussed its socioeconomic impact on diaspora and resident Nepalis and the challenges and opportunities faced 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 Associations, Research Centers, International Organizations, Private Sectors, Industries, Startups, and Innovators) to explore the areas of collaboration and interest.

After the grand success of two conventions, the NRNA organized the third convention in Kathmandu from October 17-18, 2023, in Kathmandu. The event commenced together with the 11th International General Convention of the Non-Resident Nepali Association (NRNA) that took place in Kathmandu from October 17 to 20. This year, the Convention focused on the theme 'Science, Technology, Innovation, and Investment for Socio-economic Development of Nepal'.

The theme of the convention was shaped by the Nepal National Planning Commission's 15th Periodic Plan (2019-2024) and Sustainable Development Goals adopted by the United Nations. The convention created a vibrant platform to discuss and develop strategies and an action plan to ensure that science, technology, and innovation are valued and wisely used for the benefit of the Nepali people in the days to come. The convention provided unique opportunities for NRNA members and Nepali experts and investors for network, linkage, and knowledge sharing on the theme. The convention aimed to enhance multi-stakeholder engagement toward the utilization of science, technology, and innovation for the socioeconomic development of the country.

While this year's convention highly valued the output and recommendations of the previous conventions, the convention focused on the implementable agenda that could be used as a short and long-term plan.

The convention comprised of four plenary sessions focusing on the Roadmap to Nepal's future economy, Science & Technology investment, policies, collaboration, and commercialization, Future IT and digital technology – Nepal positioning, sustainable infrastructure, agriculture, and alternate energy, according to the organizer. Similarly, there were as many as 12 scientific symposiums in areas of smart and sustainable urban development, sustainable agriculture and food security, sustainable environment, disaster and risk management, renewable energy, biotechnology, and commercial opportunity, S&T investment and policies, disruptive digital and AI technology, population and public health, economy, and foreign investment, sustainable transportation and construction materials, and foreign employment and vocational-technical education, and a special session of Science and Technology commercialization and application.

The next chapters include all Plenary and Symposium sessions feedback and recommendations including the NRNA declaration.

SUMMARIES AND RECOMMENDATIONS

The 3rd NRN Global Knowledge Convention (GKC23) was organized by the Non-Resident Nepali Association (NRNA) in partnership with the government of Nepal (GoN) on 17-18 October 2023 in Kathmandu, Nepal. The convention received support from education and research institutes, the private sector, FNCCI, and various stakeholders. Rt. Hon. President of Nepal, Mr. Ram Chandra Poudel, inaugurated the convention on the evening of 17 October. Foreign Minister Hon. Mr. Narayan Prakash Saud, Minister of Education, Science and Technology Hon. Mr. Ashok Rai, Minister of Agriculture and Livestock Development Hon. Dr Bedu Ram Bhusal, and Minister of Labor, Employment and Social Security Hon. Mr. Sharat Singh Bhandari addressed the convention, along with Chief Election Commissioner Dinesh Kumar Thapaliya. Also, members of the Federal Parliament of Nepal, former ministers, high-ranking government officials, senior authorities of universities and research institutions, leaders of the private sector, accomplished international, national, and NRN experts, as well as students, attended the convention.

The abstract booklet, program details, and presentations have been made available on the convention's website at *www.knowledge.nrna.org.* Drawing from the knowledge shared during sessions, panel member inputs, and expert views on participant questions, the convention organizing committee prepared this comprehensive report for the Non-Resident Nepali Association and the Government of Nepal. The report contains a nine nine-point declarations and a summary of all presentations with key recommendations for consideration and implementation.

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3rd NRN GLOBAL KNOWLEDGE CONVENTION (GKC 2023) DECLARATION

The Non-Resident Nepali Association was organized the 3rd Global Knowledge Convention (GKC) on October 17 and 18, 2023 at Hotel Soaltee, Kathmandu. The theme of the convention was 'Science, Technology, Innovation and Investment for Socio-economic Development of Nepal', which was in alignment with the Fifteenth Plan (2019-2024) the Government of Nepal and the Sustainable Development Goals of the United Nations. The convention brought together Nepali diaspora scholars and scholars from Nepal's stakeholders from various organizations. The participants deliberated in various disciplines in view of utilizing science, technology, and innovation for the socioeconomic development of Nepal. The convention has endorsed the following 10-point declaration.

1. The subsequent conventions will be held without coinciding with the NRNA ICC Global Conferences to augment the vibrancy and effectiveness of the convention as a forum for networking, partnership formation, and knowledge sharing between stakeholders in the field of education, science, technology, research, and innovation.

2. A comprehensive report and proceedings of the GKC 2023 will be published by NRNA through Nepal Science Foundation Trust, which will be shared with the Government of Nepal and other stakeholders within the next six months.

3. The participants recommended to the Ministry of Education, Science and Technology to incorporate following elements in the upcoming bill on "National Applied Science, Technology, Inventions, and Innovation Fund":

    3.1 Formation of a Consortium Partner Committee consisting of the representatives of (a) Nepal Government, (b) Private Sector and Industries, (c) Startups and Entrepreneurs, (d) Academic and Scientific Institutions, (e) NRNA SKTT Department (NSFT), (f) Returnee Professionals, Scientists, and Entrepreneurs.

    3.2 The consortium shall make broad consultations with wide array of stakeholders and develop long term strategy and guidelines for the disbursements of the fund that should make it easier to support bottom-up approaches, grassroots level innovations, and works of Science, Technology, and Innovation (STI) works involving NRN and local scientific partners.

    3.3 The Government of Nepal and NRNA should initially contribute 1 crore rupees each to Nepal Science Foundation Trust, which in turn should develop a position paper and a road map to mobilize Nepali diaspora scientific and technological potential in Nepali research, development, innovation, and incubation works, and to kickstart global scholar exchange fellowship programs with particular aim of strengthening and retaining talents within Nepal.

4. Nepal should consider bringing a law requiring all levels of government and private corporations to spend minimum 1% of their budget in Research and Development, with a provision of special tax incentives for such expenditure to leverage faster socio-economic development.

5. Participants also collectively considered that it would be helpful to create a one-basket endowment fund for research and development jointly contributed by Government of Nepal, private industries, and NRNA, and be managed by a jointly created steering committee.

6. That Nepal is well positioned to carve its own innovative solutions in agriculture, mental well-being, bio-economy, and sustainable development by particularly capitalizing on traditional knowledge and culture, Vedic knowledge, wisdom and practices, and vertical geo-climatic attributes. Consequently, the participants urged NRNA and the Nepal Government to invest in science, technology, innovation and development in line with those strategic advantages.

7. Nepal should review its technology import strategy to discourage technologies that have unsustainable future and encourage emerging technologies and applications that are likely to be compatible with the emerging role of AI, robotics, big data, clean-energy, and green future, vocational education and, additionally, that have inspirational value in creating job opportunities and retaining talented human resource in Nepal. These strategies are better formulated if they are not donor dependent and donor driven; they are better made by wider stakeholder deliberations in view of safeguarding Nepal's people, nature, and environment.

8. To manage the rapid growth in urban population, Nepal should modernize its cities in a planned way to incorporate "smart city" concepts, that include modern public transit, reduced pollution, improved services, employment generation, and tourism promotion. Managed extraction and environmentally sensible use of critical construction materials should be part of this modernization effort.

9. NRNA should engage with NPC, NAST, Universities, and Private and Relevant Sectors to create proactive representation as a means of creating a continuous channel of engagement in national policy formulation.

(The declaration was endorsed by the NRNA ICC Executive Committee on 19/10/2023)

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SUMMARIES OF PRESENTATIONS AND DISCUSSIONS

This convention successfully brought together experts from Nepal, the Nepali diaspora, and the international community to share their knowledge and expertise, fostering networking and collaboration. The goal was to share experiences, provide key recommendations, and help formulate an action plan to propel Nepal toward a knowledge-based economy.

The convention featured four plenaries and 12 symposium sessions covering diverse topics such as science and technology policy, knowledge-based economy, innovation and technology transfer, infrastructure, renewable energy, disaster management, health, agriculture, education, environment, and finance. Experts and distinguished panel members contributed insights on a wide range of subjects. Theme-wise highlights of the presentations and major discussions are presented in the section below:

Road Map to Future Economy

- Greater focus on sustainable investments, and the private sector should take a lead to drive economic growth.
- Enhance infrastructure resilience, particularly in roads and cities, through the implementation of green development practices.
- Ensure proper and sustainable use of natural resources, particularly focusing on land, mountains, and rivers, to address issues such as barren land, food security, and youth migration.
- Liberalize financial investment policies to encourage foreign direct investments. Replace the "One Window Investment Policy" with Automatic Rules, as practiced by our neighbors. Reduce government involvement in international private-party business contracts, allowing investors to choose international jurisdictions for business dispute settlements. Simplify bankruptcy and insolvency rules to provide easy exit avenues, allowing direct repatriation of funds via commercial banks without needing prior approval from the central bank. Extend brokerage and wealth management licenses to NRNs and foreign investors. Increase the fraction of allowed shareholding in capital-intensive projects and promote the provision of management and consultancy services to attract significant international investors.
- Extend the Double Tax Avoidance Agreement (DTAA) to all countries from which foreign investment is entering Nepal. Introduce General Anti-Avoidance Principles (GAAP) to enable Nepal to control tax leakages and close potential loopholes, such as sham transactions and treaty shopping, especially for capital gains taxes. Simultaneously expand the Bilateral Investment Protection and Promotion Agreement (BIPPA) with DTAA to instill a sense of security among foreign investors regarding their investments.
- The new legal framework (India's 2016 bankruptcy code) has allowed creditors to initiate insolvency proceedings against defaulting companies, as well as for courts to overthrow company boards, making it possible for distressed asset sales to be conducted. This way, Private Equity Venture Capital (PEVC) will grow.
- Allow NRNs to invest in commercial real estate projects and limit repatriation to maximum two properties capped to USD 500,000 per year and both payments via a banking channel. India allows USD 1 million a year.
- Allow NRNs to retain property or cash or securities or even overseas companies abroad even though they migrate to Nepal.

Science, Technology and Innovation

- Nepal should review its technology import strategy to discourage unsustainable technologies and instead, promote emerging technologies and applications that align with the evolving landscape of disruptive digital technology, artificial intelligence, robotics, big data, clean energy, and green future. The focus should be on vocational education and technologies with inspirational value, creating job opportunities, and retaining talented human resources within Nepal. These strategies are more effectively formulated when they are not donor-dependent and donor-driven. They should be made by wider stakeholder deliberations in view of safeguarding Nepal's people, nature, and environment.

- Prioritize technological advancement through research and development, capacity building and technology transfer to stay ahead in the realm of development.

- The participants recommended to the Ministry of Education, Science and Technology to incorporate the provision of the Consortium Partner Committee in the upcoming bill "National Applied Science, Technology, Inventions, and Innovation Fund". The Consortium Partner Committee can be formed consisting of representatives from various sectors including:

a. Government of Nepal
b. Private sector and industries
c. Startups and entrepreneurs
d. Academic and scientific institutions
e. NRNA SKTT Department (NSFT)
f. Returnee professionals, scientists, and entrepreneurs

- The consortium shall conduct broad consultations with a wide array of stakeholders and develop a long-term strategy and guidelines for the disbursement of the fund. This strategy should facilitate the support of bottom-up approaches, grassroots-level innovations, and works of Science, Technology, and Innovation (STI) involving NRN and local scientific partners.

- The government of Nepal and the NRN Foundation should initially contribute Rs 10 million each to the Nepal Science Foundation Trust. The Trust should develop a position paper and a roadmap to mobilize the scientific and technological potential of the Nepali diaspora in research, development, innovation, and incubation projects. The objective is to kickstart global scholar exchange fellowship programs with a particular focus on strengthening and retaining talent within Nepal.

- NRN should engage with NPC, NAST, universities, private and other relevant sectors to create proactive representation as a means of creating a continuous channel of engagement in national policy formulation.

- Nepal should consider bringing a law requiring all levels of government and private corporations to spend minimum 1 percent of their budget in Science, Technology and Innovation, with a provision of special tax incentives for such expenditure to leverage faster socio-economic development.

- Participants also collectively considered that it would be helpful to create a one-basket endowment fund for research and development jointly contributed by the government of Nepal, private industries, and NRNA, and

be managed by a jointly created steering committee.

- Nepal is well-positioned to carve out its innovative solutions in agriculture, mental well-being, bio-economy, and sustainable development by capitalizing on traditional knowledge and culture, Vedic knowledge, wisdom, practices, and vertical geo-climatic attributes. Consequently, the participants urged NRNA and the government of Nepal to invest in science, technology, innovation, and development in line with these strategic advantages.

- Develop an outcome-oriented and visionary Science, Technology, and Innovation (STI) policy, recognizing a knowledge-based economy as an essential component of the nation's economy. Revamp the STI development policy to encourage multi-sector collaboration in the economy, aligning it with the vision for a peaceful and prosperous Nepal by 2030. Increase investment in research and development from the current 0.35 percent of GDP to at least 1 percent, gradually raising it in the long run to over 2 percent. Establish globally competitive research institutions and maximize the development and use of state-of-the-art technology in all sectors of the economy through collaboration with the NRNA.

- Establish an Innovation Endowment Fund involving NRNA/GoN/private sector to promote technology and innovation. Make Nepal's economic policy conducive to innovation-based startup endeavors. Introduce an entrepreneurship-based curriculum in Nepali universities and increase partnerships with industries to transform academic research into practical applications. Revamp GoN's infrastructure to enhance the patent database and enforce intellectual property rights. Encourage NRNs and international entrepreneurs to innovate and invest in our indigenous resources and technology.

Smart and Sustainable Urban Planning

- To manage the rapid growth in urban population, Nepal should modernize its cities in a planned manner, incorporating 'smart city' concepts. This includes implementing modern, integrated public transit systems, such as an underground Metro Rail in heavily populated areas, with the objectives of reducing pollution, improving services, generating employment, and promoting tourism.
- Municipalities should assess walkability and pedestrian safety in their jurisdictions and plan to create appropriate zoning, policies, and standards to improve walkability and ensure safety. Assessing the 'Walk Score' for specific areas and reviewing applicable international best practices will help create effective plans for enhancing walkability.
- Planners should study the impact of urban development on climate change and sustainability. They can look at specific case examples in Nepal to understand what works and what does not.
- Planners should identify policy gaps related to Nepal's urbanization, and create plans for improving the urban functions and quality.
- Urban forestry and landscaping are important to enhancing the urban environment and improving the quality of life for residents. These practices contribute to food production in urban areas. Planners can strategically plant vacant areas in the city with fruits and vegetables, enhancing the urban food supply, aesthetics, and overall environment.
- Bigger cities in Nepal should assess the feasibility of implementing Bus Rapid Transit (BRT) as a cost-effective means of transport. As Nepal has recently started a BRT system, its success and challenges should be studied. The lessons learned from the existing BRT system can help in the expansion of such systems to new cities.
- Enhance municipalities' institutional capacity, make them financially strong and technically capable. Increase investment in urban infrastructure development and attract the private sector. Develop coordination mechanisms among central government agencies, provinces, and municipalities. Localize and implement SDG, New Urban Agenda, and Sendai Framework for Disaster Risk Reduction and COP28.
- By effectively implementing urban development strategies outlined in the Periodic Plan, *NUP 2007, and NUDS 2017,* with collaboration among the three tiers of government, communities, and stakeholders, the cities of tomorrow could become resilient, inclusive, and environmentally friendly.

Disruptive Agriculture and Food Security

- Establish an agro-food innovation supercluster in Nepal to ensure global competitiveness in agro-food industries through a shared reliance-based knowledge partnership among foreign and domestic laboratories, technology transfer offices, research and academic institutions, and small and medium enterprises.
- Develop commercialization strategies for native Ayurvedic, medicinal, and aromatic plants and microbes as substitutes in agro-food and pharmaceutical applications.
- Introduce a system for food security, food safety, and the promotion of healthy eating programs in partnership with the private sector and NRNA.
- Promote the adoption of eco-friendly practices in agriculture to reduce CO2 emissions and encourage sustainable farming techniques.
- Promote agro-ecological, climate-resilient technologies, innovations, and solutions for sustainable agriculture and food security.
- Revitalize and strengthen indigenous knowledge, wisdom, and innovations in agriculture by combining modern science and business innovation for sustainable food systems.
- Promote cold and dry chain technologies for improving storage of perishable and dry products (seeds, foods, feeds) reduce losses, and enable local and national food stocks.
- Use digital technologies (digital mapping, satellite data, artificial intelligence, etc.) for cost-effective, efficient, and resilient approaches to crop productivity and sustainable food systems.
- Promote organic/ecological farming with ecotourism for business innovation, economic viability, and sustainability of the food system.
- Advocate policy and institutional reforms for timely delivery and supply of quality inputs (seeds, fertilizers, credit, insurance etc.) and technical services to farmers as well as increased investment.
- Promote high-value and low-volume niche agro-products that have the comparative advantage of production. Production can be promoted by marketing them as organic agro products. This step will also help in agro-ecotourism.
- Facilitate in the development and implementation of policies and programs in strengthening the water, energy, food, and ecosystem (WEFE) nexus to maximize synergy and minimize tradeoffs for sustainable economic development.

Disruptive Digital and Artificial Intelligence Technologies

- All AI-powered project activities will grow to support indigenous technologies and local industry's needs. This growth will also contribute to the generation of numerous AI projects, fostering a pool of IT professionals who will serve as the backbone for outsourcing IT companies in Nepal, thereby supporting the concept of an IT hub in Nepal.

- **Collaboration and Innovation:** Emphasize the need for collaborative efforts between the government, private sector, and international organizations to foster innovation and digital transformation in Nepal. Encourage sharing best practices and utilizing available resources, including NRNs' knowledge and resources, to drive national development.

- **Infrastructure and Connectivity**: Support the implementation of innovative technologies, such as satellite connectivity using Low Earth Orbit (LEO) satellites, to bring reliable and affordable internet access to remote areas. Collaboration with organizations like NRNA and service providers is essential to make this initiative a reality. This will extend services to marginalized communities and enhance connectivity in challenging terrains.

- **Cybersecurity and Data Protection**: Recognize the critical importance of cybersecurity in Nepal's digital landscape. Strengthen cybersecurity infrastructure, enhance awareness, and implement policies and laws to protect individuals and data from cyber threats. Consider the shared responsibilities of service providers, families, communities, and authorities in ensuring online safety, particularly for children.

- **Education and Skill Development:** Prioritize education and skill development in technology to prepare Nepali students for the digital age. Encourage collaboration between academia, industry, and government to provide students with the necessary training and resources to excel in technology-related careers.

- **Good Governance and Implementation:** Implement good governance practices across all sectors, addressing issues related to infrastructure, healthcare, education, and more. Ensure policies, regulations, and implementation plans are in place to achieve these goals.

- **Encourage Entrepreneurship:** Promote entrepreneurship as a solution for job opportunities, particularly for female students. Support and facilitate the growth of startups and small businesses within the technology sector to create employment opportunities and drive economic growth.

- **Embrace Digital Transformation in Various Sectors:** Recognize the broad significance of digital transformation across multiple sectors, including agriculture, education, transportation, health, tourism, finance, local businesses, governance, information accessibility, and job creation. Encourage the application of information technology in all these areas.

Renewable Energy

- Develop a long-term energy plan with ingrained implementation transparency. Start a balanced approach in creating energy from mixed renewable energy sources such as solar, wind, hydro, biogas etc. Prioritize the use of technology for "Waste to Energy" conversion as it is highly applicable in Nepal. Reduce consumption of energy by adopting efficient appliances and equipment, and smart usage.
- **Green Economy Initiatives:** Align with the government's green economy initiatives, supporting systematic efforts for sustainable development in the energy sector, aiming to generate an additional 28,000 megawatts of electricity.
- **Cross-Border Energy Trade:** Encourage initiatives for cross-border trade of surplus (reserve) electricity production and implement off-grid energy systems, considering Nepal's diverse geography and achieving energy security.
- Nepal government is committed to energy transition, which will lead to exponential growth in employment associated with green energy sectors, such as renewables, batteries, and hydrogen. Nepal can become an exporter of green hydrogen. Given the government's policy thrust, companies, businesses, and industries will likely benefit as first movers with the help of Nepal Electricity Authority, a state-owned power utility. The government's subsidies for hydro and solar power plants will also help in this regard.
- Green hydrogen technologies will create new opportunities in high-skilled occupations in the coming years, necessitating a review of university curricula. Hydrogen, as an energy carrier, serves as a medium for storing energy from renewable and other sources. It can be generated at a scale with a zero-carbon footprint by using renewable energy, such as solar or wind power, and electrolysis of water.

Environment, Disaster and Risk Management

- Incorporate disaster risk reduction and management as an essential part of every development project. To improve disaster risk reduction and mitigation, increase investment, perform multi-hazard and risk mapping, adopt emerging technology, reduce food waste by improving storage capabilities and pre-storage treatment measures, increase awareness for disaster preparedness and infrastructure constructions, reduce post-disaster response time and increase the size of relief operation.
- **Climate-Resilient Infrastructure:** Emphasize constructing climate-resilient projects, integrate climate considerations in hydro projects, solar, wind, biomass and green hydrogen, and work towards achieving a zero-carbon emission status by 2045.
- **Streamline Environmental Impact Assessments:** Collaborate with the donor community to expedite Environmental Impact Assessments without compromising integrity, addressing financial constraints.

- **Disaster Notifications:** Develop a reliable system for disaster notifications and ensure land security to mitigate the impact of natural disasters.
- **Policy Framework:** Develop and enforce comprehensive policies for disaster risk reduction and environmental management. This includes legal framework, guidelines, and strategies that align with international best practices.
- **Institutional Strengthening:** Strengthen institutions responsible for disaster management at all levels—local, provincial, and national. Ensure these institutions have the necessary resources, expertise, and coordination mechanisms.
- **Early Warning Systems:** Invest in and maintain effective early warning systems. Utilize technology and community engagement to disseminate timely alerts, enhancing preparedness and reducing vulnerability.
- **Capacity Building:** Enhance the technical capacity of local communities and government officials. This includes training programs for disaster response, risk assessment, and community-based resilience initiatives.
- **Infrastructure Resilience:** Implement and enforce building codes that prioritize resilience to seismic activity and other environmental hazards. Conduct thorough risk assessments for critical infrastructure projects.
- **International Collaboration:** Foster collaboration with international organizations and donor agencies. Mobilize resources and expertise to bolster disaster response and recovery efforts.
- **Public Awareness and Education:** Conduct widespread public awareness campaigns on disaster preparedness, risk reduction, and the importance of environmental conservation. Educate communities on evacuation procedures and sustainable practices.
- **Research and Data Collection:** Invest in scientific research to understand the specific risks and vulnerabilities unique to Nepal. Collect and maintain accurate data on environmental conditions, hazards, and their potential impacts.
- **Climate Change Adaptation:** Integrate climate change adaptation strategies into disaster risk management plans. Recognize the evolving nature of risks due to climate change and formulate adaptive responses.
- **Community Involvement:** Empower and involve local communities in decision-making processes. Engage communities in the formulation and implementation of disaster risk reduction strategies, tapping into local knowledge and practices.

Population and Public Health

- Increase government visibility in smart digital health education system and public health policy and establish world-class virology research and development (R&D) centers. Create rehabilitation healthcare facilities to aid patients affected by natural disasters and complicated diseases. Improve healthcare service delivery for patients affected by dementia, psychological disorders, and mental health issues. Establish sperm and ovum banks in Nepal. Enhance the affordability of radiation oncology through public-private partnerships (PPP). Expand the safe motherhood program and in-vitro fertilization using PPP. Develop a national policy on telemedicine.
- Make a comprehensive social security policy to cover the private sector, Nepali workers living abroad and informal-sector employees. Achieve sustainable social security through job creation from the public and private sectors and shifting from a noncontributory (pay as you go) to a contributory system. Implement a performance-based pay system and nonpermanent contract employment in the public sector.

Sustainable Infrastructure and Construction Materials

- Develop infrastructure projects, procurement, and delivery structures where the government, market, and civil society work in harmony. Work with experts and stakeholders. Do not reject alternate views/ recommendations off-hand. Encourage and support one-stop decision-making. Stop political interference in infrastructure project development and management. Stop rent-seeking and license-raj management style. Develop enough in-house capabilities to reject irrational conditionalities from donors. Set up a credible agency to forecast the country's hydropower needs and development strategy. Develop committed and knowledgeable project oversight agencies.
- **Long-Term Infrastructure Planning:** Advocate for holistic, long-term plans (15-20 years) with cross-party endorsement for infrastructure development.
- **Private Sector Engagement:** Actively involve the private sector in sustainable projects, adopting international best practices while minimizing political interference.
- **Gender-Inclusive Policies:** Promote gender-sensitive policies, encourage women in decision-making roles, and address their challenges in transportation.
- **Diaspora Collaboration:** Facilitate collaboration with the diaspora for knowledge transfer, capitalizing on their expertise, avoiding past mistakes, and contributing to sustainable infrastructure.
- **Context-Specific Projects:** Support constructing context-specific projects that optimize resource utilization, addressing concerns about underutilization.
- **Community-Centric Development:** Prioritize community-centric development approaches, enhancing societal well-being, improving quality of life, and aligning with diverse population needs.
- Managed extraction and environmentally sensible use of critical construction materials should be part of this modernization effort.

Foreign Employment and Vocational Education

- Create skilled human resources and maximize the utilization of already available human capital. Reverse and recycle the brain-drain culture to brain-gain through specific measures. Increase resources and change traditional administrative approaches and mechanisms for the smooth transfer of returnee professionals in the local research environment. Utilize migrant workers' skills and expertise in the development of Nepal. Open training centers and provide seed money at the local levels to help them integrate in the economy. Address urgent issues of migrant workers such as legal issues aboard, pension for migrant workers, and establishment of shelters particularly for adversely impacted women.

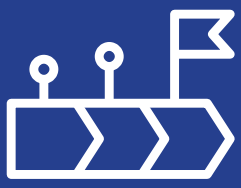
- Prioritize human capital development through vocational training and education to retain the workforce within the country. Invest in human capital development from infancy to adulthood, prioritizing immunization, education, and skill development to foster long-term growth and development. Explore new financing sources to support and implement various initiatives, given the limited fiscal space.

Key Recommendations

- Some of the basic structures needed for collaboration between the Nepali diaspora and the government of Nepal have already been built since the establishment of the Non-Resident Nepali Association in 2003 and the NRN 2nd Knowledge Convention. To make this collaboration more effective for knowledge-based economic development, we recommend that the GoN and NRNA establish sector-based committees comprising representatives from GoN, NRN, and experts from Nepal. We also recommend that the GoN invite diaspora experts to participate in GoN's policy-making bodies and engage in policy formulation and implementation. These mechanisms will help utilize diaspora skills, knowledge, and expertise effectively to support Nepal's developmental needs and provide real solutions.

4

REPORTS OF PLENARY SESSIONS



ROAD MAP TO NEPAL'S FUTURE ECONOMY

4.1 PLENARY 1

Mr. Stephen Danyo,
Sector Leader, Sustainable Development, World Bank

Nepal has taken a leadership role in operationalizing the move to a more sustainable and resilient economy. Nepal has achieved a lot, including increasing forest cover to 45 percent from 25 percent, a feat only matched by Costa Rica among developing countries. Nepal has accomplished the elimination of malaria and achieved the highest rollout of COVID-19 vaccines among developing countries, with 85 percent of the population vaccinated. Moreover, the country expanded access to electricity to 93 percent in 2021 and maintained a 5 percent GDP growth for 10 years until the Covid-19 crisis hit.

However, Nepal, like many countries, is facing simultaneous shocks, termed polycrisis, which include challenges such as COVID-19, poverty, inequality, environmental damage, and a slowdown in the global economy. With limited fiscal space, the government's ability to respond through public expenditure is restricted, necessitating the need for grants and subsidized loans to support the recovery efforts.

Recognizing the interconnectedness of people, the planet, and the economy, the government has responded by emphasizing the unlocking of human capital potential as a driver of growth. They have recognized that investments and policies designed for the benefit of the Nepali people, along with sustainable investments and the enabling of the private sector are crucial.

In addressing the challenges, it is essential to focus on water, agriculture, and forest systems, as well as irrigation systems. The government, in collaboration with the private sector, needs to prioritize the establishment of an effective notification system for natural disasters, ensure land security, and build resilient roads, as the current infrastructure has not been able to withstand various challenges, including landslides.

One notable project undertaken by the World Bank involves the construction of green infrastructure alongside roads, which can effectively prevent landslides and other environmental hazards. Developing sustainable cities with a focus on green development is also a key opportunity for Nepal, given the significant potential for clean energy within the country.

In addition, providing vocational training and education can play a crucial role in curbing the trend of Nepali youths migrating abroad for work. To finance these initiatives, the government must explore new financing sources to adequately address these areas and achieve sustainable and inclusive development.

Recommendations

- Increase focus on sustainable investments and the private sector should take a lead to drive economic growth.
- Enhance infrastructure resilience, particularly in roads and cities, through the implementation of green development practices.
- Develop a reliable system for disaster notifications and ensure land security to mitigate the impact of natural disasters.
- Prioritize human capital development through vocational training and education to retain the workforce within the country.
- Explore new financing sources to support and implement various initiatives, given the limited fiscal space.

Dr Prakash Sharan Mahat,
Finance Minister

We are currently facing an economic crisis that demands immediate attention. The economic progress has not matched the expected trajectory since 1990. Recognizing this, the current coalition government is striving to propel development forward. Over the years, the country has witnessed remarkable growth. The economy has increased by 60 times since 1990, while per capita income has risen by sevenfold. Additionally, the average life expectancy has extended to 72 years from 54 years, and there have been significant improvements in revenue collection and access to electricity. Moreover, efforts have led to a reduction in maternal and infant mortality rates, alongside advancements in road connectivity and water supply.

Despite the challenges posed by natural disasters, the COVID-19 pandemic, and a decade-long civil war, there is a strong determination to achieve development and progress through a well-defined roadmap. This entails building a stable foundation and addressing weaknesses within the system. It is crucial to institutionalize the 2015 constitution, build institutions accordingly, and establish laws in line with the three-tiered government structure to ensure a balanced distribution of rights and responsibilities.

Despite the limitations of resources, it is important to communicate the abundant opportunities available in Nepal, particularly to the country's youth. With a focus on key sectors, such as hydropower, information technology, tourism, and agriculture, significant strides have been made. The encouragement of private sector participation in the development of 300-400 MW hydropower projects signifies a promising future in the energy sector. Similarly, the growth of the IT sector, with substantial product exports and increased foreign exchange allowance for investment, has solidified its position as a major contributor to the economy.

While the tourism sector faced a setback following the COVID-19 pandemic, there is a noticeable surge in domestic and international tourism, leading to increased investments in the hotel industry. Also, the agricultural sector is experiencing a resurgence, with individuals returning from abroad to invest in and revitalize Nepal's agricultural potential. With such promising developments across various sectors, Nepal is poised to leverage its substantial growth potential in the near future.

Key points

- Nepal has seen substantial economic growth, including a notable increase in GDP, per capita income, life expectancy, and infrastructure improvements.
- The government aims to establish a clear roadmap for stability, focusing on the implementation of the 2015 constitution and building laws tailored to the three-tiered government structure.
- Key sectors such as hydropower, IT, tourism, and agriculture present significant opportunities, with the government actively promoting private sector engagement and foreign investment.
- Despite challenges, the IT and tourism sectors have shown resilience, with a noticeable increase in product exports and a resurgence in both domestic and international tourism, leading to increased investments in the hospitality industry.
- There is a growing interest in Nepal's agricultural sector, with returning migrants investing in the country's agriculture, contributing to its overall economic growth.

Mr. Rajesh Agrawal,
President, CNI

Currently, the global economy is facing a recession, and our economy is following a similar trajectory, with a mere 1.86 percent GDP growth recorded in the third quarter, projected to slow down to 0.8 percent in 2023. The foreign currency reserves are sufficient to cover imports for up to 11 months, and the balance of payments remains stable. However, the major challenges revolve around a production deficit and high-interest rates, resulting in a significant decrease in market demand and the closure of several industries, with many others teetering on the brink of shutdown.

The scarcity of available funds in the market, coupled with banks' inability to lend at lower rates, has limited industrial operations to a mere 30 percent capacity utilization. This decline in industrial output has also led to a reduction in imports and subsequently impacted overall revenue. Compounded by a 7 percent inflation rate, maintaining stable prices has become challenging, given the increased costs of products in the international market. Also, the credit growth remains far below the government's targeted 11 percent, signaling the persistence of the recessionary pressures.

As the government attempts to phase out the subsidies provided during the COVID-19 pandemic, the anticipated economic revival with a 6 percent growth target seems increasingly daunting, as the low revenue has significantly impeded economic activities.

Recommendations

- Lower interest rates and facilitate easier credit access to stimulate market demand and enhance industrial operations.
- Adopt policies promoting sustainable economic growth and targeted credit expansion to achieve the GDP growth target.
- Implement a phased approach to manage the transition away from COVID-19 subsidies while maintaining economic stability.

Mr. Sunil KC,
President, Nepal Bankers' Association

The banking sector, with a balance sheet comparable to Nepal's GDP, has become a significant generator of employment, creating 60,000 jobs to date. With a presence in every 752 local units, the banking system has emerged as a transformative force within the economy.

While challenges persist, both domestically and globally, there remain encouraging prospects, particularly evident in the positive balance of payments and robust foreign exchange reserves. The banking system has made substantial investments, amounting to 300 billion dollars, in the development of hydropower, thereby contributing significantly to the expansion of green energy initiatives.

This momentum presents a promising opportunity for further investment, with the potential for Nepali banks to fund large-scale projects with capacities of up to 300 MW. Addressing the funding gap requires sustainable approaches such as the utilization of green bonds and other viable financial instruments. Moreover, the banking sector is actively seeking collaboration with Non-Resident Nepalis, facilitating the opening of bank accounts in Nepal from abroad for the convenience of NRNs.

Key points and recommendations

- The banking sector in Nepal plays a crucial role, with a balance sheet equivalent to Nepal's GDP and creating 60,000 jobs.
- Banks have a widespread presence, with approximately one bank for every 752 local units.
- Despite challenges, the banking sector demonstrates positive performance in balance of payments and foreign exchange reserves.
- Significant investments of 300 billion dollars have been made in hydropower, presenting opportunities for further green energy investment.
- The banking industry welcomes collaboration with Non-Resident Nepali (NRNs), facilitating the opening of bank accounts in Nepal from abroad.

Dr Yuba Raj Khatiwada,
Former Finance Minister

Natural resources can serve as a boon or a curse, depending on their proper or improper use. Utilizing land, mountains, and rivers appropriately can yield positive results, as seen in their productive use as financial assets. However, mismanagement of these resources has led to issues such as increased barren land, food security problems, and a significant youth exodus to foreign lands.

While the emphasis on green development and infrastructure is commendable, the agricultural sector's practices have led to CO2 emissions, necessitating a shift towards more sustainable agricultural methods. In the realm of transportation, where 50 percent of the total fossil fuel consumption is attributed to the sector primarily reliant on diesel, there is a critical need for alternative and sustainable transportation solutions.

Investments in human capital development, ranging from infancy to adulthood, including immunization, education, and skills development, must form a fundamental aspect of the roadmap for progress. Incorporating technological advancements through research and development and technology transfer is essential to foster overall development.

Strengthening federalism and decentralizing development efforts to the grassroots level is crucial, as it not only promotes democratic principles but also builds resilience within the federal governance structure to withstand various shocks and challenges.

Recommendations

- Ensure proper and sustainable use of natural resources, particularly focusing on land, mountains, and rivers, to address issues such as barren land, food security, and youth migration.
- Promote the adoption of eco-friendly practices in agriculture to reduce CO2 emissions and encourage sustainable farming techniques.
- Invest in human capital development from infancy to adulthood, prioritizing immunization, education, and skill development to foster long-term growth and development.
- Prioritize technological advancement through research and development and technology transfer to stay ahead in the realm of development.
- Strengthen federalism and decentralize development efforts to empower local governance and enhance democratic principles while building resilience to withstand various challenges and shocks.

Dr Upendra Mahato,
Founding President, NRNA

For economic prosperity, it is essential to foster collaborative relationships with our neighboring countries, India and China, particularly as we find ourselves situated between two economic giants. Recognizing that they are progressing at a faster pace while we lag behind, we must leverage our potential, with a primary focus on hydropower.

The example of how Middle Eastern countries transformed their economies by exporting crude oil underscores the significance of investing in hydropower. With India's decision to purchase electricity from Nepal, there is now an opportune moment for Nepal to invest freely in hydropower and harness its resources for economic growth and development.

Recommendations

- Foster collaborative relations with neighboring countries for economic prosperity
- Invest in hydropower and harness resources for growth

Prof. Dr. Parthibeshwar Prasad Timilsina,
TU, Nepal

To strengthen the economy of Nepal, it is crucial to establish a well-defined roadmap for economic development over a significant period, ideally spanning 20 years and divided into four distinct phases. This approach should foster a coordinated and committed strategy, driven by objective criteria, ensuring a consensus on economic development among political parties, thereby eliminating policy dualities.

Supporting the agricultural sector by providing regular access to fertilizers, managing irrigation water, and supplying technology and labor for increased agricultural production would effectively reduce the dependency on agricultural imports.

It is important to provide support to small and medium-scale industries, fostering production growth, while simultaneously encouraging large business entities to expand and promote exports, thereby generating national income and creating a new wave of entrepreneurs.

In leveraging the economic potential of neighboring countries like India and China, it is essential to capitalize on their anticipated growth over the next two decades, seeking to maximize benefits for Nepal. Furthermore, the Non-Resident Nepali Association (NRNA) can play a pivotal role in collaborating with local youths to foster the creation of a vibrant entrepreneurial ecosystem.

Recommendations

- Establish a 20-year economic roadmap for coordinated and sustainable development, ensuring political consensus and consistency in policies.
- Prioritize agricultural development to reduce dependency on imports by facilitating consistent fertilizer supply, efficient water management, and technological support.
- Support the growth of small and medium-scale industries and promote exports to boost national income and foster new entrepreneurs.

- Leverage the economic potential of neighboring countries, India and China, to maximize benefits for Nepal.
- Foster collaboration between the Non-Resident Nepali Association (NRNA) and local youth to drive entrepreneurship and create a dynamic business environment.

Mr. Manish Jha,
Member, House of Representatives

The unification process of Nepal traces back to 255 years ago, with the establishment of the country's first private sector company a century later. In 1923, the Kamdhenu Charkha Pracharak Mahaguthi Sangh was founded, marking a significant milestone. Furthermore, 87 years ago, a businessperson from Kolkata made the first foreign direct investment (FDI) of INRs 100,000 in Nepal. The establishment of the first school occurred 120 years ago, while the country's first election took place 64 years ago, reflecting a rich historical legacy that must be integrated into the nation's achievements.

In our journey of progress, it is essential to address our weaknesses and establish a robust system. Despite the necessity for investments in education and technology, we have faced constraints that require restructuring and rebuilding. Strengthening institutional frameworks is crucial, as the existing institutions, though numerous, often lack the necessary effectiveness and functionality, emphasizing the importance of institutional practices over the mere existence of institutes.

Drawing from the global context, India boasts over 5,000 universities, whereas the UK, with a smaller number of universities, has some of the best educational institutions globally, underscoring the need for a functional system that effectively utilizes resources. The exploration of new contributors to the economy, such as the growing prominence of the IT sector, is essential, given its increasing significance in both India and Nepal. However, it is crucial to address the decline of the manufacturing sector, which currently contributes only 3 percent to the national economy, highlighting the need for revitalization efforts in this area. Amidst these considerations, it is important to prioritize the development and empowerment of rural areas across Nepal.

Recommendations

- Address weaknesses and prioritize the establishment of a robust system, particularly in education and technology, through restructuring and effective institutional development.
- Emphasize the need for functional institutional frameworks over the mere existence of institutions to ensure effective practices in Nepal.
- Highlight the significance of a functional educational system based on the global context, comparing countries like India and the UK.
- Explore new contributors to the economy, such as the growing IT sector, while focusing on revitalizing the declining manufacturing sector.
- Prioritize the development and empowerment of rural areas across Nepal.

Contributors: Dr Bindu Lohani, Dr Prakash Sharan Mahat, Mr. Stephen Danyo, Mr. Rajesh Kumar Agrawal, Mr. Sunil K.C., Dr Yubraj Khatiwada, Dr Upendra Mahato, Prof. Dr Parthibeshwar Prasad Timilsina, Mr. Manish Jha

4.2

PLENARY 2

SCIENCE, TECHNOLOGY INVESTMENT, INNOVATION, COLLABORATION AND COMMERCIALIZATION

Prof. Dr Dilip Subba,
Vice-chancellor, NAST, Nepal

Science, Technology, Investment, Innovation, Collaboration, and Commercialization are all intricately linked to the transformation of the socio-economy. Science is essential for the production of knowledge, while technology facilitates the creation of products and services. Investment is crucial not only for the production of knowledge but also for scaling up their production and commercialization. Collaboration fosters the sharing of resources and risks, leading to the generation of collective ideas. Commercialization, in turn, creates wealth and fosters the economic development of nations, contributing to the overall well-being of people.

The experience of developed countries has emphasized the critical role of knowledge capital in this day and age. Knowledge itself serves as capital and its generation further fuels capital accumulation. Notably, a robust economy is strongly intertwined with the strength of science, technology, and innovation. Increased investment in Research and Development (R&D) directly correlates with higher profits for businesses and companies.

I urge the scientific community, as well as governmental, private sector, and academic institutions, to prioritize the advancement of robust science education, especially within the realm of technology curriculum. We must focus on solving research problems that yield actionable outcomes and nurture innovation-driven entrepreneurs. Substantial government investment in R&D should be encouraged, accompanied by the provision of soft loans and tax exemptions to support these initiatives. A strong research partnership between the private sector and universities is also crucial for sustained progress.

In addition, it is important to recognize the significance of science diplomacy. All advancements achieved through scientific pursuits must prioritize the preservation of the planet's health and avoid the destruction of ecosystems. Development efforts should never compromise human values and social norms.

The Nepal Academy of Science and Technology (NAST) has played a significant role by providing research and innovation incentives as well as science and technology promotional incentives. This has been instrumental in promoting research activities. Moving forward, the future plans of NAST include the introduction of cutting-edge technologies in agriculture, the conservation and modernization of indigenous technologies, the development of urban health technologies, the commercialization of medicinal plants through research, and the establishment of collaborations with international centers of excellence for enhancing research capacities.

It is time to advocate for science and collectively strive to position Nepal as a technology leader rather than a mere follower.

Recommendations

- Prioritize strong science education and technology curriculum to foster innovation and knowledge production.
- Encourage substantial government investment in Research and Development (R&D) by offering soft loans and tax exemptions to promote the commercialization of research.
- Foster strong research partnerships between the private sector and universities to encourage collaborative innovation and idea sharing.
- Emphasize the importance of science diplomacy and ensure that scientific development efforts prioritize the preservation of the planet's health and the protection of ecosystems, while upholding human values and social norms.
- Establish initiatives to position Nepal as a technology leader by introducing cutting-edge technologies in various sectors, promoting indigenous technology conservation and modernization, and enhancing research capacities through collaborations with international centers of excellence.

Dr Prativa Pandey,
CEO, Herveda Botanicals, Nepal

After completing my PhD in the United States, I spent two years working there before returning to Nepal eight years ago. During my time back in Nepal, I encountered several challenges and one of the most significant obstacles faced by startups is the absence of a clear definition by the government, resulting in a blanket policy that fails to adequately support all startups. The overarching challenge revolves around the ecosystem, which has posed a considerable hurdle for startups to thrive.

Over the past eight years, my work has primarily focused on the intersection of the Quadruple Helix, wherein I have been actively involved in academia and an independent research center. Unfortunately, due to the government's lack of recognition for research centers, we were compelled to register our institution as an NGO. In addition to my involvement in academia, I have actively participated in policy-making with the government. As an entrepreneur and a board member of the Federation of Women Entrepreneurs, I have witnessed the existence of sound policies, yet the challenges persist in their effective implementation. Although the policy supports collateral-free loans, the lack of implementation remains a pressing issue.

The prevalent trade deficit has posed a major concern, with the outflow of knowledge exacerbating the situation without any significant efforts to repatriate this knowledge. Additionally, the field of science and technology does not reap immediate benefits from investments; rather, it demands time and sustained commitment for substantial returns.

Compounded by the substantial exodus of youths abroad, Nepal is grappling with a knowledge deficit, further complicating the challenges faced by the nation. Bureaucratic hurdles also contribute to the complexities, necessitating a thoughtful approach toward devising effective strategies for navigating these obstacles.

Recommendations

- Startups in Nepal face challenges due to the absence of a clear government definition, resulting in a blanket policy that doesn't support all startups adequately.
- The ecosystem for startups is challenging, hindering their growth and development.
- Lack of government recognition for research centers forces them to register as NGOs, impacting their operational status.
- Although there are sound policies in place, effective implementation, particularly concerning collateral-free loans, remains a significant issue in Nepal.
- Nepal's persistent trade deficit and the outflow of knowledge, combined with the significant emigration of youths, have led to a knowledge deficit, posing further challenges to the nation's development.

Er. Ganesh Shah,
Former Minister for Environment, Science and Technology

The Non-Resident Nepali Association (NRNA) should establish a dedicated fund for science and technology initiatives. While many countries worldwide benefit from private sector investments in science and technology, such an initiative is currently lacking in Nepal. Various investment models exist, including profitable ventures, Corporate Social Responsibility (CSR) initiatives, and charitable contributions. The NRNA can choose to operate within any of these models.

However, it is crucial to recognize that the returns from science and technology investments may not be immediate. The private sector should consider investing at least 1 percent of its profits in research and development, which would not only contribute to the advancement of science and technology but also potentially bolster the profitability For members of NRNA, there is an opportunity to function as science diplomats, advocating for the vital role of investment in science and technology. It is imperative to acknowledge that without significant investment in science and technology, the attainment of prosperity will remain a challenge for any nation.

Dr Bijaya Panta,
Professor of Botany, TU, Nepal

During my time pursuing my PhD in Japan, I observed students researching an industry-specific problem, aiming to address it within the scope of their thesis. In stark contrast, industries in Nepal have not actively sought out researchers to identify and solve their challenges. Despite research initiatives that began approximately 60 years ago at Tribhuvan University, the resulting research output remains fragmented and lacks centralized data integration, hindering the potential for effective commercialization.

Historically, Nepal has had success in exporting commodities such as potatoes, oranges, and cardamom to foreign markets. However, production has been declining due to issues like virus infections, a problem that could be addressed through targeted research and the engagement of researchers to tackle these crises. Regrettably, the necessary focus on such endeavors has been lacking.

The Terai region possesses significant potential for paddy cultivation, yet this promising sector has not received the attention it deserves. Research initiatives must be not only conducted but also effectively disseminated to the general public, allowing for widespread awareness and knowledge transfer.

Drawing a comparison, the United States developed tuberculosis medication many years ago, leading to a substantial decrease in the number of TB patients within the country. Conversely, Nepal continues to rely on the same medication. Emphasizing research in the field of medicine could potentially enable Nepal to tap into the broader South Asian market and address pressing healthcare needs in the region.

Recommendations

- Nepali industries have not actively engaged researchers to address their challenges, unlike practices in other countries.
- Despite a long history of research at Tribhuvan University, Nepal's research output remains fragmented, hindering effective commercialization.
- Declining production of key export commodities like potatoes, oranges, and cardamom requires targeted research to address issues such as virus infections.
- The untapped potential for paddy cultivation in the Terai region demands focused research attention.
- Effective dissemination of research findings is crucial for widespread awareness, and emphasis on medical research could help Nepal address healthcare needs and access the South Asian market.

Dr Ramesh Chandra Paudel,
Member, NPC

While the commendable use of smartphones and the growing internet penetration in Nepal are noteworthy, it is crucial to prioritize the provision of science and technology education in schools. To achieve this, significant investment in infrastructure is imperative, as the present times demand an emphasis on this area.

Presently, only 36 percent of government schools are connected to the internet, highlighting the pressing need to expand internet access in these educational institutions. Moreover, the failure to digitize the curriculum and provide adequate training to teachers poses a significant challenge. Without addressing these issues, the future human resource pool may not remain competitive in the coming decade.

Although the export of IT services has shown promise, continued investment in IT from the grassroots level is essential for further improvement. Notably, the country has yet to allocate one percent of its GDP to science and technology, underscoring the need for greater emphasis and investment in this critical sector. Additionally, the Non-Resident Nepali Association (NRNA) should consider investing in technology infrastructure in rural schools, as even a small amount of investment could significantly benefit students by fostering digital literacy and technological competence.

Recommendations

- Despite the impressive use of smartphones and internet penetration, the focus must shift towards providing science and technology education in schools, necessitating investments in related infrastructure.
- With only 36 percent of government schools currently connected to the internet, there is a critical need to expand internet access and digitize the curriculum while also providing necessary training to teachers to ensure competitiveness in the future workforce.
- While the export of IT services shows promise, there remains a need for increased investment in IT education from the school level to further enhance the sector's growth.
- Emphasizing the importance of increased investment, Nepal should allocate at least one percent of its GDP to science and technology.

Mr. Bhawan Bhatta,
Former President, NRNA

With a vast network spanning 85 countries and encompassing eight million Nepalis, the Non-Resident Nepali Association (NRNA) holds immense potential for facilitating networking and serving as a crucial avenue for investment. Recognizing the importance of customer-friendly products, a concerted focus on research and development (R&D) is imperative. Establishing a strong brand value can be achieved through the marketing of organic and Himalayan products.

During a meeting with the Chief Minister of Haryana, he told me despite producing 30 lakh tons of wheat, the region struggled to raise prices by a single rupee. Nepal, however, can leverage its branding as a Himalayan region product to market similar high-quality wheat, necessitating a robust branding strategy.

Acknowledging the need for increased investment in R&D, fostering collaborations with foreign companies becomes pivotal, given the cost-effective nature of operations in Nepal. Thus, the government must establish a flexible mechanism to facilitate such partnerships. Nepal has the potential to position itself as a tax-free nation, inviting holding companies from China and India to operate within its borders. Even a nominal two percent transaction fee from these companies could lead to substantial benefits for the nation.

By emphasizing the development of sectors such as hydroelectricity, agriculture, and tourism (HAT), Nepal can effectively pave the way toward becoming a developed economy while also establishing itself as a spiritual hub and a destination for revitalization.

Key points

- NRNA should significantly contribute to networking and investment facilitation through its extensive global network, spanning 85 countries and comprising eight million Nepalis.
- Emphasizing the importance of customer-friendly products, the focus on robust research and development (R&D) is crucial, particularly in building brand value through the marketing of organic and Himalayan products.
- Nepal has the potential to establish itself as a tax-free nation, inviting foreign holding companies to operate within its borders and potentially levying a minimal transaction fee, leading to significant economic benefits.
- A strategic focus on the development of key sectors such as hydroelectricity, agriculture, and tourism (HAT) can drive Nepal's journey toward becoming a developed economy while positioning itself as a spiritual hub for revitalization.

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4.3

PLENARY 3

FUTURE IT AND DIGITAL TECHNOLOGY

Mr. Chandra Dhakal,
President of FNCCI, Nepal

The increasing trend of children of political leaders and other personalities settling in foreign countries is a matter of personal choice and freedom. However, this pattern poses challenges to the overall development of Nepal. It has the potential for substantial growth if we channel the same level of energy and commitment that individuals invest in other countries back into our own.

While exposure to foreign countries is valuable, it is essential to maintain a focus on the development of Nepal. Non-Resident Nepali (NRNs) should bring back their valuable skills, technology, and capital to invest in key sectors that offer immense opportunities, such as IT, agriculture, and energy. Nepal's policies and implementation strategies are not flawless, but certain areas require immediate attention.

For instance, while an IT park was established, its full potential has not been harnessed due to mismanagement and underutilization. Reforms are necessary in various aspects, mostly in our approach to initiatives such as the startup policy, which has been drafted but lacks the necessary governmental commitment for effective implementation. Nepal's untapped potential is evident, particularly in the fields of science and technology, where only the initial groundwork has been laid. There remains an abundance of opportunities waiting to be explored with the right focus and dedication, Nepal can achieve unprecedented progress and prosperity.

Key points

- The trend of settling the children of political leaders and other public figures is not very supportive of the development of Nepal.
- NRNs should bring their skills, technology, and capital back to Nepal and invest in certain sectors with tremendous opportunities including IT, agriculture, and energy.
- Nepal lacks effective implementation of policies. For instance, an IT park was established but has not been well utilized in a proper way. This trend should come to an end.
- There are also other areas where reforms are required. Policy on startups is an example. The policy for startups was drafted but the government has not put enough effort into implementing it for the positive results.
- Nepal has immense opportunities yet to be explored. Works done in the field of science and technology are only in their infancy. There is a lot of potential for growth.

Prof. Dr Subarna Shakya,
Director, IT Innovation Center, TU, Nepal

The IT landscape in Nepal has undergone significant changes since the inception of the National Computer Center in 1971, which introduced computers to the country, followed by Mercantile Communication in 1995, paving the way for internet facilities. I recall my guardian mentioning paying Rs125 for email services, highlighting the early stages of technological development in the region.

The introduction of the IT Policy in 2000 and the establishment of the National Information Technology Center in 2002 were pivotal steps in Nepal's IT evolution. However, the dissolution of the High-Level Commission for IT in 2003 was seen as a setback, with the consensus being that the commission should have been strengthened for the further advancement of the IT sector.

Despite these challenges, Nepal has made significant progress in the IT sector, implementing key policies such as the ICT Policy 2015, the Electronic Transaction Act, and the Digital Nepal framework. However, challenges remain, particularly in terms of IT infrastructure, security, management, social influence, and lack of awareness.

To address these challenges, the focus should be on digital government initiatives and e-governance. Currently standing at 125th position, efforts are being made to ensure that government services are accessible to all, even in the remote corners of the country, through various devices. The establishment of a cloud-based data center has become imperative for securing public data and enhancing e-governance.

Moreover, the development of IT infrastructure, including servers, computers, network equipment, and storage, remains crucial for the sustainable growth of the IT sector. While progress has been made with the development of various record systems such as the IRD record system, Supreme Court data system, and the election commission record system, the focus should shift towards understanding big data, smart sensors, cloud computing, GPS, and other advanced technologies.

Political commitment and policy reforms are vital for effective IT development. Efforts must be directed towards the development of ICT human resources and the establishment of pilot projects. Various projects, supported by organizations like the ADB, are already underway, focusing on areas such as vehicle registration, tendering systems, and website management.

Digital transformation, an essential requirement in the current context, necessitates process transformation, business model innovation, and domain and cultural shifts. Research plays a crucial role in the overall development of the IT sector, and the benefits of digital technology include enhanced communication, continuous innovation, secure data management, and improved employee efficiency.

While Nepal has made significant strides in embracing digital technologies, challenges such as the lack of political will and bureaucratic hurdles persist. Hence, the formulation of an action plan and the development of a national-level vision are essential for sustained progress in the digital sphere.

Key points

- Policy reforms
- Infrastructure development
- Human resource development
- Increase the number of pilot projects

Dr Bishesh Khanal,
Research Scientist and Director, NAAMII, Nepal

Creating possibilities within the IT sector hinges on the generation and dissemination of knowledge, as well as fostering entrepreneurship. Despite its relatively small size, NAAMII has made significant contributions to IT development. The organization has attracted IT enthusiasts from 25 to 30 countries seeking to acquire skills in AI and other related fields.

This growing interest underscores the immense potential of the IT sector in Nepal. Collaborative efforts with the Non-Resident Nepali Association (NRNA) in establishing a virtual lab could further enhance the scope of research and development. NAAMII, currently supported by 20 to 22 full-time researchers, could benefit from NRNA's involvement in this venture. However, challenges persist, primarily rooted in the limited understanding of the importance of science within the country.

Nepal has largely remained a consumer of science and technology, failing to make substantial investments in these areas. Also, the government's disregard for research initiatives is hindering progress. Establishing a regulatory body to oversee and support research institutions in Nepal is crucial. This calls for the institutionalization of research centers and increased involvement of the industrial sector in the promotion and funding of research activities.

To capitalize on the existing opportunities, it is imperative to adopt a forward-looking approach and invest strategically in the IT sector. Rather than solely focusing on past innovations and trends, Nepal should prioritize future-oriented investments. The establishment of a National Funding Agency dedicated to encouraging and promoting IT innovations is essential in this regard. Amidst the opportunities, challenges remain abundant.

Nepal's dependence on foreign technology without a significant emphasis on domestic innovation is a prominent issue. Addressing this requires the formulation of policies and acts that facilitate the funding and regulation of private, non-profit research centers. A concerted effort is needed to foster a culture of knowledge investment and technological innovation within the country.

Key points

- NAAMII has played a significant role in IT development in Nepal, despite being a small organization.
- The interest of IT enthusiasts from approximately 25 to 30 countries indicates the considerable potential of the IT sector in Nepal.
- Collaboration with NRNA in establishing a virtual lab presents an opportunity for further research and development in the IT sector.
- Lack of emphasis on the significance of science has hindered the country's progress in the IT sector.
- Establishing a regulatory body to oversee and support research institutions, along with encouraging the industrial sector to invest in research, is vital for fostering innovation in the IT sector in Nepal.

Dr Dipesh Bista
CEO, E-Governance Commission

The E-Governance Commission, established a year ago, has the prime minister as the chair and the Minister of Communication and Information Technology as the vice-chair. Maintaining the interoperability of our e-governance systems across the country, from the central to the local governments, is crucial. The e-governance envisioned by the Commission is an ecosystem.

For instance, when a baby is born, their vaccination records are integrated into the national health system, and their education records are shared with the national education system. Consequently, when they reach the appropriate age, the NID system contacts them to create their identification card. The commission is planning for such proactive governance. Our priority is to create the e-governance blueprint, analyze it, and assess the current situation.

We aim to establish an integrated platform. The Commission is also advocating for the 'only once' policy—where data is collected from the public only once and retrieved from the common interoperational platform. This approach can significantly save time, energy, and money. The Department of Education possesses millions of pieces of data that can potentially be opened to the private sector for developing software and AI engines. The use of data collected for election purposes is restricted by law. Let's reconsider this policy.

Key points

- The E-Governance Commission, established a year ago, has the prime minister as the chair and the Minister of Communication and Information Technology as the vice chair.
- The commission's vision for e-governance emphasizes creating an ecosystem where various systems, from health to education, are interconnected and data is shared seamlessly.
- The commission aims to streamline data collection and sharing through the implementation of an integrated platform and the 'only once' policy, reducing redundancy and saving resources.
- The Commission suggests reevaluating the legal restrictions on the use of data collected for election purposes to potentially maximize its utility for other purposes.

Dr Minendra Rijal,
Former Minister for Information and Communications

The digital divide in Nepal is widening, particularly due to a significant segment of the population being illiterate. However, if technology were accessible to the general public with basic literacy skills, they could potentially earn around USD 6,000 to USD 7,000 annually through crowdsourcing and the use of IT platforms. Despite the potential benefits, progress in this direction has been sluggish in Nepal.

The rural telecommunications development fund has remained unused, highlighting a lack of effective implementation. Meanwhile, India, our neighboring country, has made tremendous strides in the technology sector, serving as a lesson for us to accelerate our own efforts. Ensuring robust data security is imperative in Nepal.

Measures must be taken to enhance the security of data centers and banking information to protect sensitive data from potential breaches. Strengthening the connection with the diaspora, establishing a reliable payment gateway, and facilitating remittances will serve as significant drivers for the increased utilization of technology in the country.

Key points

- The digital divide in Nepal is exacerbated by a substantial population segment lacking basic literacy, hindering their access to technology and opportunities for income generation.
- Leveraging technology could potentially empower individuals with basic literacy to earn approximately US$6,000 to US$7,000 annually through crowdsourcing and IT platforms.
- Nepal's progress in the technology sector has been sluggish, as evidenced by the underutilization of the rural telecommunications development fund and the need for more effective implementation strategies warranted.
- Observing India's significant advancements in the technology sector serves as a valuable lesson, prompting Nepal to accelerate its efforts and initiatives in this domain.
- trengthening data security measures, particularly for data centers and banking information, is crucial to safeguard sensitive data and prevent potential breaches in Nepal's technology infrastructure.

Summary and Recommendation

- All the panelist's deliberations support the common goals in alignment with the UN Sustainable development goal and Nepal Government's 16th Five-year plan. The IT industry's strength is based, fundamentally, on the trust, in which NRNA members and human resources of Nepal collectively work in the areas of investment and technology transfer. The panel members explored potential in areas like Artificial Intelligence, Green Hydrogen Energy, blockchain, Smart and Sustainable Infrastructure.

- Nepal government is committed to energy transition, which will lead to exponential growth in employment associated with Green Energy sectors, such as renewables, batteries, and hydrogen. Nepal can become an exporter of green hydrogen. Given the government's policy thrust, companies, businesses and industries will likely benefit as first movers with the help of government subsidies, incentives and policy support.

- Green Hydrogen Technologies will open up remarkable new opportunities in high-skilled occupations in the coming years.

- Curriculum in universities must be reviewed accordingly.

- Hydrogen can also be used as an energy carrier; a medium to store energy from renewable and other sources and it can be generated at scale with a zero-carbon footprint by using renewable energy such as solar or wind power, for instance, to split water (electrolysis).

- All AI-powered project activities will grow with cheaper sources of energy and agricultural products. This will also help generate a plethora of AI projects generating IT professionals who will also be the backbone of outsourcing IT companies in Nepal supporting the concept of IT HUB in Nepal.

- Women leaders can be engaged by expanding community engagement, strengthening participation, and fundamentally redistributing power to promote a transition to more equitable, resilient and sustainable energy systems. Integrated policy in the area of energy and agriculture will accelerate the benefit to the society especially at the grassroots level.

- The future of service sectors, industries, and communities is intertwined. Harnessing these technology trends while ensuring equitable access can enhance services outcomes for a more sustainable future. Building capacity to adapt technologies and innovate in Nepal's context is challenging, especially in the context of climate change and building back greener and better.

- It is important to promote AI literacy to the general population. There is a need for smart regulations that foster innovations and protect fundamental rights. Synthetic images and fake information are certainly a double threat to democracy. A system needs to be developed for incorporating the opinions of representatives from the society (social partners) in the policy-making process. Corporate managers, workers and academics should all be involved and for the assessment of private sector needs on IT-related issues.

- The standard like Industry 5.0 of the Future approach brings benefits for industry, for workers and society. Additionally, Human Resource 5.0., is characterized by a focus on technology, data, and analytics to improve HR processes and decision-making. It also focuses on creating a more flexible and agile workforce, by providing remote work options and fostering a culture of continuous learning and development. Society 5.0

is characterized by problem-solving and value creation, variety, decentralization, resilience, sustainability, and environmental harmony. The goal is to build a society free from the different limitations that exist now, where everybody may generate value whenever they want, wherever they are, in safety and harmony with nature.

- There is a need for a special ACT under the banner of "Institutions of special importance" backed by a special budget for generating talent in all sectors through Human capital building program especially in high revenue-generating sectors like IT industries. NRN professionals with international experiences can play a catalyst role in policy intervention.

- NRNs program is adding value to bring together to exchange all views, latest technological developments in the field which makes Nepal self-sufficient in generating talented professional experts. These sessions meet not only the domestic needs but also export to meet the needs of regional countries and global requirements.

- Experienced girls and AI-savvy women leaders of the NRN diaspora could play key roles in engaging INGOs, NGOs, government, and local communities of Nepal, empowering them through the latest technology of AI to minimize the gender gap. Nepalese people should be motivated to reskill and upskill to cope with changes in the unprecedented speed of AI evolution. Voice, agency, and empowerment should be ensured for women, poor and marginalized communities, in the face of technological dominance by a few actors.

- Think tanks from the consortium of NRNs and local professionals need to be mobilized in all sectors including the area of law enforcement fully supported by concerned stakeholders. Support is required in the area of Cyber security, AI act, AI regulation and behavior policy with robust law enforcement. NRNA expert members can be key resource persons to handle the complications involved in policy including implementation challenges. There are challenging areas to deploy AI backed technologies in a federal context where local levels have limited knowledge, capacity, infrastructure, etc.

- A road map plan needs to be worked out for strong collaboration between Academia and Industries, Science Technology and Innovation (STI), the STI endowment fund and the global Scholar Exchange program. Several stakeholders including state and public corporations as well as industry are willing to be partners with NRNs and will work together to achieve desired goals and establish NRNA credential as a knowledge investment partner for Nepal's socio-economic prosperity.

- This session has brought together stakeholders and provided strategic support to help transition Nepal's economy into a knowledge-based one. It has helped in fostering connectivity among policymakers and professionals in public and private sectors and establishing a robust professional alliance and partnership between the diaspora and scientific institutions of Nepal. The community of NRNs and stakeholders of Nepal will remain responsive and effective in the future.

Contributors: Prof Dr Timila Yami Thapa, Dr Bal Krishna Bal, Prof. Dr Subarna Shakya, Dr Bisesh Khanal, Mr. Chandra Prasad Dhakal, Mr. Dipesh Bista, Dr Minendra Rijal, Mr. Kumar Pant

4.4

PLENARY 4

SUSTAINABLE INFRASTRUCTURE, AGRICULTURE, AND ALTERNATE ENERGY

Session Chair: Prof. Dr Tri Ratna Bajracharya, Immediate Past President of the Nepal Engineers' Association and Former Dean of the Institute of Engineering, Tribhuvan University

Prof. Bajracharya contextualized the importance of the session theme, emphasizing the pivotal role of sustainable infrastructure, agriculture, and alternate energy in shaping Nepal's future development and

guided the audience through a spectrum of topics, from sustainable infrastructure principles to gender considerations in development, energy sector ambitions, and challenges in project implementation.

Mr. Arnaud Heckmann,
Head, Country Operation, Asian Development Bank, Nepal

The conference proceedings investigated the extensive engagement of the Asian Development Bank (ADB) in Nepal's development journey, with a focus on infrastructure. Mr. Arnaud Heckmann, Head of Country Operation at ADB's Nepal Resident Mission, provided a comprehensive overview of the challenges and opportunities shaping the country's infrastructure landscape.

Mr. Heckmann highlighted ADB's enduring commitment to Nepal since 1969, with cumulative assistance reaching USD 8 billion. The ongoing portfolio, standing at USD 3.7 billion, primarily targets energy and transport, constituting 60 percent of the total. The presentation emphasized the pivotal role of ADB in fostering private sector-led growth.

The operations of ADB in Nepal are guided by partnership strategies, encapsulated in three strategic objectives: improving infrastructure for private sector-led growth, and enhancing sustainability and resilience. A key message underscored the necessity for Nepal to prioritize the quality and quantity of investment in infrastructure.

The presenter identified several challenges faced by public infrastructure, both in Nepal and globally. These challenges include paper-based approval processes, poor contractor performance, procedural delays, and a lack of coordinated efforts in compensation and site clearance. The urgency of addressing these challenges was emphasized to ensure timely project delivery and community benefits.

Mr. Heckmann advocated for a shift from an engineering-driven approach to a more comprehensive vision that incorporates social and safeguard issues. He stressed the importance of quality contractors over the lowest bidders, the inclusion of environmental and social safeguards, and the promotion of health and safety for workers.

The integration of climate change considerations into infrastructure development was discussed in light of the risks coming from the Hindukush Himalaya. ADB's commitment to supporting Nepal's climate agenda, particularly in financing green and resilient infrastructure, was highlighted as a crucial aspect beyond the regular agenda.

The presenter concluded by offering a set of recommendations, including the need for digitization, coordinated efforts across government tiers, and streamlined clearance policies. A call to action resonated throughout the presentation, emphasizing that ADB's contribution, while significant, requires collaborative efforts from the government and development partners to address public investment challenges in Nepal.

Dr Sandip Shah,
Hydropower Engineer, Former President of IPPAN

Dr Sandip Shah's presentation shed light on the challenges and advancements in Nepal's hydro and alternate energy sector, emphasizing the potential of solar, battery energy storage systems, and green hydrogen.

Dr Shah highlighted challenges faced in the hydro and alternate energy sector, noting the evolving landscape with the introduction of solar, battery energy storage systems, and green hydrogen. Developing hydro projects in Nepal has been challenging despite the government's decision to liberalize the sector in 1992.

The presenter acknowledged significant developments driven by political will, with projects like Khimti and Bhotekoshi initiated through foreign direct investment (FDI). Nepal currently boasts an installed capacity of nearly 3,000 MW with numerous hydro and solar projects under construction. Projections indicate an additional 3000 MW in the next three years and 5000-8000 MW in the pipeline.

Dr Shah emphasized the substantial contribution of the private sector to these developments, with 75 percent of upcoming projects expected to be privately owned. While political parties recognize the potential of hydro, the instability in the policy framework, evident in recent drafts of the electricity bill, poses challenges.

The presenter commended the 1992 Electricity Act but highlighted the need for minor amendments to address the evolving energy spectrum. Policy stability is crucial, given the dynamic nature of the sector and the impact of policy changes with each shift in government.

Dr Shah addressed financial constraints, pointing out the inadequacy of the banking system to finance large-scale projects. The reliance on FDI is evident, necessitating the establishment of a foreign market and the development of infrastructure both to the south and north.

The presentation stressed the importance of incorporating climate considerations in hydro projects, citing damages faced by the Melamchi Water Supply Project and a recent 150 MW hydro project. Careful project design, along with attention to environmental and social issues, is essential to mitigate climate risks.

In conclusion, Dr Sandip Shah's presentation provided a comprehensive overview of the challenges and opportunities in Nepal's hydro and alternate energy sectors. The report emphasizes the need for a stable policy framework, financial innovation, and climate-conscious project design to ensure a sustainable and resilient energy future.

Dr Reshma Shrestha,
Kathmandu University,

on the "Intersection of Sustainable Infrastructure, Alternative Energy, and Gender Considerations"

Dr Shrestha underscored the essence of sustainable infrastructure, emphasizing designs that minimize environmental impact, optimize water supply, and sanitation, and prioritize the preservation of natural environments. The discussion extended to alternative energy sources like solar, wind, and hydrogen-based energies, all aimed at reducing carbon emissions.

The presenter articulated the importance of addressing women's needs from two perspectives: as users and contributors to sustainable development. Specific challenges faced by women in transportation highlighted the necessity of safe and accessible facilities. Additionally, ensuring women's access to clean and efficient energy was identified as crucial for their overall well-being.

Dr Shrestha emphasized the unique role of women in leadership positions, highlighting their ability to understand and address the challenges faced by other women. The presentation underscored the crucial role women can play in crafting gender-sensitive policies. Unfortunately, the underrepresentation of women in decision-making roles has resulted in a lack of prioritization for women-centric policies.

The report acknowledged the historical underrepresentation of women, noting that only 20 percent of graduates were women between 2007 and 2019. However, a positive trend was identified, with a projected increase of 40% within the next three years. This shift signifies a potential improvement in gender representation in relevant fields.

Dr Shrestha's presentation provided valuable insights into the integral connection between sustainable infrastructure, alternative energy, and gender considerations. The report calls for a holistic approach to development, ensuring that the needs of women are central to policymaking, leadership roles, and education.

Dr Surya Raj Acharya,
Infrastructure Expert

Dr Surya Raj Acharya's presentation centered on the progress made in physical infrastructure in Nepal, emphasizing the need for a strategic shift to support the next phase of economic growth.

Dr Acharya acknowledged the progress achieved in physical infrastructure, providing basic services like roads, water, and electricity. However, he emphasized the necessity of evolving the infrastructure approach to support higher economic growth levels. The forthcoming phase requires infrastructure that not only caters to basic needs but also supports production, fosters economic competitiveness, and facilitates trade.

The presenter underscored the need to revamp current infrastructure procedures. Many projects, including those funded by donors, are initiated without strategic plans, leading to post-completion debates about their rationale. Dr Acharya emphasized the importance of engaging in discussions before project commencement, especially given Nepal's relatively late entry into physical infrastructure development.

To meet the demands of the next phase, Dr Acharya highlighted the importance of investing in critical infrastructure such as

tunnels, viaducts, and metros. This necessitates a focus on knowledge enhancement, institutional capacity building, and improvements in policy-level capacity and project management.

Dr Acharya identified the diaspora as a pivotal player in advancing infrastructure development. While leveraging their expertise, it is crucial not to repeat past mistakes and instead capitalize on existing opportunities. The report encourages active engagement with the diaspora to benefit from their knowledge and experiences.

The presenter addressed challenges in conducting Environmental Impact Assessments, noting the significant paperwork and financial resources involved. In a financially constrained country like Nepal, Dr Acharya stressed the importance of engaging with the donor community to expedite assessments without compromising environmental integrity.

Dr Surya Raj Acharya's presentation highlighted the critical need for a strategic shift in Nepal's approach to infrastructure development. The report underscores the importance of pre-project discussions, the role of the diaspora, and efficient procedures to meet the demands of the evolving economic landscape while ensuring sustainable development.

Mr. Bhim Udas,
Advisor, NRNA

Mr. Bhim Udas, Advisor to NRNA, delivered a comprehensive presentation on sustainable infrastructure, emphasizing its crucial role in fostering economic, social, financial, and environmental resilience.

The presenter outlined the principles of sustainable infrastructure, emphasizing careful planning, design, and operation to ensure resilience across economic, social, financial, and environmental aspects, including climate resilience. Sustainable infrastructure is depicted as a pathway to a better future, promoting societal well-being, clean energy initiatives, air quality enhancement, climate change mitigation, and biodiversity safeguarding.

Mr. Udas underscored the pivotal roles of water, transportation, and healthcare in facilitating socio-economic development within the framework of sustainable infrastructure. The concept is designed to meet the diverse needs of the population, spanning various sectors such as hydro and roads, with a keen emphasis on prioritizing the well-being of both current and future generations.

In the context of the present fiscal budget, the government has outlined ambitious plans to develop significant infrastructure projects, with a targeted achievement of 3600 MW of electricity. The budget places a critical emphasis on establishing a green economy, recognizing its crucial importance in sustainable development.

Mr. Udas posed a key question: how do we realize these goals? The report advocates for a long-term development plan spanning 15 to 20 years, saving endorsement from all political parties to ensure continuity across successive governments. This strategic vision is deemed essential for achieving sustainable development objectives.

The presenter stressed the importance of accepting international best practices for project development and actively involving the private sector in sustainable infrastructure initiatives. Discouraging political interference in bureaucratic processes is identified as imperative for effective and efficient implementation.

In conclusion, Mr. Bhim Udas's presentation provided a holistic perspective on advancing sustainable infrastructure for the benefit of current and future generations. The report highlights the need for a strategic, long-term plan, international best practices, and active private-sector involvement while discouraging political interference.

Mr. Shakti Basnet,
Minister for Energy, Water Resources and Irrigation

The conference witnessed an insightful presentation as the Chief Guest of the Session by the honorable Mr. Shakti Bahadur Basnet, Minister of Energy, Water Resources and Irrigation, focusing on the importance of context-specific project construction, climate-resilient infrastructure, and sustainable energy development.

Minister Basnet emphasized the significance of constructing projects that align with Nepal's specific context, considering unique needs and priorities. The core focus on building climate-resilient infrastructure was underscored, with a development approach centered on human well-being.

The presenter highlighted the need to integrate resource utilization and mobilization strategies into the planning process. Minister Basnet expressed concerns about the underutilization of Nepal's resources, emphasizing the potential that remains untapped.

The government has undertaken systematic efforts to promote the sustainable development of the energy sector. Nepal aims to generate an additional 28,000 megawatts of electricity within the next 12 years, leveraging its substantial potential in run-of-river, semi-reservoir, and reservoir-based hydropower.

Energy security is a priority for Nepal, given its diverse geography. The country envisions an off-grid energy system and is actively involved in initiatives to facilitate the cross-border trade of surplus electricity production. With 2,800 MW already connected to the national grid, Nepal is making strides towards meeting its ambitious energy goals.

Nepal, recognizing its vulnerability to climate change, prioritizes renewable energy to ensure environmental security. The ambitious goal is to achieve a zero-carbon emission status by 2045. Collaborating with the international community, Nepal is actively engaged in efforts to mitigate the impacts of climate change.

In conclusion, Mr. Shakti Basnet's presentation outlined Nepal's commitment to sustainable development and energy security. The report captures the strategic vision, ambitious energy goals, and proactive measures taken to address environmental concerns, making it a pivotal contribution to the conference proceedings.

Recommendation

Based on the presentations and discussion during the session a set of recommendations has been developed which serve as a roadmap for sustainable and inclusive development in Nepal, grounded in the valuable insights shared during the Plenary 4 session.

1. Long-Term Infrastructure Planning: Advocate for holistic, long-term plans (15-20 years) with cross-party endorsement for infrastructure development.
2. Private Sector Engagement: Actively involve the private sector in sustainable projects, adopting international best practices while minimizing political interference.
3. Gender-Inclusive Policies: Promote gender-sensitive policies, encourage women in decision-making roles, and address their challenges in transportation.
4. Climate-Resilient Infrastructure: Emphasize constructing climate-resilient projects, integrate climate considerations in hydro projects, and work towards achieving a zero-carbon emission status by 2045.
5. Diaspora Collaboration: Facilitate collaboration with the diaspora for knowledge transfer, capitalizing on their expertise, avoiding past mistakes, and contributing to sustainable infrastructure.
6. Context-Specific Projects: Support constructing context-specific projects that optimize resource utilization, addressing concerns about underutilization.
7. Green Economy Initiatives: Align with the government's green economy initiatives, supporting systematic efforts for sustainable development in the energy sector, aiming to generate an additional 28,000 megawatts of electricity.
8. Cross-Border Energy Trade: Encourage initiatives for cross-border trade of surplus (reserve) electricity production and implement off-grid energy systems, considering Nepal's diverse geography and achieving energy security.
9. Streamlined Environmental Impact Assessments: Collaborate with the donor community to expedite Environmental Impact Assessments without compromising integrity, addressing financial constraints.
10. Community-Centric Development: Prioritize community-centric development approaches, enhancing societal well-being, improving quality of life, and aligning with diverse population needs.

Contributors: Prof. Dr Tri Ratna Bajracharya, Mr. Shakti Bahadur Basnet, Mr. Arnaud Heckmann, Dr Sandip Shah, Dr Reshma Shrestha, Dr Surya Raj Acharya, Mr. Bhim Udas

5
REPORTS ON SYMPOSIUM SESSIONS

SMART AND SUSTAINABLE URBAN DEVELOPMENT

Co-chairs of the session: Dr Ambika Adhikari, USA, Dr Sunil Babu Shrestha

5.1 SESSION 1

Introduction

The session "Smart and Sustainable Urban Development" provided a platform for the diaspora and Nepal-based scholars, professionals and practitioners to present their research findings and experience and discuss topics related to urbanization process Nepal. The symposium was conducted in a hybrid fashion with presentations done remotely and physically in Kathmandu. The symposium provided assessments of the current situation related to Nepal's urbanization and offered practical policy recommendations related to urban growth and development in Nepal. Policies should also be aligned to the UN's Sustainable Development Goal (2015) Number 11: "Sustainable Cities and Communities". The following policy recommendations from the symposium can be useful for the relevant agencies of the government of Nepal, Nepali institutions, and profession also for their review, reference, and action.

Urbanization is important for economic development and prosperity of a country, as cities are the economic engines for the regions. However, cities also generate waste and pollution and face socio-economic challenges related to growth. Globally, cities account for more than 60 percent of greenhouse gases that cause global warming. Thus, good management of urbanization is important both to ensure economic advancement and limit pollution, and greenhouse gas emissions.

According to the data from Nepal's national census in 2021, the percentage of urban dwellers (as officially defined) increased from 17 percent in 2011 to more than 66 percent in 2021 (CBS, 2021) with an increase in the number of municipalities in 2017 from 217 to 293. However, a World Bank Report (Muzzini, E. and G. Aparicio, 2013) states that Nepal remains the least urbanized country in South Asia. For comparison, the World Bank (2018) data shows that Nepal's urban population in 2018 was only 20 percent of the national population.

The Nepali government's official definition of new urban areas is controversial because many important criteria such as urban infrastructure and services, open space, population density and economic viability are not thoroughly addressed in the definition. The official definition of urban settlements has frequently changed and does not meet accepted international norms. Further, to be classified as an urban area, there are different requirements in different geographic (ecological) regions of Nepal.

While there is no single universally accepted definition for what an urban area is, each country develops and uses its own criteria to define what are urban and rural areas. Criteria generally regarded as good indicators for defining a settlement as an urban area include the following:

- Total population
- Population density
- Availability of urban infrastructure and services (such as roads, water supply, stormwater, wastewater, electricity)
- Availability of services and amenities, e.g., parks, open space, transit, communication services, institutions of higher education, government services, financial services, hospitality services, public and private services, and health services
- Employment opportunities in primary sectors such as service, manufacturing, trade, export

- The area covered by the footprint of buildings as the percentage of the total geographic area of the settlement
- Intensity of building development in the area, often measured by the Floor Area Ratio (FAR)

Comprehensive definitions of "urban area" were created by the European Union in collaboration with the International Labor Organization (ILO), the Food and Agricultural Organization of the United Nations (FAO), the Organization for Economic Co-operation and Development (OECD), UN-Habitat, the World Bank and European Union (2021), and European Commission 2020).

Although informal and organic growth of urban areas can also work well, the lack of coordinated planning for infrastructure to support the growth can lead to many 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. This is negatively impacting economic development in the cities, and the quality of life for the people. Some large Nepali cities such as the ones in Kathmandu Valley have well-developed plans, but most newly emerging urban areas in the country lack planning for infrastructure, services, and development.

The session focused on the following topics.

- Urban walkability
- Urban environment: landscaping and greeneries
- Planning to mitigate climate change
- Identifying and addressing policy gaps in urbanization
- Assessing the benefits of bus rapid transit (BRT)

Asia has become the hotspot for climate change, the biggest challenge of the 21st century. A total of 35 percent of worldwide energy-related carbon dioxide emissions is from developing Asian nations, compared to 17 percent in 1990. The figures will most likely increase in the days to come as we have emerging economies such as India and China. Human-induced warming is increasing at an unprecedented rate of over 0.2 percent per decade. The world is warming.

There are a number of impacts of climate change such as an increase in temperature, extreme weather events leading to natural disasters, air and water pollution and many health impacts.

Climate is closely related to urbanization. Urban areas are major contributors to climate change as cities are the center for innovation, business, and economy. Climate change is also going to affect cities. The number of urban dwellers will increase by 2.5 billion, with nearly 90 percent growth in Asia and Africa. In the meantime, Nepal is one of the fastest urbanizing countries that witnessed a rise in urban population from 17 percent in 2011 to 66.17 percent in 2022, at least in theory mostly due to the reclassification of local regions, and migration from rural to urban areas in Nepal.

Case studies of Hariwon Municipality and Simta Rural Municipality:

Hariwon in Sarlahi has a total population of 49,988, with a population density of 748 people per square kilometer. Simta in Karnali, on the other hand, has a total population of 24,083, with a population density of 100 people per square kilometer. Some key common issues between the two areas include the lack of consideration for footpaths and cycle tracks during road construction, the absence of a water treatment facility, poorly managed public toilets, and the lack of a sewage system. In Hariwon, waste management services are available only in the market area, while in Simta, there is currently no waste management system in place. According to a recent study, urban development concerns in both areas include issues such as haphazard growth and development contradictions, urban poverty, constraints on basic service delivery, and the complete oversight of climate change issues during construction. Additionally, social issues such as drug abuse, early marriage, and dowry practices are still waiting to be addressed comprehensively.

The presenters concluded that both cities prioritize the development of hardware infrastructure, such as buildings and roads, over considerations for urban politico-social-economy. This approach fails to account for the potential impacts of climate change and sustainable development. The current initiatives are insufficient in scope, lacking climate-adapted housing solutions, and posing significant challenges for achieving sustainable urban development aligned with the goals outlined in SDG 11 and SDG 13.

Dr Sudha Shrestha
IOE, presentation on 'Sustainable Urban Landscape in Green Cities in Nepal'

Urban areas in the world have been suffering from numerous problems such as pollution, noise, public transport problems, and so on. To address such problems, cities must be designed from a sustainable development perspective using a multifactorial approach based on economic, social, technical, and ecological aspects.

The green city is a way to increase the sustainability of urbanized areas. Green cities mean green trees and green plantations, water harvesting, zero waste, green material and technology for the construction of buildings, roads, bridges, etc. Green cities are a way of reducing negative impacts on the environment.

Moreover, a sustainable landscape design evaluates every aspect of the landscape with the goal of reducing negative environmental impact, while including features beneficial to the natural world. Sustainable landscaping should include an attractive and pleasant environment that is in balance with the local climate and requires minimal resource inputs, such as fertilizer and water human labor. The key elements of sustainable landscaping are soil health, water conservation, energy efficiency, wildlife habitat, and minimization of waste.

Landfill sites can also be converted into useful parks (growing flowers, fruits, etc.). Huge lawns can be reduced in size and replaced with beautiful wildflowers, grasses, ornamental as well as fruit giving trees and medicinal herbs. Some examples are Kenilworth Park-on landfill site and the Indraprastha Park in India. The native plants should be in preference for landscape. And the landscape should be tied up with the economy. Nepal imports fruits, flowers and vegetables worth billions every year as per the statistics, which can be grown in landscape.

A sustainable landscape is crucial to reduce such huge expenses. In cities, instead of simple and ornamental tree plantation, fruit giving trees need to be planted in parks, streets of neighborhood, open spaces, rooftop garden, vertical farming land along the ring road, river side, private open spaces, and so on.

Ms. Shubha Adhikari,
AICP, ASNEngr, USA

Nepal is going through rapid urbanization. Cities will grow larger and denser and new cities will be born. Let's build a world-class city by being proactive, not reactive. One sector that we can work in is public transportation.

Good public transportation can save costs, preserve the environment, and save energy. BRT is a transit system that uses buses to emulate the features of a rail. Some features of BRT are running way–grade separated guideway and so on, vehicles with large capacity, stations that are accessible with good shelter from sun, rain, and comfortable seating, and safety measures such as emergency calling and surveillance system, and level boarding, ticketing system.

First, the capital cost of BRT is low. BRT is a suitable option for low to medium ridership. The estimated capital cost of five Heavy Rail per mile ranges from USD 60 million-4.3 billion, five light rail from USD 91 million-1.3 billion, 39 BRT from USD 3.4 million to 99 million. Besides the cost, other benefits of BRT are small start-up cost, can be initiated locally and implemented incrementally, can be converted to other higher capacity modes if ridership increases, offers flexibility in terms of routing, station placement, termini, flexibility in operation, bus is a familiar mode to riders, there is workforce availability and training.

What should be done to ensure success?

Guideway management, good service plan, capacity building, workforce development and training, rider awareness and education, integration of ITS, good operation and maintenance plan and so on.

What are the challenges and opportunities?

The challenges are the need for stronger institutional framework to build and operate BRT, need for capacity building training in culture in all aspects of BRT, operations and maintenance cost estimate and forecast, asset management, integration of signals and intelligent transportation system(ITS), enforcement of signal priority, pedestrian crossing and sidewalk encroachment, jaywalking, coordination with multiple non-formal transit operators, integration of smart tech (it can be an opportunity). They can also be a huge opportunity.

Mr. Yek Raj Adhikari ,
(jointly with Mr. Narayan P Bhandari) on Efforts on Sustainable Urban Development in Nepal: Policy Gaps and Way Forward

Nepal has witnessed a high level of rural-urban transition since the last 3 decades. Migration from hill and mountain to Terai and Valley is very high.

For sustainable urban development in Nepal, the policies and strategies are Constitution of Nepal, 2015, 15th periodic plan 2018/19 to 2023/24, the National Urban Policy, 2007, National Urban Development Strategy, 2017, Sectoral program to achieve sustainable urban development.

Despite having policies, challenges galore in Nepal's urbanization. In historic/cultural city, loss of traditional architecture, green/blue infrastructure, and urban form of cultural city, vertical division of narrow house, short supply of urban services, encroachment of open spaces, environmental degradation with slum formation due to dilapidated or disaster damaged buildings, vulnerable to disaster risk have emerged as big challenges. In new urbanization, unplanned urban expansion. Normally ribbon development, increase in squatter settlements, unregulated/exclusive investment in real estate, lack of standardization/reversibility, short supply of infrastructure and services, problem in drainage system, urban environmental degradation, loss of green areas, river pollution, traffic congestion, and increase in disaster risks are major challenges in new urbanization.

Nevertheless, challenges accompany opportunities. Newly formed municipalities provide opportunities for timely intervention. Urban agenda has been set as a priority by the federal, provincial and local governments, non-government agencies and donors. The private sector is interested in investments in development and management of urban infrastructures. Experience of government agencies in land development, especially land polling programs. Legally empowered local governments are also an opportunity.

Recommendations

The symposium "Smart and Sustainable Urban Development in Nepal (SSUDN)" provided a platform for the diaspora and Nepali scholars, professionals and practitioners to present their research findings and experience and to discuss the topics related to urbanization process Nepal. Papers in the symposium provided assessments of the current situation, and offered practical recommendations related to smart and sustainable urban planning and development in Nepal. The speakers provided several policy guidelines to improve urban planning and development programs in Nepal. The following is a list of major recommendations made by the presenters.

- Municipalities should assess walkability and pedestrian safety in their jurisdictions, and plan to create appropriate zoning, policies, and standards to improve walkability and make it safe. Assessing "Walk Score" for specific areas, and reviewing applicable international best practices will help create good plans for enhancing walkability.
- Planners should study the impact of urban development on climate change and sustainability. They can look at specific case examples in Nepal to understand what works and what does not.
- Planners should identify policy gaps related to Nepal's urbanization and create plans for improving the urban functions and quality.
- Urban forestry and landscaping are important to improve the urban environment, and quality of life for the

residents, and also help produce food in the urban areas. Planners can plant vacant areas in the city with edible fruits and vegetables to improve urban food supply, aesthetics, and environment.

- Bigger cities in Nepal should assess the feasibility of providing Bus Rapid Transit (BRT) as a cost-effective means of transport. As Nepal has now begun a BRT system, its success and challenges should be studied. A BRT system can be expanded to new cities.
- Enhance municipalities' institutional capacity, make them financially strong and technically capable. Increase investment in urban infrastructure development and attract the private sector. Develop Coordination mechanisms among central government agencies, provinces, and municipalities. Localize and implement SDG, New Urban Agenda, Sendai Frame for Disaster Risk Reduction and COP27.
- Through effective implementation of urban development strategies envisaged on Periodic Plan, NUP, 2007, NUDS 2017, with collaboration among three tiers of governments, communities, and stakeholders, the cities of tomorrow could be resilient, inclusive, and environment friendly.

Plan of Action

- NRNA and the authors should follow up with the concerned government and non-profit agencies and universities in Nepal to disseminate the recommendations and findings from the symposium.
- The conference organizers should work with the contributors of the symposium to organize papers for publication in the journal to be published by Nepal Science Foundation Trust (NSFT) so that the findings become permanently recorded for reference.
- Within its Skill, Knowledge, and Innovation (SKI) Department, NRNA should continue to do research and study the opportunities and challenges related to urbanization in Nepal and create up-to-date databases for reference.
- The diaspora groups and Nepali government and institutions should work to 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)

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5.2

SESSION 2

SUSTAINABLE AGRICULTURE AND FOOD SECURITY

Introduction

Nepal boasts of being an agricultural nation. The chief occupation of most of the people is agriculture and Nepal's economy is heavily reliant on it. Despite being the backbone of the nation, Nepal is still importing the basic groups of our most consumed grains—rice, let alone other fruits and vegetables.

Amid this scenario, this discussion focused on how we can increase agricultural production, practicing sustainable agriculture and keeping in mind food security to bolster the country's economy.

Prof. Dr Devendra Gauchan,
TU, Nepal, presented on "Mainstreaming Sustainable Agriculture and Food Security in Nepal: Challenges, Opportunities and Strategies"

There are vast opportunities in the agricultural sector that can drive innovation and sustainability. These opportunities include investment and promotion of new modern technologies such as nanotechnology, nuclear technology, biotechnology, and artificial intelligence (AI). Embracing these cutting-edge technologies can lead to significant advancements in crop production, resource management, and overall agricultural efficiency.

The implementation of Good Agricultural Practices (GAPs) is crucial for sustainable agriculture. This involves the integration of Integrated Plant Nutrient Management Systems (IPNMS) to optimize nutrient use, an increase in fertilizer use in crops, and the adoption of improved and high-yielding seeds (HYVs/Hybrids). Also, investment in irrigation systems is essential for ensuring water-efficient agriculture. Mechanization plays a pivotal role in modernizing agriculture. Customized mechanization, designed to be small-scale, youth-friendly, and women-friendly, can reduce operational costs and alleviate the physical burden on women, making agriculture more attractive to the younger generation.

Also, value addition, value chain and improved marketing systems with eco-labeling, organic certification and GI branding linking water-food-energy-ecosystem (WEFE) nexus; Agro-Eco-tourism: Linking sustainable agriculture and rich traditional food culture with Eco-tourism (e.g., homestays, farm stays, green agro-based resorts); high-value low volume niche products with nature positive, nutrition-sensitive and geographically targeted niche-based production with innovative branding and marketing are other opportunities.

The way forward for Nepal is that it should focus on collective, cooperative, and contract farming including land bank approach

to increase production, utilize fallow lands and reduce land/soil degradation; prioritize high value low volume comparative advantages niche products employing organic and ecological certification, eco-labeling and GI branding. Nepal should also promote new modern, green, clean, and digital technologies, innovations and GAPs to increase productivity, profitability, and improve ecosystem services; link sustainable agriculture with eco-tourism through value chain development and marketing by combining rich biodiversity and indigenous knowledge with modern science and business innovation.

Moreover, strategies for mainstreaming sustainable agriculture require investment on research, innovation, and human resource development with enabling policies, institutions and programs to test and scale out sustainable agriculture technologies are the needs of the day.

Prof. Bishal K. Situala,
Norwegian University of Life Sciences (NMBU), presented on "Wisdom-Based Agriculture for Regenerative Food Systems in Nepal: Cultivating Inner Transformation"

There are options in agriculture that are climate-positive and also contribute to health and wellbeing. One of the options, wisdom-based agriculture, is a context-responsive, low-input, sustainable agriculture for the wellbeing of larger society from a strong cultural and wisdom base. Various methods we see are traditional farming, peasant agriculture, natural farming, sustainable farming, mindful agriculture, permaculture and so on.

Our future dream project is to promote 'regenerative agriculture'. According to a definition by Syngenta group, regenerative agriculture blends sustainable innovation with tradition. As the name suggests, it focuses on literal regeneration of the soil and of the planet's ecosystems. It improves soil, delivers high productivity and high-quality food and helps fight climate change and restore lost biodiversity.

The regenerative agriculture covers crops, no-till cultivation, rotational/ecological cattle grazing, and less synthetic fertilizer.

In a rapidly changing environment, wisdom-based agriculture contributes to Quality Food, Wellbeing, Psychological Resilience, and Personal Transformation. Examples based on wisdom traditions are Farming God's way, the Vedic way of farming or Rishi Krishi, and Sustainable Yogic Agriculture which have shown that integrated, mixed, and diversified farming potentially meets local food needs, and other challenges (climate change, various well-being crises).

One of them, the Farming God's Way (FGW), is a type of conservation agriculture (CA) that reinterprets the CA principles of no tillage, mulching and crop rotation using biblical metaphors such as God does not plow, God's blanked and the Garden of Eden.

Dr Sunder Tiwari,
Agricultural and Forestry University, Nepal, presented on "Climate Smart Dry Chain for Addressing Rice Ban by India and Enabling Plant Biodiversity in Nepal."

Rice is the major staple food in Nepal, contributing 67 percent of cereal consumption in Nepal. The total annual demand for milled rice in Nepal is estimated at 4.08 million tons and import bill of USD 300 million each year. But the current production of rice in Nepal is very low and insufficient and most of it is imported from India.

Unfortunately, India has recently banned the export of white rice to Nepal which will affect food and nutrition security in Nepal. Vulnerable people in Nepal will further face malnutrition due to this ban on preferred and staple food. Rice prices have already soared in Nepal, and it will be less affordable to the underprivileged and poor people during the festival season.

In this scenario, the government has prioritized increasing production but that has not been sufficient yet. Nepal has been struggling to increase production for the last ten years. It now needs a big investment.

On the other hand, it is also losing current production due to biotic and abiotic loss, produced rice/paddy are not healthy because of synthetic toxins (in standing crops and post-harvest loss). Next is molds or toxins loss: Aflatoxin during rainy or humid situations—due to annual flooding in Nepal. In addition, there is also a food rotting problem. A total of 7.8 metric tons of spoiled rice were distributed to earthquake survivors in Laprak VDC of Gorkha district. The food loss problem is in India as well.

Integrated Pest Management is one of the solutions. According to FAO (1967), "Integrated management is a pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible a manner as possible and maintains the pest populations at levels below those causing economic injury."

Dry Chain Technology is another. It is drying dry products (seeds, grains, nuts) to safe humidity levels and maintaining the dryness in the value chain using waterproof/airtight packaging. Drying could be achieved using natural sunlight for dry season harvests in major breadbasket regions. In humid areas or during rainfall, drying beads or mechanical dryers would be needed based on the commodity to be dried, i.e., seeds or grains. IPM and Dry Chain make food safe, reduce pest loss and increase production. Agrobiodiversity, local seed systems, food loss and toxins.

Mr. Ratna Karki,
Faculty at University of South Bohemia, presented on "Mapping for Suitability of Pro-Organic Farming in Mountainous Landscape: A Case Study of Nepal."

Agricultural productivity is declining with the increasing problem of food insecurity in mountainous regions of Nepal. However, mountains contain more diversity than plain regions due to varied landscapes. Changes in altitude have created a multitude of agro-ecological zones that have the potential to provide diversified and nutritious food for all.

Organic farming has a huge potential in this scenario. It enhances ecological services, biodiversity, environmental protection, food security, and community self-reliance.

There are solutions for sustainable agriculture and climate-resilient farming. We have been considering increasing abandoned land into using it for organic farming. The rate of abandonment is higher in mountainous regions. A study in Kavre, Lamjung, and Kaski found that about 40 percent of agricultural land in the agroecological hill regions has been abandoned.

Our study shows the cultivated area decreased significantly while the barren land increased tremendously in 2022 compared to 2010. The results are due to the increase in urban areas, population growth, climate change, and the deterioration of living conditions for many people. The study area was eight wards in 8 villages of Dolakha district.

The study analyzed and developed climate modeling and climate change predictions for suitable cropping. Climate modeling data is helpful for the predictions of environmental degradation in mountainous regions. We also examined the existing organic cropland and agroecosystem environmental conditions database (biomass, moisture, etc.).

The findings of our study will support planning and policy dialogue to improve food security, mitigate the greenhouse effect, and promote more informed science-based decision-making regarding the potential impact of organic farming.

Summary

Biodiversity loss, food insecurity, environmental concerns, and economic sustainability are key issues affecting the commercialization and transformation of agriculture in the face of the global climate crisis.

Factors such as financial suitability, social sustainability, and policy considerations are also crucial for the agricultural sector. The low productivity of this sector in Nepal is due to a lack of key inputs such as improved seeds, fertilizers, irrigation, and other food-securing technologies. In addition, factors such as high production costs, poor market access, and the lack of adequate capacity of producers, processors, and traders have also resulted negatively in the agricultural transformation.

Recent export restrictions in the supply of essential food commodities (rice, wheat, sugar, onion, etc.) from India and other countries amidst production and increasing demand concerns, the supply has dwindled, and food prices have escalated. This has negatively impacted the food security and vulnerability of poor people in Nepal. In

In such a context, cold and dry chain technologies need to be embraced to improve storage, reduce food losses make better availability, and improve quality food security for the wider population.

But progress hinges on the synergy between traditional wisdom and modern innovations. Incorporation of wisdom-based innovations and regenerative agriculture are essential for sustainability of the food system. Similarly, use of innovative tools such as digital technologies, remote sensing and GIS are important for spatial and temporal mapping of organic and sustainable production systems in the diverse landscapes and geographies of Nepal. There is a need to find a balance between adopting new technologies and preserving science based traditional agricultural practices based on comparative advantages that Nepal is endowed with abundant natural resources, cultural heritage, rich biodiversity, and traditional innovations. Additionally, the global market presents substantial opportunities for organic, green and sustainable agricultural products from Nepal.

In such a context, the importance of implementing regenerative agriculture systems are essential to link organic/ecological farming to ecotourism for promoting business innovation and sustainability of agriculture. Mainstreaming all these elements in policies, institutions, and programs with adequate investment of financial and human resources for promoting sustainable agriculture and food security are essential. These all require strategic partnerships and collaborations of national institutions with NRNA and other overseas organizations.

Recommendations

- Promote agroecological, nature positive and climate resilient technologies, innovations and solutions for sustainable agriculture and food security.
- Revitalize and strengthen indigenous knowledge, wisdom and innovations in agriculture by combining modern science and business innovation for sustainable food systems.
- Promote cold and dry chain technologies for improving storage of perishable and dry products (seeds, foods, feeds) reduce losses, and enable local and national food stocks.
- Use digital technologies (digital mapping, satellite data, artificial intelligence, etc.) for cost-effective, efficient, and resilient approaches to sustainable food systems.
- Promote linkage of organic/ecological farming with ecotourism for business innovation, economic viability, and sustainability of the food system.
- Advocate policy and institutional reforms for timely delivery and supply of quality inputs (seeds, fertilizers, credit, insurance, etc.) and technical services to farmers as well as increased investment.
- Promote high-value and low-volume niche agro-products that have the comparative advantage of producing in diverse ecological niches linking with organic marketing and agro-ecotourism.
- Facilitate the development and implementation of policies and programs in strengthening the water, energy, food and ecosystem (WEFE) nexus to maximize synergy and minimize tradeoffs for sustainable economic development.
- Emphasize strong collaboration and partnerships between the national institutions of Nepal and NRNA to develop specific futuristic roadmaps and create an enabling environment and investment framework for generating agroecological, nature-positive and resilient solutions and innovations in food systems.
- Initiate the process for developing a "global forum" with a "center of excellence" of committed
- NRN and Nepal based agricultural professionals with diverse expertise and disciplines to facilitate the implementation of recommended actions.

Plan of Action

1. Create a "Committee" on Agriculture, Food Security and Forestry in NRNA.
2. Initiate the process of developing a "global forum" with a "center of excellence"
3. Develop a vision or Road map for 2030 and Beyond

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5.3

SESSION 3

SUSTAINABLE ENVIRONMENT, DISASTER AND RISK MANAGEMENT

Introduction

Air pollution and Waste materials:

Nepal is located between the towering Himalayas to the north and the populous Indo-Gangetic plain to the south. Due to its unique geographical positioning, the country faces many environmental challenges that originate from various sources at both local and regional levels. Air quality is a major concern, as Nepal is situated in a critical atmospheric zone. The interplay of diverse land uses, including forests, farms, and urban areas, further complicates air pollution and waste management issues. Kathmandu, Nepal's capital, is particularly affected by air pollution caused by brick kilns and industrial activities that have far-reaching consequences. This is especially concerning for the Kathmandu Valley, a region at the forefront of urbanization and commerce, where environmental health is crucial.

Despite strides in development, the nation grapples with persistent challenges, notably in aerosol pollution and waste management. Transboundary aerosols, influenced by multiple sources, heighten concerns about climate change, necessitating focused efforts to understand and mitigate their impact on the fragile Himalayan ecosystem.

Earthquake:

The symposium underscored that Nepal's unique topography, characterized by seismic activity, makes it susceptible to a spectrum of natural disasters such as earthquakes, floods, landslides, and glacial lake outbursts. These environmental challenges are compounded by the climatic and seismic vulnerabilities inherent in the country's mountainous terrain. Rainfall-triggered floods and glacial lake outburst floods pose continual threats to both infrastructure and livelihoods, exemplified by recent disasters like the Seti Flood in 2012 and the Melamchi debris flow in 2021. The need to map and understand the geomorphic and tectonic features in the mountain ecosystem is crucial, especially in climate change exacerbating these hazards.

Recognizing the urgency of addressing environmental challenges, Nepal has prioritized Disaster Reduction and Risk Management (DRRM) as a linchpin in its development agenda. Legislative measures such as the DRRM Act (2017), the National Policy for Disaster Risk Reduction (2018), and the National DRR Strategic Plan of Action (2018-2030) underscore the country's commitment to building resilience in the face of climate and earthquake-related risks.

The aftermath of the Gorkha Earthquake 2015 served as a poignant example of the importance of adopting the "build back better" principle. Nepal's concerted efforts to construct over 750,000 homes across 31 districts exemplify the nation's resilience and its ability to glean valuable lessons for future disaster management. Equally noteworthy is the pivotal role played by local communities, demonstrating remarkable strength during search and rescue efforts and underscoring the indispensable nature of community engagement in disaster response and recovery.

Dr Gangalal Tuladhar,
Former Minister of Education, Science & Technology, presented on Sustainable Environment, Disaster and Risk Management in the Context of Nepal

Nepal, located in a seismically active region and prone to various natural disasters like earthquakes, floods, landslides, and glacial lake outburst floods, faces significant risks to its people, infrastructure, and environment. Thus, the country has recognized the importance of Disaster Reduction and Risk Management (DRRM) as a fundamental component of its development agenda.

Nepal is ranked 4th in the Climate Risk Index, and 11th in Global risk for earthquakes, with 80 percent of the population exposed to hazards. It has witnessed many natural disasters every year, killing people and damaging properties.

Realizing the worrisome situation, the DRRM Act was passed in 2017. DRM committees have been formed at all three levels. The DRRM council is headed by the prime minister. Similarly, the National Policy for Disaster Risk Reduction was formulated in 2018 and the National DRR Strategic Plan of Action (2018-2030) is also in action.

The Gorkha Earthquake can be the best lesson for disaster response. Keeping in mind the building back better principle, we have constructed over 750,000 homes in 31 districts. The reconstruction campaign has some takeaway messages and some lessons to be learned. We also have the framework to mobilize international donor agencies accordingly.

The Gorkha Earthquake search and rescue taught another important lesson as well. The international team extricated only 19 victims. However, the community (local communities) extricated 22,326 victims, reflecting the power of local communities that we have been advocating for.

Regarding the way forward, Nepal recognizes the importance of harmonizing DRRM and the SDGs to achieve sustainable development. By integrating disaster risk reduction strategies into its broader development agenda, Nepal aims to protect its people and environment while making progress towards global sustainability goals.

There are funds to mitigate the risks at the local level. There are not many experts and technical people at the local level. However, there is an IT department, for the early warning systems, with basic training. The local government has funds for disaster risk management. The provincial government bridges the gap between the local and central governments to mitigate the risk of disaster. While operating funds at all levels, it has always been response-focused. But preparation-based focus is also a need of the day.

Dr Jeevan Regmi,
TU, Nepal presented on "Overview of Long-Range Transport of Air Pollution Over Nepal and its Impact on the Himalayas"

In pollution, aerosols are a system of solid or liquid particles suspended in air between 0.001 microns to 100 microns. It is quite uncertain due to the variation in size. The sources of aerosols are natural and anthropogenic—the cause of the increase in the pollution level in our community.

The aerosols affect visibility, human health, cloud microphysics, and the climate system. For example, in human health, larger particles reach even the lungs, basically affecting the respiratory system.

Studies show the biomass burning and dust storms in IGP (Indo Gangetic Plains) region gets transported to the southern slopes of Himalayas. The impact of transboundary aerosols on Himalayas is of rising concern to study the pattern of climate change. And the large variation in temperature and topography also poses a major challenge.

How do the transboundary aerosols enter into our region? In all four seasons, the maximum number of aerosols come from the IGP and during post-monsoon and pre monsoon even from Afghanistan, Pakistan, and Iraq.

The Eastern Terai is observed to have a greater value of aerosol optical depth (AOD) compared to the Western part and the value of AOD decreases gradually with the increase in altitude. Can aerosol tax like carbon tax help? The uncertainty level of the source is high. So, first we need to be clear on whom to tax and to what extent.

Ms. Aastha Bindu Malla,
CEEN, presented on "Sustainable Waste Management and Policy in Nepal."

Nepal has been facing major environmental challenges associated with urban population growth, waste generation, and waste treatment. Inadequate waste treatments and disposal of waste create risks for human health and ecosystems. In the meantime, the adoption of sophisticated waste management technologies is lagging. And the data on solid waste is less or largely non-existent.

In the case of Nepal, the waste generation is lesser in mountain regions than in urban areas and Terai. Kathmandu is the largest waste generator where each Nepali generates 1.1 kg of waste every day. Most of it is organic waste covering 63.22 percent. At the same time, plastic and paper waste have also emerged as a big problem. Unfortunately, only 86 percent of the waste is collected.

Waste management is crucial because there is a correlation between waste and climate change. If the waste is not treated properly, greenhouse gases will be emitted such as Co2 and methane, and nitrous oxide, which increases the risk of global warming.

What is happening in Nepal? The wastes are mostly burned or thrown away, contributing to global warming. The waste management process in Nepal involves door-to-door waste collection, transportation, transfer center Teku in the case of Kathmandu, and landfill sites like Sisdol. Nothing is done in between. The mixed waste is kept together to throw in the landfill. A total of 45 percent of waste is managed by dumping and burning. Recycling is almost null.

Nepal must learn from Europe and Korea in Asia for recycling. Nepal has informal recycling—the waste pickers come and pick up the waste, and the resources are moved to India. Bought cheaper, the recycled products will be sent back to Nepal at high prices.

Moreover, research is underway on Refuse Derived Fuel due to growing plastic and paper wastes. We can turn plastic and paper into fuel for burning that can be used in brick kilns.

Our policy should first focus on reducing, then reusing, and recycling. Nepal can achieve sustainable waste management by segregation of food waste and other waste at the source. Food waste can be converted to compost or animal food. This kind of recycling contributes to resource (nutrient) recovery. Nepal does not have a fossil fuel reserve. We must reduce the consumption of Gas and firewood by replacing cities, energy waste (RDF) technology. Other waste which is open dumping and burning can be treated with a sanitary landfill.

To sum up, comprehensive scientific research and development, low cost environmentally friendly technologies and strict policy implication is needed for sustainable waste management.

Dr Basanta Raj Adhikari,
Director, Centre for Disaster Studies, IOE, TU, Nepal, presented on "Navigating Cascading Hazards for Sustainable Risk Reduction in the Nepal Himalaya"

Major drivers of geohazards in the Himalayas are strong monsoons with erratic rainfall and long dry winters, regular seismic destabilization, climate extremities, forest fire, and anthropogenic activities. Glacier lakes are showing an alarming trend in the Himalayas—they are growing, and they are melting. We have risks at higher altitudes. The quantity and area of such lakes are increasingly posing serious threats. For example, if Birendra Taal of Gorkha bursts, the village Sama Gaau at a low height will be destroyed completely.

The Himalayas are moving and active, resulting in frequent earthquakes. The western Nepal is at high risk of an eight-year-scale earthquake. The recent Kagbeni debris flow, the Melamchi flood in 2021, and so on show the level of threats. In the meantime, the erosion is moving upward—the mass is collected, and sediments are piled.

It is not true that everything is a result of climate change completely. This year's flood in Kagbeni is not merely the climate change impact. It was a landslide dam outburst flood. The water level in the river was lower for a few months indicating the blockage in the river.

Currently, we are investing in hydro, making hotels, and other infrastructure at high altitudes. However, such critical infrastructure should be built with proper assessment of cascading hazards in the Himalayas. While making high dams in Nepal and different projects at height, we need a proper study of compounding hazards. Infrastructure resilience without considering the effects of climate is no longer an option in the Nepal Himalayas. The establishment of hydro-meteorological stations at the high altitude (>3000m) to understand the high mountain climate and weather pattern is a must. Another way forward is the preparation of impact-based multi-hazard forecast systems.

Dr Bhupendra Das,
Environmental Specialist, Nepal, presented on "Assessment of Brick Kiln's Air Pollutants Impact on Human Health in Industrial Areas of Kathmandu Valley."

The brick kiln industry is one of the fastest growing and most recognized sources of deteriorating air quality in Nepal. Fine dust particles, harmful pollutants (HCs, SOx, CO, NOx), and a tiny quantity of hazardous dioxins are all released by brick kilns.

Study sites of this study are Kathmandu, Lalitpur, and Bhaktapur brick kiln industrial areas. The results show the PM2.5 distribution in Kathmandu Valley is high near the brick kiln. The farther you go, the level of pollutants declines.

During the household survey in Bhaktapur, most of the respondents said they had persistent cough, phlegm, eye problems, headaches, etc. People living near kilns are suffering more.

Dr Arnico Pandey,
Environmental Scientist

We need to analyze risks while building infrastructures, otherwise the investment will go in vain. We need to understand geology as well. We can also use old and unused airports as a rescue base for storing the rescue materials.

Dr Keshav Paudel,
United States

Air pollution is a major public health problem. We need an independent body in Nepal to make policies and plans for environmental health.

Prof. Dr Rejina Maskey Byanju,
Central Department of Environment & Science, TU

There is a difference between a landfill and a dumping site. People are aware about the segregation of waste, but even if they are segregated, the municipal level will mix the waste. We must resolve it. Segregation is the first Mantra.

Recommendations

The symposium had enlightening panel discussions, engaging open-floor dialogues, and thought-provoking paper presentations highlighting Nepal's environmental challenges. It became evident that navigating the complex landscape of the nation's unique geography requires a holistic approach. Thus, the symposium emphasized integrating multifaceted strategies outlined (10 points highlights) below for tackling these challenges to address aerosol pollution mitigation, sustainable waste management, and robust disaster risk reduction measures. By prioritizing these actions, the Nepalese government can create a resilient and adaptive environment that minimizes the impact of disasters and contributes to the sustainable development of the country.

Policy Framework: Develop and enforce comprehensive policies for disaster risk reduction and environmental management. This includes legal frameworks, guidelines, and strategies that align with international best practices.

Institutional Strengthening: Strengthen institutions responsible for disaster management at all levels—local, provincial, and national. Ensure these institutions have the necessary resources, expertise, and coordination mechanisms.

Early Warning Systems: Invest in and maintain effective early warning systems. Utilize technology and community engagement to disseminate timely alerts, enhancing preparedness and reducing vulnerability.

Capacity Building: Enhance the technical capacity of local communities and government officials. This includes training programs for disaster response, risk assessment, and community-based resilience initiatives.

Infrastructure Resilience: Implement and enforce building codes that prioritize resilience to seismic activity and other environmental hazards. Conduct thorough risk assessments for critical infrastructure projects.

International Collaboration: Foster collaboration with international organizations and donor agencies. Mobilize resources and expertise to bolster disaster response and recovery efforts.

Public Awareness and Education: Conduct widespread public awareness campaigns on disaster preparedness, risk reduction, and the importance of environmental conservation. Educate communities on evacuation procedures and sustainable practices.

Research and Data Collection: Invest in scientific research to understand the specific risks and vulnerabilities unique to Nepal. Collect and maintain accurate data on environmental conditions, hazards, and their potential impacts.

Climate Change Adaptation: Integrate climate change adaptation strategies into disaster risk management plans. Recognize the evolving nature of risks due to climate change and formulate adaptive responses.

Community Involvement: Empower and involve local communities in decision-making processes. Engage communities in the formulation and implementation of disaster risk reduction strategies, tapping into local knowledge and practices.

Plan of Action

- Develop and enforce comprehensive policies for disaster risk reduction and environmental management.
- Create a Disaster and Risk Management team in the Secretariat Office and satellite offices in major NCC.
- Review "Center of Excellence" and "Community Environment Academy" established at NAST in 2019.

Contributors: Dr Rudra Aryal, USA, Dr Sangeeta Singh, Dr Gangalal Tuladhar, Dr Jeevan Regmi, Aastha Bindu Malla, Dr Basanta Raj Adhikari, Dr Bhupendra Das, Mr. Anil Pokhrel, Dr Arnico Panday, Prof. Dr Rejina Maskey Byanju, Dr Keshab Paudel

5.4

SESSION 4

RENEWABLE ENERGY

The 3rd NRNA Global Knowledge Convention featured a dedicated segment on 'Renewable Energy', chaired by Dr Biraj Thapa and Dr Nabin Aryal.

Throughout the session, several speakers shared their insights on the topic. Experts discussed the feasibility of implementing renewable energy solutions in Nepal from a global perspective, delving into various aspects of the technology and its potential in the country.

Introduction

The discourse on the theme started with Dr Kiran Gautam, senior divisional engineer at WECS, Nepal. Dr Gautam's presentation titled 'Current Status of Renewable Energy and Future Directions' gave a description of the changing landscape of the energy sector in Nepal, including the introduction of strategic factors.

Highlighting Nepal's commitment to achieve Net Zero Emission by 2045, he pointed out heavy dependence on biomass and petroleum, energy security issues, and low per capita energy consumption as major energy challenges for Nepal.

Dr Kiran Gautam, set an extraordinary tone for the session, delivering a compelling presentation on Nepal's current renewable energy status and future directions. Illustrating Nepal's energy landscape, she underscored the pressing challenge of escalating fossil fuel demands and the dominant use of biomass, emphasizing the imperative need for an energy transition to unlock both economic and environmental benefits. Dr Gautam's crucial message resonated strongly, pointing out that the current efforts are merely a fraction of what is necessary to achieve Nepal's Sustainable Development Goals (SDGs) and net-zero emissions. She emphasized the crucial role of investment and urged the NRNA to acknowledge this crucial bottleneck. Her incisive ten-minute presentation not only highlighted pertinent challenges but also proposed viable pathways forward for Nepal's sustainable energy journey.

Following Dr Kiran Gautam, Ms. Usha Khatiwada, the component lead in the USAID-funded Urja Nepal Project, explored the immense potential of renewable energy, particularly in hydropower. She presented Nepal's government strategies and the considerable progress made towards the set goals. Ms. Khatiwada underscored the necessity for exceptional measures, emphasizing meticulous planning and implementation across key segments, including generation, transmission, financing, and human resources. With a focus on the financing aspect, she elucidated the critical need for effective project financing in Nepal to achieve the nation's ambitious energy objectives. Additionally, she highlighted the challenges inherent in project

financing within Nepal, offering insightful suggestions for potential mitigation measures.

Nawa Raj Dhakal, the Executive Director at the Alternative Energy Promotion Center Nepal, focused on outlining the organization's role and responsibilities in promoting renewable energy (RE) deployment and energy efficiency (EE) adoption. Highlighting the nation's crucial policies and strategies, he underscored the significance of the National Determined Contributions (NDC), released in 2020, as a key policy crucial for refining the energy sector, provided it is implemented effectively. However, he brought attention to the significant financing gap of 33 billion USD for the implementation of the NDC, which aligns with Nepal's Sustainable Development Goals (SDGs). He suggested that the NRNA consider this funding gap as an opportunity for resource mobilization.

Dr Ram Lama,

the Academic Industry Coordinator at Kathmandu University, emphasized the critical need for green hydrogen in Nepal's energy transition. Given the concerning increase in renewable energy penetration coupled with inadequate storage solutions, he highlighted how green hydrogen could serve as an economic asset for Nepal. Its implementation could facilitate the replacement of coal and fossil fuels, addressing the nation's energy demands. Dr Lama emphasized the diverse applications of green hydrogen, from steel mining to synthetic natural gas (SNG) and urea production, underscoring its suitability for a country like Nepal, characterized by significant disparities in peak and average energy demand, as well as variations in dry and wet energy sources. He concluded by highlighting the pivotal role of effective policy frameworks and robust funding mechanisms, areas where Kathmandu University has made consistent efforts over the past three years while acknowledging the ongoing challenge of securing the necessary funding support.

The session concluded with a distinctive video presentation by Prof. Ole Gunnar Dahlhaung from NTNU, Norway. His presentation commenced with an emphasis on Europe and Norway's ambitious emission targets and net-zero goals, outlining the progressive measures undertaken by the EU. Notably, he highlighted the successful implementation of green fuels in various modes of transportation, from buses to ships and airplanes. Transitioning to the context of Nepal's energy landscape, he drew parallels and elucidated the lessons Nepal can learn from these global initiatives. Prof. Dahlhaung stressed the significance of a dual focus on renewable energy (RE) and its storage for a country like Nepal. Conclusively, he underscored that green hydrogen penetration stands as the most favorable option for Nepal at present, emphasizing its potential for addressing the nation's unique energy requirements and challenges.

The session was marked by valuable interactive discussions, with Professor Timila Yami emphasizing the need for gender inclusivity in energy transitions, Dr Bishal Silwal calling for revisions in Nepal's hydropower potential study to address climate change-induced alterations in river flow, and improvements in transmission lines. Current investor Bipul Raj Pandey highlighted bureaucratic challenges in Nepal's energy sector, emphasizing the need for a more streamlined environment to encourage smoother investments.

The session as a whole provided comprehensive insights into the current status and potential future of renewable energy in Nepal, emphasizing the challenges that need to be addressed and the opportunities that can be seized to achieve sustainable energy goals and ensure a greener, more sustainable future for the country.

Prof. Ole Gunnar Dahlhaug,

from The Norwegian University of Science and Technology spoke on the topic 'Energy Transitions: Global Perspectives and Message to Nepal'. He discussed Europe's aspirations and presented data on renewable energy in Europe, such as electrifying transportation and adopting hydrogen in aviation and shipping. He emphasized Europe's goals in renewable resources and also advised Nepal to prioritize eco-friendly industries and electric or hydrogen-powered vehicles to protect the environment.

'Professor Dahlhaug says Nepal has a huge energy potential in both solar and hydro power. He would like to see this potential used wisely,' said Professor Dahlhaug, recommending Nepal to develop more renewable energy.

During the **Q and A session**, participants shared their views and opinions on how the NRNA committee can work better to foster renewable energy in the context of Nepal. Suggestions were also made regarding women's involvement in the energy sector and focus on climate change. And in response, experts took it as constructive criticism and said that they are also working on those things. Further, concerns regarding bureaucracy's low efficiency for the investors were also raised. In response to that the experts were positive that the bureaucracy is in a further improving stage and will give smooth functioning for the investors.

Summary

The session highlighted the importance of renewable energy in Nepal. The speakers emphasized the need for green hydrogen and renewable energy in Nepal, offering a roadmap for sustainable growth and urging collaborative efforts. Renewable energy is a vital component of Nepal's growth and environmental stewardship.

Recommendations

- Develop a long-term energy plan with ingrained implementation transparency. Start a balanced approach in creating energy from mixed renewable energy sources such as solar, wind, hydro, biogas etc. Prioritize the use of technology for "Waste to Energy" conversion as it is highly applicable in Nepal. Reduce consumption of electrical energy by adopting efficient appliances and equipment, and smart usage.
- Green Economy Initiatives: Align with the government's green economy initiatives, supporting systematic efforts for sustainable development in the energy sector, aiming to generate an additional 28,000 megawatts of electricity.
- Cross-Border Energy Trade: Encourage initiatives for cross-border trade of surplus (reserve) electricity production and implement off-grid energy systems, considering Nepal's diverse geography and achieving energy security.
- Nepal government is committed to energy transition, which will lead to an exponential growth in employment associated with Green Energy sectors, such as renewables, batteries and hydrogen. Nepal can become an exporter of green hydrogen energy. Given the government's policy thrust, companies, businesses and industries will likely benefit as first movers with the help of the government. The government should subsidize hydro and solar power with the help of incentives and policy support.
- Green Hydrogen Technologies will open up remarkable new opportunities in high-skilled occupations in the coming years. Curriculum in universities has to be reviewed accordingly. Hydrogen can also be used as an energy carrier; a medium to store energy from renewable and other sources and it can be generated at scale with a zero-carbon footprint by using renewable energy such as solar or wind power, for instance, to split water (electrolysis).

Plan of Action

- Create a "Center of Excellence" and Post Courses in renewable energy at Kathmandu University in collaboration with NAST, GoN, and Nepali abroad.
- Develop national-level energy mix, energy storage, and transportation.

Contributors: *Dr Biraj Thapa, Mr. Bhim Udas, Dr Kiran Gautam, Ms. Usha Khatiwada, Mr. Nawaraj Dhakal, Dr Ram Lama, Prof. Ole Gunnar Dahlhaug*

5.5

SESSION 5

BIOTECHNOLOGY AND COMMERCIAL OPPORTUNITY

Session Co-chairs: Dr. Sushila Maharjan, USA and Dr. Indira Tiwari, South Korea, Dr. Jarina Joshi, Nepal

Prof. Janardan Lamichhane,
Dean, Department of Biotechnology, KU, Nepal, on the topic "Navigating Biotechnology in Nepal: Significance and Challenges in Commercial Opportunities."

While the history of biotech initiatives by government institutions in Nepal is extensive, the nation is yet to make significant strides in the field of biotechnology. The Leprosy Mission, funded by TLMI, was established in 1957, followed by the National Public Health Laboratory in 1968. The Department of Plant Resources was founded in 1974, alongside the Central Veterinary Laboratory in 1990 and the National Forensic Laboratory in 1986. The Nepal Academy of Science and Technology was instituted in 1982, while the National Potato Research Center commenced operations in 1992. The Nepal Agriculture Research Council, established in 1997, shows the government's commitment to advancing biotechnological endeavors. Despite these institutional foundations, the development of biotechnology in Nepal still necessitates significant progress and investment.

The introduction of biotechnology education in Nepal is a relatively recent development. The undergraduate program at Kathmandu University was initiated in 2003, followed by similar programs at SANN International College, affiliated with PU, in 2005, and at White House College in 2007. Additionally, biotechnology programs are also offered at Kantipur Valley College and Universal College. The master's program began at Tribhuvan University in 2008, while both master's and Ph.D. programs were established at Kathmandu University in 2010. These educational initiatives represent a significant step forward in cultivating a skilled workforce in the field of biotechnology in Nepal.

The private sector in Nepal has also witnessed several significant initiatives in the realm of biotechnology. The Research Laboratory for Agriculture Biotechnology and Biochemistry was established in 1986, alongside the establishment of the Nepal Biotech Nursery in the same year. The Om Hospital and Research Center were founded in 1996, followed by Green Research and Technology in 1997. The Nepal Development Research Institute was established at an undisclosed date, contributing to the growing private sector involvement in biotechnological research. Also, Everest Biotech Private Ltd joined the landscape in 2000, further solidifying the private sector's commitment to advancing biotechnological research and development in Nepal.

Since 2007, there has been a significant surge of interest among young individuals in the field of biotechnology. The Center for

Molecular Dynamics Nepal was established in 2007, followed by the Research Institute for Bioscience and Biotechnology in 2010 and the Annapurna Research in 2011. Likewise, the Center for Kathmandu Institute of Applied Science was founded in 2014, followed by the Phutung Research Institute in 2016. Most recently, the National Technology Innovation Center was established in 2023. And these institutions have the involvement of young minds, reflecting the growing enthusiasm and commitment among Nepalese youths to contribute to the advancement of biotechnological research and development in the country.

In Nepal, several young biotech companies are actively engaged in various specialized fields. Shikhar Biotech focuses on antibody production, while Biovac Nepal is dedicated to vaccine production. Kalapas Biotech and Ficus Biotech are both involved in plant biotechnology, each with their respective areas of specialization. Praramva Biotech specializes in vermicomposting, and Shubham Biotech focuses on enzyme and food production. These emerging biotech companies reflect the diverse and expanding landscape of biotechnological entrepreneurship in Nepal.

The involvement of Nepali youth in the agricultural and plant sciences industries is of great significance. With minimal initial investments, many young individuals have entered this field and are experiencing considerable growth, demonstrating substantial potential. Their contributions extend to the domains of drug and food development. Since 2010, a growing number of youths have been actively engaged in innovation research, policy development, nature conservation, and the utilization of indigenous technologies. Their efforts also focus on harnessing the knowledge and expertise gained by Nepali youths from their experiences abroad. There is significant research dedicated to soil conservation, environmental preservation, and a myriad of other critical areas in Nepal.

The biotech industry in Nepal has reached a certain level of establishment. However, it is important to empower this sector through increased investments, knowledge dissemination, and the provision of ample opportunities. One of the primary challenges lies in the limited relationship between academia and industry. While research is being conducted in various centers, industries exhibit hesitancy in adopting these research findings into their operations. This reluctance to utilize research outcomes is compounded by the absence of supportive government policies.

Also, the dearth of investments poses a significant hindrance, especially for the 15-20 existing companies. Many of these companies establish research centers but face financial constraints in sustaining regular investments, thereby impeding the progress of capable youth. The competent younger generation is lagging due to the lack of adequate financial support and investment opportunities.

Dr Sugat Ratna Tuladhar,
Lower Saxony Center for Biomedical Engineering, on "Decellularization-A Promising Technology for Cardiovascular Tissue Engineering"

Decellularization, a technique employed to extract the extracellular matrix from tissues by eliminating cells, serves as an essential method for obtaining scaffolds used in tissue engineering. Its efficacy is exemplified by the successful practice of decellularized heart valve replacements worldwide.

The process involves a time-effective, low-concentration detergent-based decellularization of rat hearts.

Considering the pressing need for life-saving organ transplants, the potential of decellularized hearts is significant, given that 114,000 individuals in the US alone are currently on the waitlist for organ transplants. Shockingly, 60 percent of these patients may not receive the organs they urgently require, leading to the loss of 20 lives per day in the USA due to the scarcity of available resources.

Miromatrix Medical Inc., a Minnesota-based company, has started a mission to commercialize decellularized organs, aiming to eliminate the organ transplant waitlist. Their approach involves the removal of cells from pig organs, leaving behind a non-cellular matrix, which is then decellularized by introducing living human cells. The resulting organs are transplanted using the same techniques and equipment as in current organ transplantation procedures.

Mr. Nabin Bikash Maharjan,
Co-founder/ CEO, Blue Waste to Value, on "Nepal A Pilot and Ready to Extend an Efficient Environmentally Friendly SWM Adopting Circular Economy in Nepal"

The issue of solid waste in Kathmandu is of significant concern, primarily characterized by a prevailing 'collect and dump' model that emphasizes the transport of waste without addressing comprehensive management. This approach is centered solely on reaching the ultimate dumpsite, manifesting poor management practices driven by vested interests, often at the expense of neglecting the rights of local communities and disregarding principles of social and environmental justice.

To address this issue, initiatives have been implemented to segregate and process waste. This includes the installation of machinery for waste segregation, subsequent drying of waste, and implementation of recycling processes. With these efforts, Kathmandu has the potential to manage up to 70 percent of household waste effectively.

Likewise, community engagement is a vital component, particularly in waste segregation and composting activities. To facilitate proper waste management, ensuring contractual investment security, acquiring land for material recovery facilities, and establishing efficient landfill facilities are crucial. Local units in Nepal can play a pivotal role in waste management by investing in and adopting appropriate technologies for effective landfill management.

Dr Ram Prasad Aganja,
Postdoctoral Researcher Department of Veterinary Public Health, on the topic "Nepal AI-2 Quorum Sensing Controlled Delivery of Cytolysin-A by Tryptophan Auxotrophic Low Endotoxic Salmonella and its Anticancer Effects in CT26 Mice with Colon Cancer"

Salmonella has demonstrated potential in its anti-cancer mechanisms. It exploits the highly chaotic vasculature and rich micronutrients within tumors, capitalizing on the presence of immune cells.

The utilization of attenuated auxotrophic Salmonella Typhimurium has yielded promising anti-tumor effects. To mitigate endotoxicity, modifications to the lipid A structure were implemented. Additionally, the regulated expression of Ctya at higher cell densities under quorum-sensing signaling has been instrumental.

Through the engineering of Salmonella Typhimurium, both safety and tumor invasion were enhanced. The introduction of Ctya-expressing Salmonella resulted in a significant 67 percent reduction in tumors within the mouse CT26 cancer model.

Mr. Nabin Narayan Munakarmi,
President at BSN, on "Nepal Status of Biotechnology in Nepal and Its Future Prospects"

Biotechnology encompasses the development and utilization of biological processes, forms, and systems to maximize benefits for humankind and other life forms. It entails the application of scientific and engineering principles to manipulate materials using biological agents, thus facilitating the production of goods and services. The choice of biotechnology is grounded in its interdisciplinary nature, knowledge-based approach, and its capacity to offer unique solutions. Additionally, its high-throughput capabilities do not displace traditional methods, rendering it an environmentally friendly and versatile option. However, it is not without controversy, as it often clashes with ethical beliefs, particularly concerning cloning, and some concerns arise over potential harmful effects.

The existing national policies and strategies for biotechnology in Nepal include the Agriculture Perspective Plan, 1995-2025, which was formulated in 1995. This plan did not explicitly mention biotechnology; however, it adopted technology-based agricultural development as one of its key strategies. Also, Nepal became a signatory to the Cartagena Protocol on Biosafety in 2001.

The Nepal Agricultural Research Council introduced a 20-year plan, wherein the NARC Biotechnology Laboratory was designated to function as a central facility, aiming to coordinate all biotechnology activities under the NARC system. The most recent development is the Biotechnology Policy-2063, established by the government, to enhance production and productivity through research, development, and the transfer of biotechnological knowledge. This policy also identified tissue culture and plant improvement as priority areas for advancement.

In Nepal, the prospects of biotechnology encompass various promising domains. In the agricultural sector, the focus lies on the development of tissue culture techniques, exploration of medicinal plants and bioactive compounds, as well as the advancement of biofertilizers and biopesticides. The utilization of barcoding and molecular breeding techniques holds significant potential for enhancing agricultural practices.

In the fields of medicine and forensics, the future holds promise for molecular diagnosis methods, the development of antibodies and vaccines, DNA fingerprinting techniques, next-generation sequencing, and the application of flow cytometry. Within the realm of environment and conservation, the future entails advancements in the production of biofuels, bioremediation techniques, as well as the application of molecular ecology in the study of plants and animals.

Summary

Biotechnology and Commercial Opportunity discussed the state of biotechnology in Nepal, highlighting its historical development, educational initiatives, private sector involvement, youth participation, and challenges. Government institutions laid the foundation for biotech in Nepal, with various educational programs and private companies contributing to research and development. Despite these advancements, challenges such as limited academia-industry collaboration, insufficient investments, and the absence of supportive policies hinder progress.

Recommendations

- **Enhanced Collaboration:** Foster closer ties between academia and industry to facilitate the translation of research findings into practical applications. Encourage partnerships and collaborations between research institutions, government bodies, and the private sector to harness collective expertise and resources.
- **Policy Support:** Develop supportive government policies that incentivize industries to adopt research outcomes and facilitate the growth of the biotech sector. Strengthen regulatory frameworks to ensure ethical and safe practices while promoting innovation.
- **Increased Investments:** Address the dearth of investments by providing financial support and creating investment opportunities for existing companies and capable young individuals. Allocating funds and resources for research and development in biotechnology is crucial for sustainable growth.
- **Education and Awareness:** Emphasize the importance and benefits of biotechnology through education and awareness campaigns. Encourage the participation of youth in biotech endeavors by highlighting the potential contributions and opportunities in this field.
- Kathmandu lacks comprehensive waste management and neglects local communities and environmental justice. Community engagement in in waste segregation and composting is crucial for effective waste management.
- Salmonella demonstrates anti-cancer effects by targeting the chaotic vasculature and nutrient-rich environment within tumors, taking advantage of the presence of immune cells. Further study on Salmonella is recommended.

Plan of Action

- Create a Steering Committee of representatives of GoN, Businesses, academic institutions and Nepali abroad coordinated by NAST to enhance collaboration, policy support, increased investments, education and awareness.
- Foster closer collaboration between Nepalis abroad and local governments to develop comprehensive waste management schemes including e-waste.

Contributors: *Dr Jarina Joshi, Dr Indira Tiwari, Prof. Dr Janardan Lamichhane, Dr Sugat Ratna Tuladhar, Mr. Nabin Bikash Maharjan, Dr Ram Prasad Aganja*

5.6

SESSION 6

SCIENCE AND TECHNOLOGY INVESTMENT AND POLICIES

Session chairs: Dr Rabindra Dhakal, Nepal and Dr Sanjivan Gautam, USA

Introduction

The 3rd NRNA Global Knowledge Convention featured a session titled 'Science and Technology (STI) Investment and Policies', chaired by Dr Rabindra Dhakal and Dr Sanjivan Gautam. This session primarily focused on the topics of Research and Development (R&D), Science and Technology, policy formulation, and the practical execution of such policies. Speakers shared their perspectives on strategic investment and policy development, highlighting Nepal's existing shortcomings in understanding and appreciating the potential of technology. The session additionally encompassed a panel discussion where experts actively engaged in conversations, providing valuable insights into the diverse aspects of R&D implementation in Nepal.

The core proceedings of the session commenced with a presentation by Dr Indra Bikram Joshi from the Ministry of Education, Science, and Technology (MoEST).

Dr Joshi's presentation titled 'National Strategies and the Current Status of Implementing the 2019 STI Policy' highlighted the Science, Technology, and Innovation (STI) policy implementation cycle and the ongoing preparation of an action plan awaiting government approval. Dr Joshi also pointed out the critical issues in Nepal's STI landscape, such as low prioritization of science and technology, insufficient public and private sector investments, and weak stakeholder coordination.

At the moment, the government has decided to provide one percent of the development budget but that's not sufficient to give the results,' said Dr Joshi.

Dr Joshi informed the audience about the MoEST's annual programs, including science literacy and innovation management. He also added that an STI Action Plan is ready and waiting for government approval. To make this action plan, there have been various consultations, workshops, meetings, and seminars.

In the 16th Five Year plan, we are also setting the target for the number of patented innovations. More than 100 patented research should be there,' said Dr Joshi while stressing the periodic plan's focus on multidisciplinary laboratories, incubation centers, and computational infrastructures. He called for the creation of a research and innovation-friendly ecosystem and the establishment of STI governance in Nepal.

Dr Deepak Kumar Khadka,

senior research fellow, Policy Research Institute, made a presentation titled 'Evidence-based Strategic Investment in Science Technology and Innovation in Nepal. A Policy Shift Urgently Needed.' He delved into the status of research and development (R&D) spending in the country, the public's practical expectations, and the nation's future course of action. Dr Khadka noted that the number of scientific research activities increased between 2001 and 2022, highlighting a positive trajectory of scientific development. However, R&D output in Nepal is underperforming, ranked 121st globally. Dr Khadka also pointed out the inadequate representation of Nepal's data in global datasets.

He compared government budget allocations for various sectors, noting the low R&D budget, a mere 0.3% of the GDP across all sectors. Dr Khadka also highlighted the need to allocate resources for research programs at universities. He outlined a 10-year work plan with Rs 434 billion earmarked for 243 programs. Dr Khadka recommended the establishment of a standardized reporting system, evidence-based and demand-driven funding policies, and the development of policies and programs within the Science Cycle framework.

Gross expenditure across different sectors R&D defense, education, infrastructure and research as a percentage of GDP is one of the indicators of any country's real R&D growth and Nepal current status warrants greater attention on all fronts. One percent of the development fund for innovation and incubation fund is good but R&D cycle demand investment is based on supply and demand. The New S&T Act will need to address gaps. Increased publication and patents are indicative of an overall increase in R&D performance and application.

Prof. Dr Rameshwar Adhikari,

affiliated to the Research Center for Applied Science and Technology (RECAST), Tribhuvan University, delivered a presentation titled 'Investment in Youth and Education: A Blueprint for National Prosperity.' During his presentation, Dr Adhikari highlighted Nepal's investments in youth and the education sector, outlining a comprehensive roadmap for the country's future development. He discussed specific areas requiring investment, including education, research and development, and opportunities for the youth. Dr Adhikari also attributed the exodus of Nepali youths for better opportunities to weak political leadership. He added that the provision of the essential instruments and tools is a must for fostering youth development in the country.

"It is not that nothing has been done in this country. The government is working actively. Research from the non-profit sector is also plausible. Olympiads and science conferences are also frequent," said Dr Adhikari. "Policies have also been made and implemented in the sector. When it comes to budget allocation, the sector of science, technology and education has been neglected."

The presentations were followed by a **panel discussion**. During the discussion, Dr Nanda Bahadur Singh, a professor at Mid-Western University, delved into the issue of retaining young students in educational institutions. He argued that various political unions and their ideologies are hindering the progress of Nepal's education system. Dr Singh stressed that unless the influence of political parties and their ideologies within universities is effectively addressed, fostering innovation and advancing research will remain a formidable challenge. 'The presence of different political unions within universities is eroding the academic excellence of these institutions,' he strongly voiced his concern. Likewise, he suggested that Nepal should allocate a minimum of 2% of its GDP for research and development (R&D).

He highlighted Chandigarh University, established in 2012, at the same time as Mid-Western University, ranked as India's top patent university, producing 9000 patents yearly out of the country's 64000. He stressed consulting VCs for R&D budget allocation, not relying solely on street demand. He advocated for transparent VC appointments, friendly legal frameworks for

patent registration, and linking STI policy to patent-driven innovation. He suggested allocating 6 percent of GDP to education, with 2 percent for R&D. Universities should enjoy special policies like tax exemptions, strike immunity, and comprehensive insurance to support innovation.

Ms. Pramila Bajracharya,

secretary at MoEST, addressed the panel by discussing the collaborative efforts required between academic institutions and government entities to tackle policymaking and investment concerns within the education system. She emphasized the necessity of policy measures to address the issues at hand, highlighting the ministry's ongoing efforts in this regard. Furthermore, she mentioned the Ministry's commitment to retaining researchers as well as ensuring they have access to the necessary equipment and tools. She expressed optimism about the Ministry's ability to create a conducive and healthy working environment for researchers within Nepal.

She shared the progress on the implementation of the new STI policy 13 thematic areas through an Act that will enable connectivity between academic, government departments, R&D institutions, and industry partners and increase R&D investment over the current 0.3 percent GDP to retain and support in-house research innovation.

Prof. Dr Manish Pokharel,

Dean at the School of Engineering, Kathmandu University, addressed the critical aspects of policies, rules, and their effective implementation in advancing the Research and Development (R&D) initiatives at Kathmandu University. He shed light on the launch of the Nepal Innovation Center, emphasizing its primary goal: retaining the youth in the country while nurturing a culture of innovative research within Kathmandu University. Professor Pokharel underscored the importance of crafting policies uniquely tailored to the context of Nepal, mapping the technology needs first, and developing policies thereafter and not relying rather than adopting policy wholesale from other nations. He emphasized the necessity of prioritizing essential needs before expecting technological advancements to organically follow and zero political interference a necessity for institutions to perform.

Prof. Dr Ajay Bhattarai,

head of the department of chemistry at Mahendra Morang Aadarsh Multiple Campus, Biratnagar, stated that students have historically chosen other activities over research because the academia could not convince them that they can make a living out of it. Highlighting the lack of rigor in research published in Nepali journals, Dr Bhattarai noted that fewer than six Nepali journals have made it to the Scopus Index. 'If we go to places, people complain that they are under pressure to leave the country because of activities such as research and employment,' he added.

Summary

The session convened a remarkable assembly of experts who generously shared their valuable insights concerning various research and development issues in Nepal. It shed light on the crucial role of upcoming STI policy implementation and its inclusivity to all stakeholders and passing of the final Act from parliament without any change. R&D in advancing innovation, sustainability of the nation and retaining and empowering its younger generation, depoliticization of institutions, opening a transparent process of appointments, professional ideology driven ideology of the institution, developing innovation-led patent ecosystem to protect and support commercialization. New startup companies in AI, nanotechnology, and robotics, IT areas are publishing papers in high-impact journals, holding adjunct positions in overseas universities but there is no such arrangement and collaboration in Nepal Academic institutions. Institute publishing in high-quality journals should be rewarded and recognized, special protection and funding support to individual and small startup companies is needed. Private investment in universities and developing a patent survival ecosystem is necessary and defined in the new STI policy.

The session served as a platform for substantive discussions, promoting a holistic perspective on science and technology, a multidisciplinary coordination and collaboration system ultimately contributing innovative ideas to enhance the country's development across all sectors powered by science and technology as a driver to socio-economic prosperity.

Recommendations

- Set up a joint innovation incubation fund with NRNA.
- Engage NRNA in new STI policy formulation and implementation.
- Increase investment in STI to at least 1% of GDP.
- Review and develop patent policy paper.
- Establish PhD and post-doctoral fellowship program.
- Reward and incentives to start-ups, publications, and young scientists.
- Initiate collaborative projects with the industry to address industry problems and value add to indigenous technology.

Plan of Action

The panel experts agreed that plan of action is the implementation of new STI policy with sustainable funding, It needs to be implemented without any political interference, accommodate all stakeholders including startup and SMEs, It should be application focus and address nee emerging S&T areas, support publication, application focus and create employment for youth to retain them in the country and be able to provide future employment opportunities and encourage enterprises to support local industries. The session served as a platform for substantive disc

Contributors: *Dr Rabindra Dhakal, Nepal and Dr Sanjivan Gautam, USA Dr Indra Bikram Joshi, Dr Rameshwar Adhikari, Dr Deepak Kumar Khadka, Dr Deepak Kumar Khadka, Dr Nanda Bahadur Singh, Ms. Pramila Bajracharya, Dr Manish Pokharel, Prof. Dr Ajay Bhattarai*

5.7

SESSION 7

DISRUPTIVE DIGITAL AND ARTIFICIAL INTELLIGENCE TECHNOLOGY

The 3rd NRNA Global Knowledge Convention featured a session on 'Disruptive Digital and AI Technology,' chaired by Dr Gyanendra P. Joshi and Dr Pratima Pradhan. The whole session was about insights into the recent developments in the digital sector, including the rise of AI technology, and the implications of such developments for national policies on digital transformation. Experts engaged in discussions discussed various technology-related topics, specifically focusing on the current technological landscape in Nepal.

Dr Birendra Kumar Mishra,

former joint Secretary at Ministry of Information and Communication (MoIC) was the keynote speaker for the session. Dr Mishra presented on the topic "Digital Transformation in Nepal, Pioneering a Path to Prosperity".

'Digital technology is a catalyst for unlocking opportunities across sectors such as agriculture, healthcare, education, tourism, finance, and governance,' said Dr Mishra.

He also pointed out that government and private sector initiatives have the potential to boost digitalization in Nepal, while sharing success stories of local businesses embracing digital technology. Mr. Mishra discussed three key business enablers, talent and technology development, startup growth, and private/public partnerships, to promote economic progress.

'A skilled IT workforce among the youth can positively impact the country's GDP,' Dr Mishra explained. 'NRNA should invest more in digital skills development programs by partnering with international companies to retain overseas youth.'

Dr Ved Prasad Kafle,

research manager at the National Institute of Information and Communications Technology, Tokyo, presented on the topic 'Connecting Unconnected: Beyond-5G and Non-Terrestrial Networks in Nepal's Context,' offering insights into Society 5.0'.

Society 5.0 is a society that integrates economic progress while addressing social issues through a seamless cyberspace and physical space connection,' Dr Kafle explained the concept of Society 5.0 as a viable state.

He shared valuable information about GEO and LEO satellites, emphasizing their relevance in the context of 5G and beyond 5G networks, along with satellite networking. Furthermore, he discussed LEO constellations and their role in making internet

services feasible. Dr Kafle explored the potential benefits of satellite networking in mountainous countries like Nepal, expanding telecommunication services. He also touched upon satellite service providers and highlighted business opportunities in serving underserved communities, offering reliable connectivity, and promoting employment in remote, less resource-rich regions. 'Challenges like investment constraints and lack of policy support and regulation need to be addressed,' Dr Kafle opined.

Ms. Rosa Kiran Basukala,

Deputy Director at NTA, Nepal, spoke on "Securing Nepal's Digital Infrastructure: Cyber Security and Data Protection". At the very beginning of her presentation, she highlighted NTA's efforts to enhance cyber security in Nepal, demonstrating the country's rise in global cyber security rankings from 2014 to 2020. Additionally, she addressed the impact of the 2008 Electronic Transaction Act on digital banking and the International Telecommunication Union's assessment in 2015 pointing out Nepal's need for policy, legal measures, and multilingual awareness resources. She discussed multiple bill drafts that can enhance cyber security and expressed joy over Nepal's new cyber security policy, considering it a significant achievement. 'Online Child Protection Guidelines and Cyber security Bylaws also contribute to decreasing cybercrime,' Ms. Basukala added. She also stated that the Right to Information and Privacy, provisioned by the Constitution of Nepal, contributes to achieving cyber security goals, promising diverse opportunities across sectors.

A **panel discussion** was set up for the latter part of the session, featuring four participants. Mr. Anil Dutta, joint secretary at MoICT, Nepal, Mr. KN Mishra, general manager at Seethos, Nepal, Mr. Sanjaya Golchha, managing director at Neoteric, Nepal, and Mr. James Nyachhyon from Cybernetic, Nepal, discussed how Nepal can shape its future with the power of digital transformation.

In the panel discussion, Anil Dutta called for amendments to laws targeting the facilitation of the internet services provided by SpaceX's Starlink. KN Mishra highlighted the need for legal reforms that could promote collaborative engagement between the private sector and the government. Likewise, Sanjaya Golchha expressed the private sector's expectations from the government in overcoming challenges and creating a conducive environment for the IT industry. Lastly, James Nyachhyon commented on the current status of technology and innovation in the country, while stressing on the need of knowledge transfer and capacity building in the technology sector.

Summary

The whole session showcased the transformative potential of technology in Nepal. The speakers shed light on digital transformation, satellite networking, and cyber security, underlining the country's strides toward progress. The panel discussion further discussed addressing vital regulatory and strategic considerations on AI and the IT sector. As Nepal continues to embrace these disruptive technologies, the panel discussion presented an optimistic view of a journey towards a digitally powered Nepal but with a demand for government support.

- The importance of recognizing the potential of disruptive technology for national development was emphasized.
- Rather than blaming the government, the need for individuals to take initiative and contribute to solutions was highlighted.
- The private sector's significant role in enhancing Nepal's GDP through IT efforts was acknowledged.
- Embracing best practices was deemed essential for driving national development.

Recommendations

After considering the insights and recommendations shared by the speakers during the symposium, we recommend the following 7-points actions to harness digital transformation for Nepal's prosperous future

1. **Collaboration and Innovation:** Emphasize the need for collaborative efforts among the government, private sector, and international organizations to foster innovation and digital transformation in Nepal. Encourage sharing best practices and utilizing available resources, including NRNs' knowledge and resources , toto drive national development.
2. **Infrastructure and Connectivity:** Support the implementation of innovative technologies, such as satellite connectivity using Low Earth Orbit (LEO) satellites, to bring reliable and affordable internet access to remote areas. Collaboration with organizations like NRNA and service providers is essential to make this initiative a reality. This will extend services to marginalized communities and enhance connectivity in challenging terrains.
3. **Cybersecurity and Data Protection:** Recognize the critical importance of cybersecurity in Nepal's digital landscape. Strengthen cybersecurity infrastructure, enhance awareness, and implement policies and laws to protect individuals and data from cyber threats. Consider the shared responsibilities of service providers, families, communities, and authorities in ensuring online safety, particularly for children.
4. **Education and Skill Development:** Prioritize education and skill development in technology to prepare Nepalese students for the digital age. Encourage collaboration between academia, industry, and government to provide students with the necessary training and resources to excel in technology-related careers.
5. **Good Governance and Implementation:** Implement good governance practices across all sectors, addressing issues related to infrastructure, healthcare, education, and more. Ensure policies, regulations, and implementation plans are in place to achieve these goals.
6. **Encourage Entrepreneurship:** Promote entrepreneurship as a solution for job opportunities, particularly for female students. Support and facilitate the growth of startups and small businesses within the technology sector to create employment opportunities and drive economic growth. NRNA can collaborate in this regard.
7. **Embrace Digital Transformation in Various Sectors:** Recognize the broad significance of digital transformation across multiple sectors, including agriculture, education, transportation, health, tourism, finance, local businesses, governance, information accessibility, and job creation. Encourage the application of information technology in all these areas.

Plan of Action

- NRNA to organize a follow-up meeting with GoN, private sector and academia to create a collaborative team.
- NRNA to develop a strategy to encourage entrepreneurship and promote entrepreneurship.

Contributors: *Dr Gyanendra P Joshi, Dr Pratima Pradhan, Nepal, Mr. Birendra Mishra, Dr Ved P. Kafle, Ms. Roja Kiran Basukala, Mr. Anil Dutta, Mr. KN Mishra, Mr. Sanjaya Golchha, Mr. James Nyachhyon, Dr Bikash Lamsal, Mr. Pragyan Thapa*

5.8

SESSION 8

POPULATION AND PUBLIC HEALTH

The 3rd NRNA Global Knowledge Convention included a segment dedicated to various issues relating to the health sector. The session was chaired by Dr Sanjeeb Sapkota, Dr Abhinav Vaidya, and Dr Pramod Dhakal. This session revolved around discussions on issues of health and broadly physical, mental, and emotional well-being, with several guest speakers sharing their insights on the subject. Experts actively participated in the conversation, offering valuable perspectives on a wide range of health-related issues and situations from Nepal's standpoint.

Introduction

The core proceedings of the session kicked off with a presentation by **Dr Sanjeeb Sapkota**, Chairperson of Global Health Committee. Dr Sapkota presented on the topic "Highlights of Global Health Committee of NRNA". He emphasized the pressing issue of migrant health, pointing out that the well-being of migrants goes hand in hand with the perks of migration. Dr Sapkota underscored that NRNA can play a pivotal role in overseeing migrant health and promoting mental well-being to prevent suicides among migrant workers.

Dr Aliza Bhandari

who is affiliated to the Global NRNA Health Committee, gave a presentation that reflected on the Tokyo Global Nepali Health Declaration's key points, titled 'Migrant Health Matters and Universal Healthcare for All'. The conference in Japan aimed to address global Nepali health issues, foster professional connections, and share health information on Nepali migrants with the Nepal government. She also underscored that a compendium with 20 declaration points is published on the home pages of NRNA Nepal and NRNA Japan.

Dr Subash Pyakurel

CEO of Health Concerns Nepal, presented on the topic 'Health Insurance: What It is Not and What It Is'. He primarily discussed disease-destitute dynamics and their three implementations. Discussing the government's insurance schemes, he detailed its tendencies, rules, and coverage. Dr Pyakurel appreciated the schemes for its results and stressed that its systemic flaws need to be dealt with. He also highlighted policy gaps such as lengthy claim and reimbursement processing and lack of neutral monitoring agency.

'NRNA can provide support in terms of human resources, financing, academic knowledge, research, and technology,' Dr Pyakurel proposed the areas where NRNA can enhance the insurance environment.

Dr Sangita Pudasainee,

Professor at Rutger University Camden and President of Nepali-American Nurse Association, presented on the topic 'Associations among Low Birth Weight, Postpartum Depression, and Mother-Infant Bonding Within Six-Months of Childbirth in Kathmandu'. Her research-based presentation emphasized the connection between low birth weight, postpartum depression, developmental issues in at-risk infants, and bonding difficulties. Her findings suggested that low birth weight is associated with increased postpartum depression that is linked to increased developmental vulnerability among at-risk infants.

'Policymakers and providers can design intervention programs and policies such as home visits to screen mothers for postpartum depression and to screen infants for developmental assessment and monitoring,' Dr Pudasainee explained the implications of her findings.

She also added that healthcare workers can design community-based interventions to decrease postpartum depression.

Dr Pramod Dhakal,

Director at Nepal Cluster, Emotional Well-Being Institute (EWBI) Nepal, presented on the topic 'Well-Being: The Foundation of Healthy Humanity and Its Work in Nepal'. He shed light on human mental, emotional, and spiritual dimensions along with the historical evolution of the concept of well-being. He emphasized inner well-being, Nepal's spiritual significance, and excellence through meditative practices.

'From the houses we live into the air we breathe, all are worth our gratitude,' Dr Dhakal highlighted the value of Nepali culture of well-being.

Dr Basseer Jeeawody,

founding president and executive chairman, EWBI-Geneva, presented on the topic 'Emotional Well-Being Institute and Its Global Initiatives'. He initiated the presentation on emotional well-being, emphasizing challenges and emotional vulnerability. He also talked about the EWBI's contribution towards leveraging emotional well-being and concluded with satisfaction over Nepal's progress.

Dr Kingsley Brook,

a scholar of Vedic Science, gave a presentation that emphasized the revival of Vedic Science given its relevance in modern times. He discussed consciousness, transcendental meditation, and holistic well-being, drawing inspiration from the Bhagavad Gita. Dr Brook also touched on the perks of Vedic organic agriculture, Vedic architecture (Vastu Vidya), and the International Ayurveda Congress program, showcasing the importance of Vedic knowledge in fostering human progress.

Summary

The session brought together a remarkable group of experts who shared their valuable insights on a wide range of health-related issues, insurance, and services. The event highlighted the importance of global collaboration, research, and the exchange of knowledge to address the complex challenges that communities face in Nepal and beyond. The session served as a platform for meaningful discussions and made a case for a holistic view of health and well-being, ultimately contributing ideas to improve the quality of life and livelihood in Nepal and the Nepali diaspora worldwide.

Recommendations

- NRNA will follow up and implement recommendations of ICC Health Committee conventions.
- Migrant Health Matters and Universal Healthcare for All should be a top priority in NRNA and Government of Nepal Health policies.
- Health insurance should be uniform and affordable to all.
- Health policy should also consider the low birth rate impact on family mental health and well-being and develop an awareness program.
- Consciousness, transcendental meditation, Vedic knowledge, and Bhagavad Gita teaching should also be incorporated into health programs in developing an integrated and holistic approach.
- NRNA should work closely with the Emotional Well-being Institute (EWBI) Geneva to focus on preventative strategies and programs to improve mental health well-being as identified in the MoU and involve other stakeholders.

Plan of Action

- Set up a joint Health Committee with representatives from NRNA, the Department of Health, Hospitals, and Health Associations in addressing and implementing NRNA ICC Health Committee conference findings and recommendations.
- EWBI and NSFT, SKTT NRNA hold a collaborative workshop in 2024 with stakeholders in Mental Health to identify priority areas and develop program to raise mental health awareness campaign and address existing gaps in Nepal.
- NRNA should play a pivotal role in raising awareness on migrant's health issues and addressing suicides incidents among migrant workers.

Contributors: *Dr Sanjeeb Sapkota, Dr Abhinav Vaidya, Dr Bikash Lamsal, Dr Aliza Bhandari, Dr Subash Pyakurel, Dr Pramod Dhakal, Dr Basseer Jeeawody, Dr Raju Adhikari Dr Sangita Pudasainee*

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SESSION 9

ECONOMY AND FOREIGN INVESTMENT

Introduction

The 3rd NRNA Global Knowledge Convention included a session dedicated to Economy and Foreign Investment. The session was moderated by Mr. Anal Bhattrai and Dr Ranjeet Mahato. This session had a central focus on NRN engagement and their potential for investing in Nepali projects. Speakers shared their viewpoints on effective investment strategies for NRNs and their significance in Nepal's economy. Additionally, a short panel discussion was held during the session, where experts actively participated in discussions and offered valuable insights into various facets of NRN and their importance in the economy and foreign investment in Nepal.

Mr. Shankar Uprety,

Group CEO at Hamro Patro, presented on the topic 'Entrepreneur and Startup in Digital Market'. Mr. Uprety delivered a presentation on Nepal's digital startup, Hamro Patro. He provided an overview of the platform's historical growth, mission, and diverse user demographics. He also discussed the ongoing expansion of Hamro Patro's product and service offerings, notably the recent introduction of digital remittance services through Hamro Patro, emphasizing its expansion into multiple countries. Upreti's presentation related Hamro Patro's journey with the significant advancements in the digital landscape of Nepal.

"Hamro Patro was a calendar application in 2010. We started a news aggregator and radio platform in 2014," Mr. Upreti recalled. "We introduced a forex rate utility in 2015. In 2017, we introduced an election portal." He added that the company's goal until 2017 was acquiring users and the company moved towards monetization through astrology service, remittance service, and digital payment service, among others, after achieving a milestone of 10 million users.

Mr. Ramkrishna Khatiwada,

the CEO of Infrastructure Development Bank, Nepal, presented on the topic 'Importance of NRNA for Infrastructure development'. During his presentation, he discussed the concept of positive and negative multiplier effect of investments associated with infrastructure projects. Positive multipliers result in beneficial spillover effects, while negative multipliers lead to missed opportunities. "To develop any country, infrastructure should be made, which will improve to overall economy of the country," he said. Additionally, he emphasized the role high earning NRNs can play in the development process of Nepal, particularly infrastructure development. Furthermore, he emphasized the need for collaborative efforts from four key sectors: the government, NRNs, the private sector, and financial institutions (BFIs/DFIs/IFIs) to create a robust infrastructure development ecosystem. He stressed that there is a shortage of infrastructure investment from the government in various sectors.

'NRNs can act as catalysts for changing mindsets, increasing investment opportunities, providing technical expertise, advocating for policy changes, and facilitating infrastructure financing,' he explained.

Mr. Ramesh Hamal,

CEO at Securities Board of Nepal (SEBON), gave a speech on 'Capital Market and Investment Security'. During his presentation, he pointed out that the availability of funds in Nepal is on a declining trend, and the performance of capital expenditure is in a negative state. Drawing inspiration from Singapore's economic model, Mr. Hamal emphasized the importance of adopting a pragmatic mindset that benefits both the country and society. Mr. Hamal described ongoing efforts to establish an ecosystem that supports capital formation in the private equity venture domain, leading to service and product innovations.

'We adopted a policy of segregating 10 percent of all IPOs for migrant workers. It offered social justice to those who bring remittance, gave them natural incentive to send their remittance via banking channels, and channeled the remittance into productive sector rather than on consumer goods,' Mr. Hamal explained. He also expressed the belief that Nepal possesses significant untapped potential but needs to make greater efforts to harness it, as there is a limited window of 27 years before this potential diminishes.

Mr. Hamal stressed that SEBON's plans and policies are designed to enhance the well-being of the country and its citizens. He also underscored the importance of book value for individuals and revealed that the SEBON team is actively working to engage NRNs in the secondary market. During the **panel discussion, Mr. Hem Raj Dhakal,** Vice President of FNCCI, shared insights from his personal experience in the realm of international money remittance. He delved into his company's establishment (IME) and its evolution over the years, offering his perspective on how remittance has impacted the different sectors in Nepal. The banking system was not very easy in Nepal when we started IME. Channeling of remittance through the banking sector ultimately helped the industry foster in Nepal,' he added. Mr. Dhakal also argued that remittance has had a huge impact through the role it played in offering quality education to the Nepali children. He also emphasized that Non-Resident Nepali (NRN) can contribute not only through remittances but also by sharing the knowledge and experiences they have gained from their time abroad.

Mr. Ramu Poudel,

the executive director of the Nepal Rastra Bank (NRB), discussed the NRB's role in the economic development of Non-Resident Nepalis (NRN) and foreign direct investment (FDI). He emphasized that the NRB's influence on FDI is not extensive. Regarding NRN, he mentioned that they have the option to deposit their earnings in Nepali banks with interest. He also mentioned the practice of initial public offerings (IPOs) for NRN to support their economic prosperity and highlighted the loanable financing facility available for NRN to invest in Nepali projects. Furthermore, Mr. Poudel stressed that it is time to move from discussions to implementation. He encouraged NRN to utilize the products offered by the NRB.

Mr. Eknath Khatiwada

NRN Foundation BoD, Uganda stated that Non-Resident Nepalis (NRNs) perceive a gap in terms of investing in the Nepali economy, attributing it to unclear policies and insurance limitations. However, he noted recent improvements and increased opportunities for NRNs. He suggested the establishment of an NRN investment desk within the National Planning Commission to boost NRN engagement in Nepal's economy. Emphasizing the importance of Small and Medium Enterprises (SMEs) in attracting Foreign Direct Investment (FDI), he also recommended revising the NRN Act of 2009 and strengthening the investment package. These proposals aimed to address NRNs' hesitancy and encourage investment in Nepali projects.

Mr. Rajeshwor Gyawali,

who serves as the Joint Secretary in the Ministry of Finance within the Government of Nepal, discussed the NRN Development Fund and its progress. This fund was initiated with a 10 percent partnership from the government of Nepal (GoN), and funds were collected for this program. However, due to inadequate preparation in terms of registration, investment, and share mechanisms, the project faced challenges in achieving its objectives. He pointed out that after overcoming a lengthy and challenging process, the NRN Development Fund is now operational. Additionally, he mentioned the ongoing establishment of a project bank by the NRB to facilitate smooth banking and financing for projects.

Summary

The session brought together a distinguished pool of experts who generously shared their valuable perspectives on diverse investment opportunities for NRNs. This event highlighted the pivotal role of NRNs and the available investment prospects in Nepal's projects. Discussions included the examination of various plans and policies related to the economy and foreign investment. Moreover, the event emphasized the potential for NRNs to bridge infrastructure gaps, boost the capital market, and contribute to economic growth through knowledge sharing, investments, and collaboration with key stakeholders.

The Revenue Secretary, Ministry of Finance summarized the discussion and ensured government commitment to support NRN (Non-resident Nepali) to bring back knowledge, capital, and skill. He has highlighted the support provided for the establishment of the NRN Nepal Development Fund (NDF). Additionally, he notified that the Cabinet Ministry has approved the initiation of an Initial Public Offering (IPO) specifically designated in foreign currencies for NRNs. He further mentioned that SEBON will soon release guidelines regarding this matter.

Recommendations

- Increase focus on sustainable investments and the private sector should take a lead to drive economic growth.
- Enhance infrastructure resilience, particularly in roads and cities, through the implementation of green development practices.
- Ensure proper and sustainable use of natural resources, particularly focusing on land, mountains, and rivers, to address issues such as barren land, food security, and youth migration.
- Extend the Double Tax Avoidance Agreement (DTAA) to all countries from where foreign investment is coming into Nepal. Nepal should introduce General Anti Avoidance Principles (GAAP) so that Nepal will be able to control tax leakages and close potential loopholes such as sham transactions, treaty shopping especially for capital gains taxes. Expand Bilateral Investment Protection and Promotion Agreement (BIPPA) concurrently with DTAA to make foreign investors feel safe about their investments.
- The new legal framework (India's 2016 bankruptcy code) has allowed creditors to initiate insolvency proceedings against defaulting companies, as well as for courts to overthrow company boards, making it possible for distressed asset sales to be conducted. This way, Private Equity Venture Capital (PEVC) will grow.
- Allow NRNs to invest in commercial real estate projects and limit repatriation to max two properties capped to US$ 500K per year and both payments via a banking channel. India allows $1 million per year.
- To retain property or cash or securities or even overseas companies abroad even though the NRNs migrate to Nepal.

Plan of Action

- Liberalize financial investment policies to encourage foreign direct investments by replacing One Window Investment Policy with Automatic Rules as being practiced by our neighbors, reducing government involvement in international private party business contracts, allowing investors to choose international jurisdictions for business dispute settlements, simplifying bankruptcy and insolvency rules for easy exit venues, allowing direct repatriation of funds via commercial banks without needing central bank's prior approval, allowing brokerage and wealth management licenses to NRNs and foreign investors, increasing the fraction of allowed shareholding in capital intensive projects, and management and consultancy services to attract big international investors.

Contributors: *Mr Anal Bhattarai, Dr Ranjeet Mahato, Mr Dila Kharel, Mr Shankar Upreti, Mr. Ramkrishna Khatiwada, Mr Rajeshwor Gynawali, Mr. Ramu Poudel, Mr. Hem Raj Dhakal, Mr Ekanath Khatiwada, Ram Prasad Ghimire, Mr Ramesh Hamal*

5.10

SESSION 10

SUSTAINABLE TRANSPORT DEVELOPMENT, CONTRACT MANAGEMENT AND CRITICAL CONSTRUCTION MATERIALS

Chairs of the session: Er. Badan Lal Nyachhyon, Managing Director, Multi-Disciplinary Consultants (P) Ltd., Mr. Bikal Jha, Chair, NRNA, Oman Chapter, Dr Raj Kumar Shah, Senior Lecture, Liverpool John Moores University, UK

Dr Binod Amatya,
Greater Kathmandu Valley Metro Rail Promotion Group, Nepal, presented on "Metro Rail for Integrated Development of Greater Kathmandu Valley."

Data reveals that over a third of the national vehicles currently operate within the Kathmandu Valley. Consequently, the valley is grappling with several pressing issues, including air pollution, traffic congestion, and urban sprawl.

In response to these challenges, we advocate for the formulation of a comprehensive development plan, titled "The Kathmandu Valley Development Vision 2100." This vision seeks to rejuvenate the Kathmandu Valley as an Economic and Business Hub, while simultaneously preserving its pristine environment, rich culture, and heritage, and ensuring high-quality living in a resilient and charming city. As a pivotal component of this plan, we put forth the "Metro Rail Vision" aimed at the integrated urban development of the Kathmandu Valley, with a focus on establishing an efficient transport system centered around a metro rail network.

This proposal spans a 20-year period and emphasizes that the implementation of the metro rail network will not impinge upon the region's cultural and heritage values. The suggested metro route includes nine major underground stations and substations, with the central station located at the Bhrikuti Mandap Junction. The proposed metro map encompasses five lines, totaling a 200 km network encompassing the entirety of the Kathmandu Valley. We emphasize the importance of integrating the metro network with the development of smart cities, as a well-connected transportation system is imperative for the realization of a smart city.

Also, we advocate for the establishment of business hubs, exemplified by the concept of Chobar within Kathmandu and areas beyond the valley, such as Banepa, which will be seamlessly connected by the metro system. Furthermore, we suggest the establishment of convention centers in suburban areas like Godavari, with the aim of linking these centers through the metro network, thereby connecting the suburban parts of the valley with the central areas. In addition, we stress the significance of establishing strong national and international connections. We emphasize that an urban rail network serves not only as a means of transportation but also as an instrument for the regeneration and restructuring of our cities.

Er. Prakash Upadhyaya,
Former Spokesman of Department of Railways, Nepal, on "Development of Railway in Nepal: Opportunity and Challenges"

Railways play a crucial role in global transportation infrastructure, offering efficiency and sustainability benefits in an ever-evolving world.

Nepal is currently in the initial stages of railway development. The upgrade of the Jayanagar-Janakpur-Bardibas railway (69 km) is underway, with the Jayanagar-Janakpur section already completed and put into passenger service since 2021 AD. As of July 16, 2023, the railway service has been extended to Bijalpura, resulting in a total of 52 km of operational track.

However, Nepal faces several challenges in railway development, including difficult topography, young geology, deep river crossings, and less consolidated deposits in the Tarai region, which pose hurdles for constructing an extensive transport network. Despite these challenges, substantial preparations are underway for the construction of the Mechi-Mahakali railway line, which is integrated into the Trans Asian Railway global network. The Mechi-Mahakali railway line is considered one of Nepal's national pride projects, with the Simara Bardibas section (108 km) currently being prioritized for construction by the government.

Upon the completion of the Mechi-Mahakali Railway, the Birgunj-Kathmandu and Kathmandu-Kerung railway lines will be connected, allowing Nepal's railway network to link with the second central corridor through China and then to the first northern corridor (Baikal-Amur Trans-Siberian Railway) via Mongolia. Consequently, Nepal will be connected to all countries across Europe and Asia through the railway, resulting in significantly reduced transportation and shipping costs.

Both neighboring countries, India and China, have been supporting Nepal's railway development. Several projects, such as the Jalpaiguri-Kakarvitta (70 km) and Jogbani-Biratnagar (18 km) under Indian assistance, as well as the Kerung-Rasuwagadhi-Kathmandu (72 km Rasuwagadhi-Kathmandu) under Chinese assistance, are either under construction or in various stages of completion.

Regarding the Mechi-Mahakali Railway, the construction of the Railway Track Bed has been completed, and it is essential to initiate the remaining tasks, including laying the railway track, establishing stations, installing the catenary, among others.

The Birgunj-Kathmandu and Kathmandu-Kerung projects have the potential to provide the most cost-effective route between the two major economies of India and China, thereby enabling Nepal to leverage the advantages of Trans-Asian Railway (TAR) connectivity. The reduced travel and freight transport distance between India and China would be a significant advantage.

Only with a concerted effort to accelerate railway construction and bolster technical capabilities within the institution can Nepal truly realize the slogan of "Prosperous Nepal, Happy Nepali" from the railway sub-sector.

Dr Raj Shah,
Liverpool John Moores University, UK, presented on "Sustainable Management of Critical Construction Materials: Case of Sand and Gravel Mining from Local Rivers in Nepal."

Sand and gravel are essential components in construction and crucial materials for the construction industry and land reclamation. Globally, sand is the third most extensively exploited natural resource, with an estimated consumption of between 25.9 to 29.6 billion tons in 2012.

Several countries are grappling with the significant challenge of sand scarcity. Singapore, for instance, imports 35 million cubic meters of sand, while Korea is experiencing a scarcity of river sand for construction projects due to excessive mining from riverbeds. As the demand for sand and gravel in construction continues to rise at a pace faster than natural sources can sustain, prices are expected to surge. On average, the global daily demand for sand amounts to approximately 18 kg per person.

There are several challenges associated with managing critical materials such as sand and gravel in Nepal. These challenges include the identification of sustainable sources for construction sand mines, the quantification of the available quantity and quality of sand mining sources, the implementation of effective supply chain management strategies to satisfy the booming demand, the lack of regulation and proper control of mining policy and management, and insufficient support from legal aspects to control illegal operations.

So, the question is about the impact of Sand/gravel mining from rivers. The impacts include various environmental repercussions, such as environmental degradation, habitat destruction, and riverbank erosion, leading to the damage of vegetation and habitats. Furthermore, extensive sand mining results in long-lasting damage to river ecosystems, affecting both the in-stream and floodplain areas, including farmlands, houses, and infrastructures.

The consequences also extend to soil erosion and pollution stemming from the mass transportation of sand, contributing to the depletion of sand resources and the consequent loss of fertile lands. Moreover, the relentless extraction of sand can lead to a reduction in the water intake capacity, water pollution, and a decline in soil quality. Additionally, the practice results in the loss of livelihood for riverside fishermen and triggers changes in natural vegetation and farmlands.

Summary

- The Session has received all together 7 papers, out of which 4 papers were presented in the Session. Three papers presented by Er. Anata Ram Baidya on "Public Safety For all including Disability Access", Dr Er. Sudip Bhattarai on "Aviation and Aerospace" and Dr Rajendra Adhikari on "Prospects and Challenges of Public Procurement in Nepal" will be included in the Final Proceedings.
- The papers presented are very pertinent for enhancing the sustainable transport system in Kathmandu Valley and Nepal as a whole, and ensuring the supply of construction materials with preserved natural environment as permitted by the Environmental Impact Assessment and Cultural Heritage Impact Assessment.
- Public Transportation system in Kathmandu Valley is in very critical conditions with a huge toll of life due to poor management. Huge traffic congestion, air pollution, vehicle emission, travel time loss, import of vehicles as motorbikes and cars and fuel, public health issues along with haphazard urban development into a concrete jungle have converted Kathmandu Valley into a mess. This is the result of "Piece-meal" development of Kathmandu Valley without a long-term vision and mission.
- Implementation of the recommendation of the papers will resolve the major issues of traffic congestion, travel time loss, enhance mobility and connectivity and integration of all municipalities in Kathmandu Valley and will help to change it to an economic hub with regeneration of Kathmandu Valley with huge tangible and intangible benefits contributing to the National economy.
- The Railway system across Nepal in the long run will be helpful to integrate Nepal with the Trans Asia Transport System. But its development and implementation should be carefully integrated with other transport modes as surface and air transport assuring adequate traffic volume in terms of availability of adequate passengers and goods.
- The critical construction materials such as sand and gravel have a lot of challenges in Nepal based on the fragile and limited volume of construction materials available in the natural state. Most of the materials are abstracted from riverbeds and quarries with a lot of consequences such as environmental degradation, enhancing risks for landslide, river bed erosion, and damage to the existing infrastructure, culture and heritage. In order to assure the adequate volume of these critical construction materials for meeting the demand for future mega projects, a well-planned material supply chain program will be paramount.

Recommendations

- There are two sets of recommendations identified: One is related to the sustainable and integrated transport development for Kathmandu Valley and the sustainable transport development of the whole of Nepal.
- Sustainable Transport Development of Kathmandu Valley
- The state of Kathmandu Valley is in very alarming condition with a forecast that in the very near future, 20 percent of Kathmandu Valley citizens will be cancer patients. The need for a concerted effort to improve the quality of life is paramount. This requires a very urgent mission to convert Kathmandu Valley into an adorable and livable city.
- Serious effort shall be undertaken by the government and the citizens to develop the understanding that the changes required on the state of Kathmandu Valley require radical paradigm shift in the development mechanism of the Valley through promoting integrated development approach instead of practicing the "Piece-Meal" approach implemented in last 70 years with 14 transport projects and 6 urban development plans without a long-term vision and a purpose. That was a collective huge mistake on the part of the Government and civil societies.

- The paradigm shift being discussed is related to integration of major disciplines as Public Transport focusing on mass rapid transit with metro rail at the core, regenerating Kathmandu Valley to planned urban area based on thematic development of its nooks and corners into business hubs and service centers catering the need of the citizens, integrating the municipalities with an effective integrated mass transit for enhancing mobility and connectivity; and collectively resolving the major issues based on the mass rapid transit framework created by the proposed Metrorail system.
- Most importantly, the demand for an integrated approach to Development requires promoting a single-door entity for coordination of the development efforts, developing a common understanding and program with long-term vision and mission, and consensus building among the various stakeholders and authorities, and communities.
- The development of a Railway system for Nepal targeting the whole country and connecting to the trans-Asia transport system may require a comprehensive feasibility study taking care of the development of other transport modes such as surface transport and aviation. These modes could be competing and may displace each other unless studies are conducted in an integrated manner.
- The Critical construction materials as sand and gravel are the basic construction materials and common for all projects and unless the supply chain is not well planned in advance, the Nepali projects will suffer and the progress will be affected due to lack of adequate supply of quality materials. The comprehensive study of these materials with the objectives to assure adequate volume with good quality should be conducted on a priority basis

Plan of Action

1. Integrated Transport System:

- Promoting the development of sustainable transport in Nepal and avoiding redundant investments that create duplication of transport modes competing with others. For example, 51 STAL airports are abandoned and are not in operation; International airports in Pokhara and Bhairahawa are underutilized; the proposed Nijgadh Airport is under criticism because of the lack of clarity on assured air traffic and potential risk of interference with Indian Air traffic protocols and air traffic operational issues, clarity about the feasibility of operating both surface road and railways, and facing huge environmental issues;
- The development of a railway system for Nepal targeting the whole country and connecting to the trans-Asia transport system may require a comprehensive feasibility study taking care of the development of other transport modes such as surface transport and aviation. These modes could be competing with each other and may displace each other unless studies are conducted in an integrated manner.
- Promoting the sustainable and integrated transport development for the Kathmandu Valley effectively serving its comprehensive urban development following the Integrated Transport Framework Plan,
- Particularly promoting Integrated Transport System with Metro Rail system at the core in Greater Kathmandu Valley and utilizing the space around the stations as business hubs, vehicle parking and thematic urban plans.
- Integrating various transport modes as feeders to the Metro Rail and vice versa and enhancing sustainability.
- Utilizing the underground space to ease traffic congestion, reducing road accidents, reducing vehicles emission,

air and dust pollution, overcrowding of vehicles and road expansion through destruction of ancient heritage settlements.

- Enhancing the mobility and connectivity among 18 municipalities and new smart cities with the Metro Rail System, which cannot be done by any other transport system.
- Promoting paradigm shift from the "Piece-Meal" development approach implemented in the last 70 years with 14 transport projects and six urban development plans and creating haphazard urban sprawl creating the concrete jungle and a sick city with potential for poor public health with ever rising cancer patients.
- Promoting paradigm shift for regeneration of Kathmandu Valley with a long-term vision "Kathmandu Valley 2100" for improved quality of life, creating an adorable and livable city with restored ancient glory, promoted tourism, ancient culture and heritage, and natural environment.
- Regenerating Kathmandu Valley for enhancing its role in contribution to national economy from 24 percent of the GDP to more through substantial reduction of economic loss of USD 1.2 billion per annum incurred due to traffic jams, congestion, traffic accidents, excessive fuel consumption, import of excess vehicles, investment in road assets loss of travel time and working time in the absence of mass rapid transit and generation of better direct revenue from productive activities.

2. Improving Procurement of Works, Contract Management and Critical Construction Materials

- Strengthening the capacity of spending the capital investment, which is currently marked less than 25 percent in last 5 years because of the poor contract management characterized by the low bids, contracts award to ghost contractors, neglecting the qualification requirements, non-professional sub-contracting with poor capacity, poor construction quality and project designs.
- Avoiding ghost clients, consultants, and contractors through identifying and assigning project jobs to knowledgeable, experienced, and reputable experts and stakeholders, and search for capable experts through application of check and balance procedures and avoiding ad hoc decisions. This very important matter needs to be promoted through strong institutional development with in-house capabilities both in the government and private sector.

3. Managing Supply Chain of Critical Construction Materials

- Effectively managing the supply chain of critical construction materials such as natural sand, gravel, stone [and Timber] for assuring adequate supply of good quality materials and protecting the natural environment.

4. Promoting "One Door Entity"

- Identify and promote an "One Door Entity" to encourage meaningful dialogue among the stakeholders and local communities for building consensus, coordination, effective institutional arrangement, effective progress monitoring and control, developing long-term vision and mission, and avoiding divided responsibility among various entities and hurdles and ensuring effective project design management and implementation and creating harmony and partnership among the stakeholders and communities.
- Promote long term planning for 50-100 years for avoiding "Piece-Meal" development as promoted by the donor agencies for the last 70 years and based on consensus of the stakeholders.
- Award contracts based on the capability of service providers and avoiding the "Wildlife style" competition

based on the "Survival of the fittest" and practically promoting corruption, exploitation and low bid contracts neglecting natural prices established by the market.

- Develop legal tools for avoiding "Conflict of Interest", independent technical audit before finalizing Contract awards and introduce personal performance evaluation by relevant and concerned stakeholders.
- Facilitate collaboration with the diaspora for knowledge transfer, capitalizing on their expertise, avoiding past mistakes, and contributing to sustainable infrastructure and mobilization of funds for capital investment.

5. Risk Analysis and Applying Check and Balance Approach

- Identifying and defining the Project Management Directives to visualize project formulation through all phases of project cycles from concept design phase to final implementation phase, analyzing potential risks associated in every step and finding ways to eliminate these risks. The risk analysis further demand for "Check and Balance" at every level to eliminate technical, managerial, financial and political mistakes etc., strengthening accountability, creating undivided ownership, and eliminating man-made mistakes through application of Check and Balance procedures as review, verification, authentication and certification by independent subject matter experts free from project management authorities.

Contributors: *Er. Badan Nyachhyon, Mr Bikal Jha, Er. Keshab Kumar Sharma, Dr Binod Amatya, Er. Prakash Upadhyaya, Dr Rajendra Adhikari, Dr Raj Shah, Prof Hirendra Raj Pradhan*

5.11

SESSION 11

FOREIGN EMPLOYMENT AND VOCATIONAL TECHNICAL EDUCATION

DR MAN BAHADUR BK, SESSION CHAIR AND DR UTTAM GAULI, SESSION

Introduction

On reaching the airport in the morning or evening, we witness a scene where a huge mass of students and people are leaving abroad for study and foreign employment. Remittance is the backbone of our economy, covering a significant portion of it. How can we change such an economy into a sustainable and inclusive growth economy as such? And how can we create employment within our country to replace foreign employment? And what sorts of vocational technical education is required for this purpose?

Dr Kirti Kusum Joshi,
Lumbini Technological University, Nepal, presented on "Expanding Technical and Vocational Education for Promoting Traditional Crafts: The Role of Universities."

Traditional buildings are assets to the tourism industry. Houses built by hand, using locally available materials are climate responsive houses—contributing to climate change adaptation and mitigation. Our forefathers long ago thought about it, we are talking about sustainability now. Newari buildings are proven to be seismic resilient: timber frame and joints—timber is very seismic resilient. But the map of new such houses will not be passed now because of the National Building Code. There are no engineers with the capacity for structural analysis capacity of such houses. Thus, the traditional craft and technology are on the verge of extinction—it also applies to traditional architecture across Nepal.

Change in lifestyle, industrial development and technological advancement have been becoming the factor for the extinction of traditional skills. But we can save them.

Why should we save traditional crafts? Traditional crafts are economic opportunity and empowerment. Marginalized and disadvantaged communities rely on traditional craft occupations for livelihood. There are economic opportunities for handicrafts and traditional jewelry.

However, challenges accompany opportunities. Some challenges are preserving traditional skills and technologies, innovation, and adaptation. The handicraft market is uncertain and unreliable, adding more to the challenges.

Amid such challenges, we need to connect the indigenous/native knowledge and skills—the prior knowledge—to former higher education. The National Vocational Qualification Framework aims to validate competencies acquired through informal training. However, the certification is solely for employment purposes, ignoring educational progression.

Moreover, the National Qualifications Framework (NQF) aims to enable learners to choose their interest in higher education through the provision of progression pathways and permeability between Technical Vocational Education and Training and General Education streams. But there are limitations as well. Success critically depends on universities' cooperation. Concerned with certifying individuals but not with the future of the occupation itself—it misses to mull on how to preserve the occupation.

Origami effect: Japan's traditional paper craft is a perfect example of the opportunities of traditional crafts. It is used in architecture and even in robotics and spacecraft technology.

Why the integration into mainstream education? Some traditional jobs require high skills but receive no respect from people from society. And education that brings economic empowerment and dignity in the same jobs is needed: Switching jobs could be costly.

We can integrate traditional crafts in existing academic programs (e,g MIED by KUSOED) or curricula (e.g., topics on indigenous construction technologies in Civil Engineering subjects). Specialized schools in Japan for example. A concept of Dedicated University Raithane Vishwabidhyalaya has been proposed in Nepal, which is a positive step.

In conclusion, the university can play a huge role in preserving and promoting traditional crafts. They should support NQF for providing academic recognition to the artisans in their field of expertise, enabling them to progress academically as well as act as instructors or supervisors of future generations of artisans. Research and development of innovative technologies should be done to make traditional occupations more efficient and cost-effective. Why not bring artisans to visit faculties? Or Artisans-in-residence?

Ms. Bina Kunwar Thapa,
Representative, ILO Nepal, on "Strengthening Services for Nepali Diaspora and Workers in Destination and Home Countries"

Over 500,000 youths enter the Nepali labor market and on average more than 50,000 Nepali workers go abroad for work. Nepalese work in as many as 172 countries. Major destination countries include the Gulf and Malaysia. Lately, an increasing number of Nepalese are migrating to European countries for work. There is demand for skilled Nepali workers in various sectors in the EU countries. A total of 70 percent of the workers are estimated to be low skilled or unskilled as per Nepal Migration Report 2022.

As a huge number of Nepali are flying overseas, they are also facing immense challenges both in Nepal and abroad. Some challenges faced by Nepali migrant in Nepal are lack of job opportunities in domestic labor market, no information on skills demands within the country and abroad, high recruitment cost, high interest rate on loan, majority of Nepali workers low skilled and unskilled, less researchers on skills forecasting, yet to develop systematic social and economic reintegration plan.

Similarly, challenges faced by Nepali migrant in destination countries are not getting as much salary as promised, skills mis-match, no recognition of skills training obtained in Nepal, harsh working conditions, no social security, psychological problem, confiscation of identify cards, illegal status if leave a job (Gulf and Malaysia), and no diplomatic mission or consular services in many destination countries.

To solve the skills related problems, first, labor market information-related study is a must. Designing and implementing a sound labor market information system, including accurate labor market needs assessment and skills anticipation that inform migration policies, increasing migrants' access to education and training, ensuring coherence between skills, employment and migration policies are other measures. Fostering skills partnerships between countries of origin and destination, facilitating the recognition of skills of migrant workers—upon return would serve better.

Mr. Prajwal Sharma,
Representative, IOM Nepal on "Foreign Employment and Vocational Technical Education"

We are slowly moving towards an aging society. A lot of employment opportunities wait abroad for Nepali migrants. Our key destination Malaysia, for example, has been spending heavily for infrastructure and they will need one million laborers every year. Similarly in Europe, the caregiving service sector has more employment opportunities.

But the demand-driven and market-driven skill trainings are lagging in Nepal. Even the higher skilled Nepali migrants will become the victims and face problems if they fly without proper consultation and knowledge.

Seeing the trend, labor mobility will not decline for the next ten years. But we need to address the demographic dividend that is decreasing in Nepal. How to utilize their skills and knowledge in Nepal is a big question.

Dr Nahakul KC,
Vice Chairman, Lumbini Province Planning Commision as a keynote speaker on the "Role of Provincial Governments on Employment and Vocational Education"

Around 34 percent of the population in Lumbini province are unemployed. We have plans to generate two lakhs employment in two years. The primary sector in our view is agriculture but youths are not willing to join agriculture. Orienting them towards the service sector is a challenge.

Another potential sector is handicrafts. Lumbini is a tourist area. But unfortunately, Chinese handicrafts are being sold in Lumbini. We have introduced a plan to sell local handicrafts. Lumbini has a high potential area for investment, yet the service sector is not growing as anticipated. There are immense opportunities in the service sector such as hotels and casinos.

Though we have technical schools to accommodate 23,000 students, our students have been willing to go abroad. We have also opened a technological university in Lumbini, to contribute to five sectors to create skilled human resources.

Summary

Nepal has immense opportunities, but we need to find out and cash in on them. Even Gundruk and Janai are imported to Nepal in recent times. We have been failing to seek opportunities and the government has also failed to give insights. There are a lot of exemplary returnee migrants who became successful in Nepal on return. We can learn a lesson.

Using native skills, knowledge and traditional crafts is an utmost need of the country today because people are already familiar with them and these have become the means of livelihood. A large number of people live with these properties even today. However, the state and policies are reluctant to use these assets for nation-building. Likewise, labor migration or youth movement is a growing issue in the country. All are aware of it. However, a solid policy framework is not considered thinking of how a conducive environment in the country can be created to retain the youth migrants, as this has negative repercussions in both origin and destination countries. The government, non-government, and bi-multi-lateral agencies have put their efforts into labor migration but these efforts are not enough to sort out the growing problems of labor migration, which we encounter today.

As a conclusion, the chair reiterated mainstreaming native skill, arts and culture in the formal education system for which the government of Nepal has formed a preparatory committee to carry on the matter. Native skills can add value even for the foreign-employment. Likewise, he proposed to establish an international mechanism of compensating labor sending countries with some sort of royalty by the labor receiving country based on the GDP contribution of such laborers. It is because such GDP growth has been obtained by sending the youth force.

Recommendations

- Even though the government has formed a preparatory committee for establishing universities for native arts and culture, the plan has to be backed up with the budget and physical infrastructure. In this regard, constant lobbying is needed from the wider stakeholders to make it speedy move.
- Knowledge-heritage should be the foundation of learning attainment. To promote it, each local government should start a learning center for native arts and culture. NRNA needs to facilitate initiation of promoting some model learning centers and support government to expand it around the country.
- NRNA should support designing courses that are useful for skilled migrant workers and returnees.
- NRNA, through its Foundation, should develop a funding/investment strategy to promote the social enterprises as stated above.
- NRA foundation should make an agenda and action plan to implement the outcomes of GKC.

Contributors: *: Dr Man Bahadur BK, Dr Kirti Kusum Joshi, Ms. Bina Kunwar Thapa, Ms Bina Kumari Thapa, Dr Uddhab Pyakurel, Dr Nahakul KC.*

6

SPECIAL SESSIONS AND CLOSING

SPECIAL SESSION AND CLOSING STARTUP, INVESTMENT, COLLABORATION, CHALLENGES AND OPPORTUNITIES

Dr Devi Bahadur Basnet,
Co-chair, 3rd GKC, NRNA

Many youths in NRNA have concerns about how to translate discussion topics into action. This knowledge convention provided an opportunity to share the depth of knowledge and explore how to apply it in Nepal's context. Commercialization, implementation, and startups were emphasized in this year's convention. The focus of this special session is on how to utilize knowledge in Nepal's context. A report of the GKC sessions will be prepared and shared with all stakeholders, including the government, NRNA, and professionals.

Dr Raju Adhikari,
Chair, 3rd GKC, Nepal Science Foundation Trust, NRNA

Dr Adhikari delivered a thematic presentation on the NRNA knowledge investment mission perspective and proposed an outline a roadmap for the future. In his presentation, he highlighted that in the 21st century of the knowledge economy, knowledge has evolved into a commodity. He highlighted that we are in a digital and AI-Robotics age. Asia has emerged as the breeding ground for innovation, surpassing the traditional positions held by the USA and Europe and Nepal can benefit from this due to our strong relationship and geographical proximity in Asia.

He emphasized that Nepal's investment in science and technology is low, accounting for only 0.4 percent of the GDP, and research and development (R&D) receives a mere 0.62 percent of the budget. The public-private partnership is lacking, and the country ranks 111th in the Global Innovation Index. These KPIs highlight Nepal's poor prioritization in the areas of science, technology, and innovation.

Nepal's new science and technology policies which accommodate the Nuclear Research Policy and E-Governance and Digital Data look good on paper, but they have not been fully implemented due to resource constraints and real commitment. It means we are good in policy formulation but poor in implementation. The fifteenth five-year plan (2019-2023) had envisioned 35 percent gross enrollment rate in higher education and 65 percent internet connectivity and is struggling to meet these targets. Unfortunately, Nepal has become the 13th biggest supplier of international students—our skilled manpower has been drained. Poor incentives, salary structure and failure in implementation are the major problems in scientist retention programs that have impacted initiatives such as NAST Return Scientists.

The real crux of the problems is a slow strategic response to emerging STI developments and trends, outflux of high intellectual and skill human resources, poor strategic investment in R & D Innovation, STEM, HE and HR and Donor dependency syndrome.

Without the knowledge investment, the lost skill cannot be recycled and used. The number of Nepali diasporas is eight million in 90 countries. Realizing the potentials of overseas diaspora knowledge power, NRNA formed the first Skill Knowledge Innovation (SKI) Task Force in 2009. SKI launched flagship projects like Nepal Open University in 2017, Nepal Science Foundation Trust (NSFT), Skill Inventory NRN Academy and the Global Knowledge Convention. These initiatives have provided appropriate forums to develop institutional linkage and recognition of NRNA efforts and confidence that the organization is heading in the right direction.

We have now converted the SKI Task Force to the Science Knowledge and Technology Transfer (SK &TT) Department with five divisions. We have now a Skill Inventory Diaspora Resources—a database to access and share necessary expertise, experience, and innovation of diaspora globally and published the first NRN STI journal.

However, despite the above efforts, we have been failing to properly reap the benefits. There are some reasons behind it. NRNA's policy-level efforts lack a system and strategic approach, have a poor grasp of emerging Nepal and global trends, and are focused

on short-term approaches and solutions. Lack of real commitments, funding, support and commitments from both Government and NRNA have failed to drive innovation and reliance on imported technology, and thus tangible outcomes

Furthermore, due to poor coordination and collaboration, and a broken value chain we have failed in real implementation. NRNA's role is merely supportive in policy and planning. It lacks serious follow-up, and implementation of MoU, lack of leadership, advocacy, and lobbying at the highest level. Knowledge investment is driven by quick returns like capital investment. There is a need for an integrated approach and system development. Innovation can't be successfully utilized unless it is worked in a system. Patience and strategic commitment and funding are key to commercialization of innovation.

Let's develop a road map and action plan.

For the policy, a joint permanent STI steering committee should be formed involving the NRNA that takes inputs from stakeholders and sources, identifies and develops required guidelines and road map, and advocates for strategic policies, programs and position papers.

For implementation, let's establish a joint STI endowment fund, work in partnership through institutional collaboration agreements on joint projects. Global scholar exchange and fellowship program should be initiated. Many bright students want to go overseas but they are going individually. Going overseas through institutions would provide more rewards and benefits.

There should be HR development and employment policy to detain migration of our skilled manpower. Unless we create quality manpower, improvise our curriculum to global needs and education trends, we are not producing quality manpower and losing our much-needed skilled human resources.

For now, responsible innovation is the need of the country. Alignment of Science and Technology Innovation (STI) to Nepal Indigenous and Natural endowments/advantages, with a renewed Long-Term Commitment and Investment should be a top priority.

He concluded by saying that NRN declaration from this convention should be implemented by the government and NRNA jointly to engage all other stakeholders. There should also be a separate Ministry of Science and Technology.

Mr. Ekanath Khatiwada,

Two points are very important for the agriculture session. First, nexus issues - how to fusion technology and innovation in the water, energy, and food nexus. I think it is a strong recommendation.

Second is regenerative agriculture. I think Nepal has already done best in the areas of regenerative agriculture. We need to document our practices. We can give an example if we properly document our own practices.

Mr. Rajendra Khetan,

Despite possessing the necessary intellect and abundant resources, the implementation of policies has been slow. While the potential for growth and development is evident, translating conceptual ideas into tangible and effective programs has presented a significant challenge. There remains a noticeable gap between the initial ideation of policies and their successful execution within the agricultural sector.

Despite our knowledge and available means, this gap continues to impede progress. To bridge this gap, the leadership of NRN (Non-Resident Nepali) must engage in dialogue with the government. A collaborative approach is necessary, one that involves the formation of a centralized body comprising representatives from NRN, the government, the private sector, and universities, with active coordination with institutions like the World Bank.

Through this collaborative effort, a comprehensive strategy can be developed to harness the collective expertise, resources, and global exposure of these entities. Subsequently, the focus should shift towards the development of entrepreneurial products that have the potential to stimulate financial growth, create employment opportunities, generate revenue, and establish a tangible foundation for the economy.

Also, the private sector should allocate one percent of corporate social responsibility (CSR) funds to R & D. Considering the diverse experiences of the NRN, the intellectual capabilities of universities, the commitment of the government to policy formulation, and the financial resources of the private sector, a collective effort has the potential to significantly boost the country's economic growth and development. By leveraging the strengths of these four key components and fostering a collaborative environment, sustainable and impactful progress can be achieved within the agricultural and broader economic landscape.

Key points

- Despite having the necessary intellect and available resources, the implementation of policies has been sluggish. While the potential is evident, the transformation of ideas into tangible, result-oriented programs has been a challenge. Although we possess the knowledge and the means, there is a clear gap between conceptualization and effective execution.
- The leadership of NRNA needs to talk to the government. Suggested to create a center including NRN, government, private sector, universities, and coordinate with the World Bank as well.
- One percent of the CSR Fund must be allocated for R&D.

Student Representative,
Nepal

While talking about research and innovation, most of the researchers face limitations. Researchers often ask whether your research is fit in Nepal's context or not. This results in the limitation to the researchers.

This is an age of innovation. But we have not allowed our researchers to work freely. How can our researchers work freely and ensure innovation in such a context?

Ms. Pramila Bajracharya,
Secretary, Ministry of Education, Science and Technology, Nepal

The government is drafting a bill on science, technology and innovation. The government is very keen to collaborate with all parties to ensure collaborative efforts, in the process of drafting the bill.

We have seen many individual efforts. NAST is another organization that is also working in Science and Technology. Combining all efforts is a must to create a synergy.

I request NRNA members to assist us in moving forward with the new draft bill. We have given collaboration the top must priority. On the other hand, the Ministry of Industry, Commerce and Supplies has been helping startups.

We have also decided on a separate fund of Rs one billion. But we are not in the position to disburse the funds due to lack of legal base for the disbursement. The fund will have money from federal, provincial and development partners. NRNA can also contribute to the fund.

Mr. Nabin Maharjan,
Entrepreneurs and Waste Management Expert, Nepal

Project-based interventions often fail to create sustainable results. When a project ends, beneficiaries do not continue the activities. I started my company after I realized the fact.

In Nepal, there are some good laws. But the implementation part is weak. The problem on the legal part is that the law treats all types of private sector in a similar way. On the part of waste management, waste management entrepreneurs often work in the informal sector.

I request NRNA to push a positive agenda. Let's also create pressure on the government to recognize neglected sectors such as waste management. R and D is another part, we are struggling for the small things. Local government is not ready to give us a contract for the long term. We cannot make an investment in a short-term contract.

Mr. Ratan Jha,
Engineer and Urban Planner, USA

There is a trend to approach UN Agencies or other development agencies for even a small initiative related to research and innovation. Nepal's private sector has paid less attention to the research works. The private sector should start investing in research and innovation. Development partners should be the last options for the private sector.

Universities, NRN, government and private sector should work together for effective results.

A major question is: how can we bring Nepalis back to the country? We are talking about skills and capital. I think our NRNs should also return home. There should be an environment for them to return to their home country.

There must be one person in the driver's chair. Solid responsibility should be given for effective results.

A participant said that there should be a comparison of Nepal's situation with India's development as we share similar cultural and other context. In 1990, when private sector reform started, India gave privilege for extra claims. The initiation created big room for research and development. Patents of our indigenous foods have been taken by foreign companies.

No one is at a loss by investing in research and development. Both the government and private sector benefit. Now is the time for value-based investment.

Mr. Nanda Bahadur Singh,
VC of Mid-Western University

The National Planning Commission is currently drafting the 16th five-year plan. It needs to clarify the role of Non-Resident Nepalis (NRNs) in the context of Nepal. NRNA should engage with the Vice President of the NPC to elucidate the role of NRN, whether it pertains to technology transfer or other areas. In terms of human resource production, we should contact all the Vice Chancellors (VCs) of the universities and discuss the course study and the way forward.

A brain gain campaign should be strategically planned to repatriate experts, with NRNs taking a lead in this initiative. Recognizing the significance of the industrial revolution, a roadmap for revolution in all provinces should be developed. This should involve collaboration with the private sector to generate employment opportunities.

Dr Bishesh Khanal,
VC of Mid-Western University

It is unfortunate to observe that Nepal's economic outlook is frequently presented by experts from the World Bank or foreign institutions. Are there no Nepali experts who understand the fundamental nuances of the Nepali economy? In the future, NRNA should pay attention to selecting the right individuals when designing sessions. I suggest that [concerned stakeholders] consider segregating human resources and finance for improved focus.

NRNA should initiate fellowship programs to inspire youths engaged in the fields of Science, Technology, and Innovation. Numerous researchers are eager to contribute to Nepal, but they lack guidance on the process. Establish the fellowship after completing a Ph.D. so that participants can select the labs, they wish to work in.

Mr. Nabin Narayan Munakarmi,
Bio Technologist, Nepal

NRNA has proposed various activities but there is a problem in budget allocation and implementation parts. NRNA should give emphasis on R and D. Research initiatives should be relevant to Nepal's context.

A participant

To facilitate production, the development of infrastructure is imperative. However, there is currently a shortage of adequate infrastructure. An investment-friendly policy is essential for the overall progress of the country. The entire discussion would be futile without the presence of such policies. Technology, capital, and effective management are key factors for the success of development initiatives.

Prof. Dr Timila Yami Thapa
Nepal

Policy issues, along with various bottlenecks and challenges, are discouraging IT companies based in Nepal from initiating businesses on a larger scale. Even Non-Resident Nepalis (NRNs) who have acquired expertise in IT and innovation are reluctant to return due to policy and other challenges. The reality of exponential growth in AI and the tremendous potential of hydrogen energy further emphasizes the need for experts from the NRN community in the fields of energy and agriculture to contribute to Nepal's development initiatives.

Prof. Dr Narayan P Chapagain
Nepal Physical Society

Given the expertise and skilled manpower of NRNs, they could potentially initiate virtual skill training programs for capacity building if physical training is not feasible. In terms of collaborative efforts, the Non-Resident Nepali Association (NRNA) should take the lead in initiating such endeavors. Tribhuvan University has established the TU Alumni Association and has secured land for its activities. There is a desire to collaborate with NRNA, particularly in the field of research. This collaborative effort can enhance research initiatives and contribute to the overall development of Nepal.

Prof. Devendra Gauchan
Nepal

A one- or two-hour discussion is insufficient to address a serious topic such as today's session. It is crucial to establish a platform for continued discussions on science and technology. An integrated approach is essential, as opposed to an isolated one, and the nexus approach is currently absent from Nepal's policy. This is a critical area that warrants further discussion. Nepal lacks a legal framework for a geographic indication tag, hindering the branding efforts. To address issues like this, a multi stakeholder discussion is necessary. For instance, the mislabeling of tea from Ilam as Darjeeling tea highlights the need for arrangements related to geographical indications to prevent such occurrences. Continued dialogue involving various stakeholders is vital to formulate effective policies and frameworks for addressing these challenges.

Mr. Tika Ram Bhandari,
NRNA

The NRNA should play a role in creating opportunities for students and professionals who wish to return to their home country. There is a fund available for science and development, and it would be beneficial to establish opportunities that encourage students to stay in Nepal for at least two years after completing their postdoctoral studies. This approach can contribute significantly to knowledge retention and the application of expertise within the country, fostering scientific and developmental advancements. By providing platforms for returning professionals, the NRNA can play a crucial part in nurturing talent and fostering sustainable growth in Nepal.

A participant

It's commendable that 7,000 licenses have been obtained from Microsoft for Nepali IT engineers to pursue global certification. NRNA can facilitate the certification process, making it more accessible for IT professionals. Additionally, the initiation of an ICT lab in Gandaki Province is a positive step. If someone from the NRNA is willing to provide backstopping support, immediate assistance would be greatly beneficial. The urgency to start work without waiting for a policy or another framework is crucial for

the swift implementation and success of such initiatives. Your prompt support will contribute to the effective operation of the ICT lab and further the development of IT infrastructure in Gandaki Province.

Mr. Chudamani Dhamala,
Dhankuta

Farmers and friends in my village often express the view that our leaders lack honesty. They believe that if we desire transformation, we can exert pressure through the Non-Resident Nepali Association (NRNA) and engage with experts affiliated with NRNA.

A participant

The Nepali government should establish sector-wise priorities, focusing on areas such as health, agriculture, and engineering. Human resource allocation should align with these priorities. Given Nepal's challenges with reliable internet and electricity, it's crucial to acknowledge the country's remote nature when formulating plans. Nepal has not undergone an industrial revolution, contributing to a lack of employment opportunities. To address this, efforts should be made to enhance infrastructure, promote industrial development, and create job opportunities. In terms of technology transfer, there is an expectation that the Non-Resident Nepali Association (NRNA) can play a role in creating a knowledge pool of experts. Rather than solely sending Nepalis abroad, the emphasis could be on establishing comprehensive training programs within Nepal to foster skill development and technological know-how. This approach can contribute significantly to the country's progress and reduce the dependency on foreign expertise."

Mr. Rajan Lamsal,
ICT expert

Encouraging investment in startups is a valuable initiative for the Non-Resident Nepali Association (NRNA). In many countries, including Nepal, there can be hesitancy to invest in novel ideas due to perceived risks. By focusing on supporting startups, NRNA can play a crucial role in fostering innovation and entrepreneurship. Investing in ideas, particularly those generated by the young generation, can lead to the development of a vibrant startup ecosystem. This approach not only provides financial support but also creates an environment that nurtures creativity and innovation. By doing so, NRNA can contribute to the economic growth of Nepal and help harness the potential of the country's youth.

Dr Devi Bahadur Basnet,
South Korea

In line with our prioritized themes of information technology (IT), agriculture, and energy, our first and second conventions yielded numerous recommendations. Building upon the groundwork laid by these conventions, NRNA (Non-Resident Nepali Association) is now seeking to collaborate closely with Nepal's private sector to further our collective goals.

With a renewed focus on fostering collaboration between NRNA and the private sector, we aim to facilitate sustainable development and growth within the realms of IT, agriculture, and energy. By establishing a robust partnership, we can leverage the expertise, resources, and innovative capacities of both NRNA and the private sector to drive impactful initiatives and foster holistic development within these key sectors.

Dr Raju Adhikari,
Australia

Dr Adhikari provided a summary of the discussion. He said that the special session discussion was highly fruitful, and it would help NRNA develop Science, Technology, and Innovation (STI) policies and position papers. NRNA should initiate active engagement with the Government of Nepal. Establishing an STI center will be a positive step forward. NRNA's investment to set up a joint Innovation fund, promoting public-private partnerships, supporting a global scholar exchange program and supervision is warranted, marking the beginning of a new chapter, regardless of the fund's scale.

In addition, we propose that a joint position paper on Science, Technology, and Innovation be prepared. Recognizing the crucial importance of women's empowerment, NRNA is poised to assume a vital role in advancing this cause. Effective representation is imperative for successful partnerships, and thus the Nepal government is urged to invite experts from NRNA, demonstrating flexibility in fostering partnerships with Non-Resident Nepalis (NRNs). We appeal to the National Planning Commission (NPC) and Nepal Academy of Science and Technology (NAST) to include honorary representation from NRNs. The proposition is to actively engage NRNA in policy formulation, prepare a comprehensive STI position paper, and implementation of its policies.

7

ANNEXES

GLIMPSES OF THE CONFERENCE

- Glimpses of the conference
- List of organizing and management committees


NFERENCE NRNA INTERNATIONAL GENERAL ASSEMBLY 3RD NRN GLOBAL


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समृद्धिको आधार
11TH NRN GLOBAL CONFERENCE
NRNA INTERNATIONAL GENERAL ASSEMBLY
3RD NRN GLOBAL KNOWLEDGE CONVENTION
"Knowledge and Transformation: The Foundation of Prosperity."
20TH YEAR CELEBRATION
FOR NEPALI BY NEPALI
17 -20 OCT, 2023
THE SOALTEE KATHMANDU
Inauguration Ceremony
NCC PARTNERS


NCC PARTNERS


NRN GLOBAL CONFERENCE
NRNA INTERNATIONAL GENERAL ASSEMBLY
3RD NRN GLOBAL KNOWLEDGE CONVENTION
"Knowledge and Transformation: The Foundation of Prosperity."
20TH YEAR CELEBRATION
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17 -20 OCT, 2023
THE SOALTEE KATHMANDU
Press Meet


naguration Ceremony


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3rd NRN GLOBAL KNOWLEDGE CONVENTION
Plenary 1: Road Map to Nepal's Future Economy
(Chair: Dr Bindu Lohani)
October 18, 2023
The Soaltee Kathmandu, Nepal


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FOR NEPALI BY NEPALI


3rd NRN GLOBAL KNOWLEDGE CONVENTION
Science, Technology, Innovation, and Investment for Sustainable Socio-Economic Development of Nepal
Plenary 4: Sustainable Infrastructure, Agriculture, and Alternate Energy
October 17, 2023
The Soaltee Kathmandu, Nepal


20TH YEAR CELEBRATION
FOR NEPALI BY NEPALI


GLOBAL KNOWLEDGE
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20TH YEAR CELEBRATION
FOR NEPALI BY NEPALI


3rd NRN GLOBAL KNOWLEDGE CONVENTION
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October 17, 2023
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Annex 2: List of organizing and management committees

Organizing Committee

Convention Chair: Dr Raju Adhikari, RMIT University, Australia (NRNA SKTT Dept, Nepal Science Foundation Trust)

Convention Co-Chair: Dr Devi Basnet, Medytox, Inc. South Korea (NRNA-ICC Deputy General Secretary)

Consultant: Mr Tika Ram Bhandari, Nepal

Intern: Mr Labin Maharjan, Nepal

Advisory Board Member

Dr Ambika Prasad Adhikari, Arizona State University, USA

Dr Bhola Thapa, Kathmandu University, Nepal

Mr Chandra Prasad Dhakal, Federation of Nepalese Chambers of Commerce and Industry (FNCCI), Nepal

Dr Dharma Kanta Baskota, Tribhuvan University, Nepal

Dr Dilip Subba, Nepal Academy of Science and Technology (NAST), Nepal

Dr Dinesh Raj Bhuju, Nepal Academy of Science and Technology (NAST), Nepal

Dr Drona Rasali, B.C. Centre for Disease Control, Canada

Dr Ganesh Man Gurung, Gandaki University, Nepal

Er Ganesh Shah, Former Minister Government of Nepal

Dr Gangalal Tuladhar, Former Minister Government of Nepal

Dr Hari Dahal, American Physical Society, USA

Dr Hem Raj Sharma, University of Liverpool, UK (Vice President, NRNA)

Dr Maheshwar Rupakheti, Research Institute for Sustainability - Helmholtz Centre, Germany

Dr Min Bahadur Shrestha, National Planning Commission, Nepal

Dr Narayan Adhikari, Tribhuvan University, Nepal

Mrs Pramila Devi Bajrachayra, Ministry of Education, Science and Technology, Nepal

Dr Pramod Dhakal, NRNA Academy, Nepal

Dr Puru Shrestha, GeoMinMet Consultants. Inc, USA

Dr Ramesh Chandra Paudel, National Planning Commission, Nepal

Dr Rameshwar Adhikari, Tribhuvan University, Nepal

Dr Surya Raj Acharya, Expert Development and Infrastructure Policy, Nepal

Scientific Steering Committee

Dr Abhinav Vaidhya, Kathmandu Medical College, Nepal

Mr Anal Raj Bhattarai, NRN Nepal Development Fund Ltd. Kathmandu, Nepal

Er Badan Nyachhon, Multi Disciplinary Consultants, Nepal

Dr Bhushan Shrestha, Madan Bhandari University of Science and Technology, Nepal

Mr. Bikal Jha, President of NRNA Oman

Dr Biraj Thapa, Kathmandu University, Nepal

Dr Devendra Gauchan, Tribhuvan University, Nepal

Dr Gyanendra Prasad Joshi, Sejong University, South Korea

Dr Indira Tiwari, Wonkwang University, South Korea

Dr Jarina Joshi, Tribhuvan University

Dr Man Bahadur BK, Madesh University, Nepal

Dr Nabin Aryal, University of South-Eastern Norway (USN), Norway

Dr Pratima Pradhan, Kathmandu Engineering College, Nepal

Dr Rabindra Dhakal, Nepal Academy of Science and Technology (NAST), Nepal

Dr Raj Shah, Liverpool John Moores University, UK

Dr Ranjeet Mahato, Neapolis University Pafos, Cyprus

Dr Rudra Aryal, Franklin Pierce University, USA

Dr Sangeeta Singh, Nepal, Tribhuvan University, Nepal

Dr Sanjeeb Sapkota, NRNA Global Health Support Committee, USA

Dr Sanjivan Gautam, National cancer Institute, USA

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

Dr Surya Bhattarai, Central Queensland University (CQU), Australia

Dr Sushila Maharjan, Harvard Medical School, USA

Dr Uttam Gaulee, Morgan State University, USA

Convention Management Committee

Dr Badri K. C. President, NRNA, Russia

Mr Kul Acharya President, NRNA, UK

Mrs Rabina Thapa President, NRNA, USA

Mr Gouri Raj Joshi, General Secretary, NRNA, USA

Dr Keshab Paudel, General Secretary, NRNA, USA

Mr Rajendra Kumar Raut CEO, NRNA


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