

# Setting Research Priority Areas for the Gandaki Province

Aabiskar Bhusal<sup>1\*</sup>, Sristi Gurung<sup>1</sup>, Kapil Adhikari<sup>1,2</sup>

<sup>1</sup>Physics Research Initiatives, Pokhara, Gandaki, 33700, Nepal

<sup>2</sup>Gandaki University, Pokhara, Gandaki, 33700, Nepal

(Manuscript Received 16/08/2022; Review: 30/09/2022; Revised 03/10/2022; Accepted 05/10/2022)

---

## Abstract

Setting research priority areas is essential to promote science, technology, and innovation, channel limited funding, and encourage people to engage in research activities. Furthermore, it allows for securing research funding from the stakeholders of the identified areas for both short- and long-term development. In this study, we aimed to identify the research priority areas for the Gandaki province. We started by carrying out interviews with experts from different sectors. After that, a checklist of possible priority areas was prepared. Focus group discussions were carried out with experts from the listed sectors. An online survey was then carried out requesting respondents to rank the sectors according to their possible socioeconomic impact on the province. A draft was prepared which was presented during the round table discussion with the experts. In all, twelve priority areas along with their possible research activities in the province were identified. Allocating sufficient funding in these areas can help in uplifting the socio-economic status of the province, thereby fulfilling the provincial vision of a “Prosperous Province and Happy Citizen”.

*Keywords:* Priority Areas, Research Activities, Gandaki Province, Socio-economic Impact

---

## 1. Introduction

Science, technology, and innovation (STI) are the leading economic and social development indicators in a knowledge-based economy. The prosperity of a country can be appraised based on science and technology policies and their implementation. Therefore, the advancement and optimum use of STIs are essential for a government to fulfill the socioeconomic needs of its population through sustainable development.

In Gandaki Province, the development and promotion of science and technology are necessary to improve physical infrastructure, increase agricultural yield, conserve the environment and natural resources, create job opportunities, manage transportation, advance information, and communication technologies, manage urbanization and reduce environmental pollution.

The constitution of Nepal in Part 4 (Article 51) under the section of “Directive Principles, Policies, and Obligations of the State” has mentioned, “Enhancing investment in scientific study, research

works and, in the invention, progress and development of science and technology, and protecting scientists, technologists, intellectual and eminent talents”. Similarly, in Part 3, Article 27 is the Right to information, Article 30 is the Right to clean environment, Article 36 is the Right relating to food, and Article 44 is the consumer’s rights. Granting these constitutional rights to the public; policies, and plans regarding science and technology should be given a top priority.

### 1.1 Current Status

Nepal has witnessed steady but very slow progress in Science and Technology since the start of science education after establishing Tri-Chandra College in 1975 B.S. The Royal Nepal Academy of Science and Technology (RONAST) was established in 2029 B.S. to advance science and technology. After Nepal became a republic, it was renamed as Nepal Academy of Science and Technology (NAST). It has been working as an autonomous body to promote research in science and technology in the country. Besides, a separate Ministry of Science and Technology was established in 2053 B.S.

During the tenure of different governments, various

---

\*Corresponding author. Tel.: 9846602903  
E-mail address: aabiskar@pri.org.np

science-related policies have been drafted. In this context, National Policy for Science and Technology was first prepared in 2046 B.S., which was changed accordingly in 2061 and 2076 B.S. The latest edition has summarized policies, visions, and strategies for the advancement of S&T in the country (National Science, Technology, and Innovation Policy, 2076). In addition, other policies related directly to science and technology like Biodiversity Policy 2063, Urban Energy Policy 2063, National Atomic Policy 2064, Communication and Information Policy 2067, Climate Change Policy 2067, Hydroelectricity Development Policy 2068, Bhupiyog Policy 2069, National Simsar Policy 2069, Non-renewable Grant Policy 2069 and Forest Policy 2071 has also been formulated.

Nepal spends about 0.3% of total GDP in R&D (Research and Development) which is low when compared with the other countries [Korea-4.1%, USA-2.7%, China-2% & India-0.7%] [1]. More funds need to be appropriated to catch up with the rapid development of science and technology in the international arena. Nepal is geopolitically in between the two powerhouses viz. China and India both have excellent research and development capabilities. Therefore, Nepal needs to grasp this opportunity and boost its research and development by creating an alliance for mutual knowledge and resource sharing.

After the promulgation of the new federal constitution in 2072 B.S., the Ministry of Science and Technology was formed at the national and provincial levels. In Gandaki Province, science and technology fall under the purview of the Ministry of Education, Culture, Science Technology, and Social Development. Although some research and development works are being conducted in Gandaki province in science and technology, because of a lack of research priorities, they have not been effective.

Gandaki province has taken the initiative to establish the Gandaki Province Academy of Science and Technology (GPAST) as an apex body for multidisciplinary research. Its other aims are advancing science and technology, nurturing science education and research temper, maintaining economic well-being through sustainable use of natural resources, and preserving and promoting indigenous knowledge and technology.

## ***1.2 Problems and Opportunities***

There are many problems associated with the traditional state mechanism that hinders the growth of science and technology. They include failure to plan evidence-based policies; lack of quality and practical education; lack of coordination and cooperation among the people doing science, public, private corporate sectors, and policymakers; lack of commercialization of research products; endemic science illiteracy among policymakers and brain-drain of talented human resources.

However, with the promulgation of the new constitution and federal structure of the country, we now have opportunities to advance science and technology. The provincial government has considered science and technology its priority in its policy and budget. The academic institutions in Gandaki Province are equipped with ample human resources and formal infrastructures to produce the skilled human resources needed for the province.

## ***1.3 Need for Prioritizing Research Areas***

Setting research priority areas is essential to promote science, technology, and innovation, channel limited funding, and encourage people to engage in research activities. Furthermore, it allows for securing research funding from the stakeholders of the identified areas for both short- and long-term development [2].

With the vision of a “Prosperous Province and Happy Citizen”, the Provincial Policy and Planning Commission of Gandaki Province has identified seven key drivers and five enablers of prosperity in the first five-year plan [3]. The key drivers are tourism, energy, agriculture, industry, physical infrastructure, human resource, and good governance. Five key enablers of prosperity are natural beauty, biodiversity, unity in social diversity, rich cultural identity, and demographic dividend. Any research priority area should be relevant, workable, and supportive of these drivers of prosperity. Therefore, research and development should be conducted, optimizing these identified enablers of prosperity.

Keeping in mind the limited budget and human resources, we need to prioritize the areas for research that have the maximum possibility of uplifting the socioeconomic status of the province. Identifying priority areas can also serve as a framework for advancing science and technology in the province.

## 2. Methodology

Online interviews with experts from different sectors, faculty members, and research institutions head were conducted regarding provincial research priorities. The interviews were made as inclusive of all the sectors as possible. Inclusiveness in priority setting ensures that the essential research areas concerning regional needs are not left out. It also increases the sense of ownership among stakeholders, which helps in successfully implementing and fulfilling identified research agendas [4]. After that, a checklist of priority areas was prepared. A focus group discussion was then carried out with the experts in these areas to garner their views and experiences related to their field (See Annex). Primarily, the discussions were carried out to address the following questions.

- Does the research area support the provincial plans and policies?
- Does it have the potential to develop a product?
- Does it make the best use of the limited resources of the province?
- Does it have a broad consensus?

The research priority areas which address the above questions during the discussions were documented. Similarly, various reports on national priority areas and the science and technology policies of different countries were reviewed [4-7]

Three criteria of relevance, feasibility, and impact of the collected research priorities were used to select the research priority areas. Besides, areas not supporting the provincial plans and policies were excluded.

The interviews, focus group discussions, and criteria matching resulted in the identification of twelve thematic priorities: Agriculture, Data Science, Energy, Environment, Forestry, Health, Highschool Science Lab, Indigenous Technology, Industry, Natural Sciences, Transport, and Tourism.

An online survey was conducted by using a google form, for ranking research priority areas according to their potential impact on the overall socio-economic development of the province. The form was distributed using social media and emails. The targeted respondents were individuals having aca-

demical qualifications of high school and above. The survey also inquired about the possible research activities that can be conducted in the selected areas. (See Annex)

We prepared the draft by incorporating all the suggestions collected after the discussions and online survey. It was shared with the experts for review and comments. A final report was prepared by adding their valuable suggestions and feedback.

## 3. Identified Research Priority Areas

Twelve identified sectors ordered according to their socio-economic benefits to the province with their possible activities are presented below.

### 3.1 Agriculture

Constant innovation in agriculture is essential for food security. It also contributes a considerable portion to the economy. Research should be conducted in biotechnology to improve the breed of crops for better yield. Nepal being a climate change-vulnerable country, and climate-smart, sustainable food production, and distribution technologies should be adopted. The province has a high possibility of scaling up the production of apples, citrus, vegetables, etc., so research on the establishment of the agro-industries needs to be conducted. Argo-ecological crop-specific selection framework should be developed for the scale-up of crop production. To minimize the enormous loss of crops because of endemic diseases and pests, their diagnosis and control must be prioritized. A feasibility study of exotic crops like avocado, kiwi, dragon fruit, etc., should be conducted. In addition, research should be focused on the conservation, promotion, and sustainable supply of the local, neglected and underutilized crops and local varieties. Different ways to maintain the quality and safety of food should also be studied. Research on finding out ways to extend fruit and vegetable shelf life utilizing food technology needs to be conducted. Smart agriculture should be encouraged based on various internet of things (IoT) devices for real-time monitoring of soil elements, moisture, fertilizer, and temperature. Diffusion of the agricultural technologies appropriate to the rural areas is essential to uplift their living standards by increasing agricultural yields. Farmers need to be granted quick access to the market to distribute fresh fruits and vegetables by setting up efficient transportation logistics.

### **3.2 Natural Sciences**

Understanding natural laws by developing new ideas, theories, and methodologies falls under basic research's purview. People can only have a scientific and innovative mindset when they have a firm grasp of fundamental science. This will enable them to ask the right questions underlying a problem and determine the methodologies to solve it. Such groups of people are vital in solving the province's present and possible future issues. Funding for basic research and education is essential for innovation and sustainable development of the economy and society (Grupp, Hinze, & Breitschopf, 2009). So, research in fundamental science should be given a top priority. For this, students can be fostered to take part in research activities to enhance their exploration, enthusiasm, and scientific spirit in innovation activities. Universities should be encouraged to update their curriculum and restructure subject composition to include fundamental research on provincial research priorities and market demand. Programs for improving the skills of researchers like training, international collaboration and exchange, seminars, and workshops should be launched. The labs of universities need to be upgraded with state-of-the-art equipment to increase their research capacity. A network of provincial labs for research activities and scientific observation should be established. An environment conducive to intellectuals working in different research institutes should be created to convert their research ideas into startups.

### **3.3 Energy**

Production and reliable and continuous energy distribution are vital for the province's overall development. The province has many perennial water resources, so it has enormous potential in hydropower, but currently, there are only a few small or medium-scale run-of-river hydroelectricity projects. As rivers swell in the summer and contract in the winter, the total energy production dwindles. So, water reservoir-type hydroelectricity projects should be given top priority. It is not wise to fulfill energy needs from only one source, so alternative energies like wind and solar should be developed. Subsidies should be granted by the government to make them commercially viable. The development of intelligent, efficient, reliable, and safe power distribution and transmission should also be given due priority to increase energy

access to more people. Research and development of energy-saving technologies must be supported, and people should be aware of their benefits.

### **3.4 Environment**

Climate change will have a huge impact on the environment in the near future. The study of influence, vulnerability, and climate change mitigation should be the main priority. Sustainable and green development based on the principles of the 3Rs [reduce, reuse, and recycle] should be encouraged. Early natural disaster warning systems, preparedness, and management should be developed. The study should be conducted in measuring, controlling, and minimizing the effects of pollution. Decreasing the pollution from the industries by reducing and safe treatment of wastes and developing clean and efficient technologies should be done. Proper incentives should be granted to recycle wastes like papers, metals, etc., and turn them into useful products. Comprehensive studies regarding sustainable utilization, quality assessment, and conservation of water resources should be carried out. The study needs to be conducted to control rampant urbanization and focus on sustainable and green development of land use.

### **3.5 Forestry**

Research on forest conservation with mutual benefits to the community should be carried out. The province has forests with different medicinal plants. The study should be carried out in such plants' local taxonomy and information bank. Technology vital to their extraction, processing, and product development should be encouraged. The focus should be on the creation of processed goods from various plants. Sustainable utilization of timber should be encouraged to reduce natural calamities like landslides, floods, and soil erosion.

### **3.6 Health**

Essential health services should be ensured for every person. The study should be carried out to know about the present situation regarding access to health services in different parts of the province. Health infrastructures with sufficient human resources should be maintained and upgraded. Decentralization of health services needs to be encouraged so that people

especially in rural areas could reap maximum benefits. Health insurance should be promoted by making people aware of its benefits. Research should be carried out to prevent and control different communicable diseases. Because of the lack of multi-specialty hospitals, many provincial people seek health facilities elsewhere. So, priority should be given to establishing a multi-specialty hospital in the province. A platform for the multi-disciplinary team should be created for research on diseases, prevention, and control.

### **3.7 Highschool Science Lab**

Learning by doing is a critical pedagogical method in which a student conducts experiments and sees science in action. Experiments make students curious and inspire them to learn new concepts and theories. Unfortunately, almost all scientific instruments being used in schools and colleges are bought from abroad. So, research grants focusing on designing and manufacturing low-cost and quality scientific experiments need to be provided. Establishing and upgrading the science lab in secondary schools should be given the utmost priority.

### **3.8 Indigenous Technology**

Indigenous technology is based on the knowledge and skills transferred and used in the community from time immemorial. Yet, in this modern world, it is often neglected or forgotten. So, there is a need for proper scientific study to catalog, promote, preserve, and upscale indigenous technology.

### **3.9 Industry**

Pocket areas of mineral ores that are economically viable for extraction should be identified. The adoption and development of technologies needed for the extraction and processing of such ores should be prioritized. Research needs to be conducted to find out ways to preserve and scale up traditional technologies. Priority should be given to the agricultural tools and machinery industries to support our agricultural-based economy. Enterprises should be made environment-friendly via efficient and clean utilization of natural resources. There is almost negligible interaction between industries and universities and research institutions. If dialogues between them can be en-

couraged, industries can get solutions to their different hurdles during manufacturing, and universities can get new sources of revenue. It can also increase industry efficiency because of the application of different research conducted by academic centers.

### **3.10 Data Science**

Massive advancement in ICT throughout all sectors has led to vast amounts of data. Data is widely considered the most valuable resource of the 21st century. So, a well-curated centralized database management system should be built by collecting and integrating all the available data from different sectors. Novel insights gained from big data using data analysis [machine learning, artificial intelligence] and computational modeling can bring about huge benefits. Predicting weather patterns, impending natural disasters, and climate change's impact are all possible through big data analysis. It has high potential in agriculture, healthcare, and transportation too. Big data analysis requires significant computational resources. Therefore, the top priority should be to build a well-equipped high-performance computing facility or provide a cloud facility in the province.

### **3.11 Transport**

A large amount of money is spent on importing fossil fuels for transportation. Promoting electric vehicles will decrease dependency on fossil fuels and save capital. It will also reduce pollution and increase the quality of air. Research needs to be conducted on promoting green transportation. Plying on highly polluting old vehicles should be discouraged. Adopting information and communication technologies (ICT) for automated traffic management, ticketing, and location tracking should be encouraged. Constructing less accident-prone and future-proof transport infrastructures like roads, bridges, etc., should be focused on. The use of public transportation must be encouraged by making them convenient and reliable. Research on the construction of roads is essential to make them durable and better withstand weather battering. Minimizing the effects of landslides on the smooth running of transportation can be done by fostering the construction of tunnels wherever possible.

### 3.12 Tourism

The province is blessed with the magnificent Himalayas, eye-catching scenic beauty, rich biodiversity, and diverse culture. Popular adventure sports like paragliding, bungee jumping, trekking, sky diving, etc. are also available. The province can be made a tourism hub by advertising them to the world. So, tourism can be a great booster in uplifting the economic status of the province. Increasing the correspondence between the local manufacturers and tourism entrepreneurs can help in promoting and supporting the local manufacturers, for example, by using local crops and cuisines in homestays, hotels, and restaurants' food menus. Besides, developing and maintaining infrastructures related to tourism should be given a high priority. ICT for collecting real-time information on hotel occupancy and the condition of roads along different surrounding trails needs to be boosted. ICT can also be leveraged for tourist tracking and recommendation system. Experts should be encouraged to visit by convening seminars, workshops, conferences, and science on the trails. Promoting and preserving local cultures and traditions needs to be carried out by connecting them to the tourism industries.

### 4. Conclusions

In this study, we identified twelve research priority sectors for the Gandaki Province from extensive consultation with various stakeholders. Allocating necessary funding for the research in these sectors has the maximum potential to improve the province's science, technology, and socio-economic status, thus helping to fulfill the provincial vision of a "Prosperous Province and Happy Citizen."

### Acknowledgment

This work was supported by the Gandaki Province Academy of Science and Technology (GPAST).

### References

- [1] UIS. How much does your country spends in R&D?; (2021). Available from: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>. 2022.
- [2] Montorzi G, De Haan S, Ijsselmuiden C. Priority Setting for Research for Health: a Management Process for Countries. (2010).
- [3] First Five Year Plan (2076/77-2080/81) of Gandaki Province. (2020).
- [4] de Haan S, Kingamkono R, Tindamanyire N, Mshinda H, Makandi H, Tibazarwa F, et al. Setting research priorities across science, technology, and health sectors: the Tanzania experience. *Health Research Policy and Systems* 13(1) (2015) 14.
- [5] Gassler H, Wolfgang P, Julia S, Weber M, Sami M, Klaus K, et al. *Priorities in Science & Technology Policy – An International Comparison.*; 2004.
- [6] The National Medium- and Long-Term Program for Science and Technology Development (2006-2020). (2006).
- [7] *Research Priority Areas 2018 to 2023.* (2018).

### Annex

#### Online Survey

Altogether 125 respondents participated in the survey. Most of the respondents were male (87.2%) and the remaining were female (12.8%) (Fig. 1(a)). The age-group distribution of respondents is shown in Fig. 1(b). The highest number of respondents were from the age-group 25-34 years (72), followed by 35-44 (25), 24 & under (18), and 45-54 (8) years.

Figure 1: (a) Academic qualification of the respondents, (b) Ranking of sectors.

Only 10 respondents had age 55 and above.

#### Focus Group Discussion

- Prithvi Narayan Campus
- Pashchimanchal Campus
- Pokhara University
- Science Teacher's Association of Nepal (STAN), Gandaki Chapter
- Gandaki Province Planning Commission

The academic qualification of the respondents is shown in Fig. 2(a) About half of the respondents had a Master's (51.2%), one quarter had Bachelor's (25.6%), one-fifth had PhDs (20%), and the remaining (3.2%) had +2 level of academic qualification.

All the participants ranked the twelve sectors according to their potential for maximum socio-economic benefits for the Gandaki Province. Agriculture was preferred most among all the priority areas by the respondents followed by health and tourism. Forestry was ranked lowest among all the priorities.

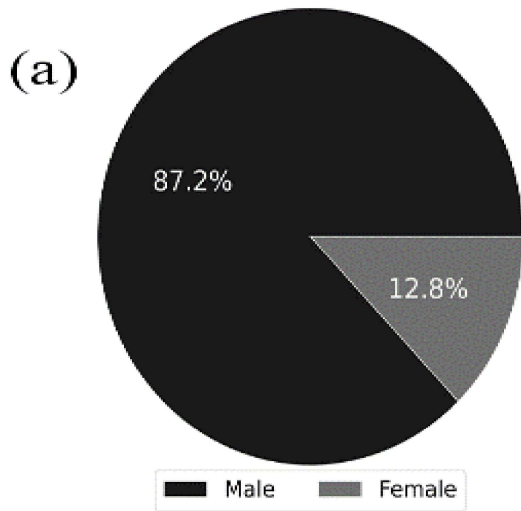


Figure 2: Distribution of (a) Gender (b) Age group of respondents.

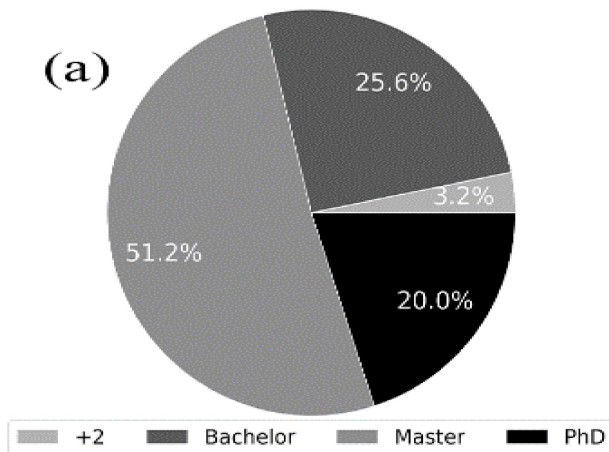


Figure 3: (a) Academic qualification of the respondents, (b) Ranking of sectors.