



**CONCEPT NOTE**  
**ON**  
**NATIONAL GEOSCIENCES POLICY OF BHUTAN**

**Focal Point Address**  
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## 1. INTRODUCTION

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This concept note for **National Geosciences Policy of Bhutan** is being submitted in line with the Constitution of the Kingdom of Bhutan 2008, Mines and Minerals Management Act 1995, Economic Development Policy 2016, Mineral Development Policy 2017, mandates and functions of the Department of Geology and Mines and “Protocol for Policy Formulation” of Gross National Happiness Commission (GNHC).

## 2. CONTEXT AND BACKGROUND

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### Rationale

Article 5, Section 2 (c) and (d) of the Constitution of the Kingdom of Bhutan state, “ *The Royal Government shall secure ecologically balanced sustainable development while promoting justifiable economic and social development*” and “*ensure a safe and healthy environment*”. Similarly, Article 9, Section 9 of the Constitution states “*The State shall endeavour to achieve economic self-reliance and promote open and progressive economy.*”

Mineral resources and its sustainable mining are critical to growth and macroeconomic stability of any country. Mineral resources in Bhutan include dolomite, limestone, quartzite, gypsum, talc, marble, graphite, iron ore, calc-tufa, coal, slate, stones, gravel and sand. These mineral resources serve as important inputs for the domestic industries and construction sectors. There are also known occurrences of metallic minerals like copper, tungsten, lead, zinc, and rare earth elements (REE). With the growth of tourism sector and rise in global demand, fine minerals or semi-gem-quality crystals like beryl, garnet, quartz, calcite, tourmaline, and decorative stones, that are common in Bhutan, have great economic potential.

However, the geological knowledge base of the country is still limited, as the systematic geological mapping effort is currently at an early stage. Further, the country remains largely under-explored and the metallogenic potential is still unknown due to limited use of modern concepts and techniques on a regional-scale mapping. Hence, it is of high priority to expand geological knowledge base through systematic regional geological surveys using state-of-the-art techniques to attract investment in exploration and mining. Although mining is identified as one of the five economic jewels of Bhutan, the mining industries remain largely underdeveloped even today. The sector contributed only 4.22 percent to the GDP in 2017 (National Statistical Bureau, 2018). With Bhutan’s graduation from LDC in 2023, the sector is expected to play a pivotal role in addressing economic challenges and bringing macroeconomic stability in the country. However, without the proper policy frameworks for geoscientific activities, its potential cannot be fully realized.

Further, geoscientific information is important for civil works; groundwater exploration; geological hazard and risk assessment; agriculture, geo-tourism, environmental protection and addressing climate change issues. Since Bhutan lies within one of the most active tectonic regimes and fragile geological systems in the world, the country is highly prone to geological hazards like earthquakes, landslides and floods. The infrastructural development and human settlements mostly occur on fragile slopes attributed to extreme topographic constraints. Since most civil works are founded on geologically uncertain grounds, it is imperative that geological studies are conducted to ensure safe development and avoid project delays resulting in cost overruns.

Moreover, with the increasing population, fast developmental pace and climate change, the risks from geological hazards to human lives and infrastructure are likely to increase concomitantly. To understand geological hazards and mitigate such impending risks, geoscientific studies are essential.

Thus, to bring geosciences at the core of economic growth, land-use planning, infrastructural development, human settlements and reduction of risks associated with geological hazards, it is paramount to adopt a National Geosciences Policy. The policy will also serve strategic directions for geosciences in expanding knowledgebase, enhancing data management, framing data sharing policy and mitigating climate-induced risks.

### **3. CRITIQUE OF CURRENT POLICY OPTIONS AND APPROACHES**

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The geoscientific activities in the country are currently governed by Economic Development Policy (EDP) 2016, Mineral Development Policy (MDP) 2017 and Mines and Minerals Management Act (MMMA) 1995. The existing policies outline the intent of the government to prioritize geological mapping and mineral exploration and entrusts the Department of Geology and Mines to undertake or supervise all such activities in the country. Similarly, National Human Settlement Policy of Bhutan outlines “MoWHS shall carry out geo-technical studies for settlement sites, prepare geo-hazard maps and demarcate no construction zones” to reduce vulnerability and increase resilience to disaster. However, these policies are not comprehensive covering the importance of geosciences in all land-use development such as roads, dams, bridges and other national important infrastructural development. Further, the EDP 2016 and MDP 2017 lack clarity on the policies or strategies on improving geoscientific and mineral resources knowledge infrastructures such as use of modern methods in regional geological and mineral resources mapping, improving knowledgebase on geological hazards such as landslides and earthquakes, geoscientific and mineral resources data management and sharing, aligning geosciences to social demands and public advocacy.

The importance of geosciences for planning and development can be better appreciated when the consequences of ignoring or placing low importance are felt. The consequences can include loss of lives and properties, safety and sustainability issues of civil structures and significant cost escalation during and after construction, thereby imposing a huge financial burden to an individual or a nation. In Bhutan, use of geoscientific knowledge for development is low. For instance, lack of proper geological studies for road construction results in recurring slope stability problems, which pose high risks to commuters and financial burden, thereby adversely impacting our economic growth. Similarly, massive landslide at dam site of PHPA-I resulted in huge cost escalation, which could have been avoided, if proper geological studies were considered before the selection of the dam site. In the absence of a comprehensive national geosciences policy, bringing geosciences at the core of development is a huge challenge.

### **4. POLICY RECOMMENDATIONS**

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To enhance systematic geoscientific information, realize the full potential of mineral resources (mainly subsurface metallogenic potential), address climate change issues, mitigate risks associated with geological hazards and align geosciences to social demands, the following policy recommendations are proposed:

- (1) Apply the modern concepts for geological mapping and the modern techniques for Earth observation to build high-quality geology, tectonics and mineral resource knowledgebase (including subsurface metallogenic potential). This should be done through systematic regional geological surveys or mapping using modern exploration technologies like remote sensing (hyper spectral, radar and other satellite imageries); geochemical and geophysical surveys (e.g. aeromagnetic, gravity, gamma-ray spectrometric); geochemical sampling; geochronology; and other lithological, structure and hydrothermal alteration mapping.
- (2) Develop earthquake hazard maps and catalogues.
- (3) Develop earthquake monitoring and information dissemination systems.
- (4) Establish institutional mechanisms to standardize use of hazard maps in developmental activities and policy domains.
- (5) Develop landslide inventory and landslide hazard maps.
- (6) Establish landslide monitoring and early warning systems.
- (7) Conduct groundwater surveys for addressing water scarcity.
- (8) Enhance research and development in the field of geosciences.
- (9) Create and establish Geographic Information Systems (GIS) database systems for geosciences and mineral resources.
- (10) Develop geoscientific data management and sharing policy.
- (11) Institute national group or geological society to promote geosciences, maintain standards and improve quality of geoscientific research and development.
- (12) Access membership to international bodies (e.g. International Union of Geological Sciences (IUGS) & Regional Integrated Multi-Hazard Early Warning System (RIMES) and geosciences journal database (e.g. Web of Science, Elsevier, Journal of Geophysical Research etc.) to keep pace with research collaboration and development.
- (13) Enhance public advocacy and develop strategies to align or meet social demands of geological surveys such as in civil works, environmental protection, land-use planning, and geological hazard assessment and risks reduction.
- (14) Enhance education programs for school and university students in geosciences and its relevance to society.
- (15) Provide strategic geoscientific policy recommendations to the government.
- (16) Provide geoscientific services to the public.
- (17) Reform relevant policies, laws, institutions and mineral resources management based on the strategic policy recommendations.

#### **4.1. Expected output of implementation of a geosciences policy recommendation**

The following outputs are anticipated by implementation of a geosciences policy recommendations:

- (1) Geoscientific knowledgebase on geology & tectonics, mineral, earthquakes, groundwater, landslides improved.

- (2) Geological survey modernized.
- (3) GIS Database System and Geoscientific Data Management and Sharing Policy developed.
- (4) Capacity of DGM in geosciences enhanced.
- (5) Geosciences research collaboration and development enhanced.
- (6) Accession to professional geosciences bodies facilitated.
- (7) Strategic geoscientific policy recommendations provided to the government.
- (8) Geosciences services for planning, development and safety of the public provided.
- (9) Geological Society of Bhutan formed and geoscientific activities including research mainstreamed.
- (10) High-quality publications on geosciences increased.
- (11) Public awareness and educational programs enhanced.
- (12) Earthquake information dissemination system developed.
- (13) Earthquake hazard and risk maps generated.
- (14) Use of geoscientific products standardized.

#### **4.2. Expected Outcome or Benefits**

The following outcomes or benefits are anticipated by implementations of the geosciences policy recommendations:

- (1) Investment in mineral exploration and mining increased.
- (2) Revenue generation and contribution to GDP increased.
- (3) Business and employment opportunities increased.
- (4) Mineral based industry and trade promoted.
- (5) Bhutan becomes part of the global mineral value chain.
- (6) Mineral resources used responsibly or managed strategically.
- (7) Seismic hazard information provided for improvement of building or construction codes and standards and to frame appropriate insurance policies.
- (8) Strategic disaster response framework developed using earthquake information.
- (9) Enhanced awareness on geological hazards (earthquakes, landslides and others).
- (10) Public understanding on the importance and use of geosciences for welfare of their lives and livelihoods improved.
- (11) Resilience of human settlement and economic development to geological hazards increased.
- (12) Policies and relevant laws reformed or improved.

### 4.3. Cost Implications

The implementation of policy will have significant budget implications to RGoB. However, the benefits derived from its implementation (as highlighted above) will far outweigh the cost. The public in general by adhering to policy recommendations can have some cost implications by undertaking geotechnical or site suitability studies for construction.

## 5. INTEGRATION OF GNH AND CROSS CUTTING ISSUES

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The implementation of the policy will enhance GNH, help address cross cutting issues and fulfil social demands in following ways:

**Economy, Employment and Poverty:** Increase in geosciences and mineral resources knowledge will increase investment in mineral exploration and mining development, trade and industry, and help diversify our economy. This will result in increased revenue and employment generation, business opportunities and therefore help reduce poverty.

**Culture, Climate Change, Disaster and Environment:** The application of geoscientific knowledge and information on earthquake, landslide and slope stability before construction of dzongs and other monuments, infrastructural development and human settlements will ensure safe or disaster and climate change resilient construction. Further, use of geosciences in mitigation of geological hazards such as landslides and earthquakes, identification of waste disposal sites etc. can help protect environment degradation and ecosystems.

**Food and Water security:** Geoscientific information helps in identifying and mapping of mineral-rich rocks that will be used to improve the soil nutrients, pH and soil structures that are essential for agriculture practice. The knowledge of geology of an area will be key for sustainable and productive agriculture development and food security. The geoscientific knowledge will also be critical in exploration of groundwater resources that will help secure water and reduce poverty.

**Good Governance:** Since geosciences underpins land-use development and economic growth, the policy recommendations for improving geoscientific knowledge will help better understanding of the geosciences and its implications in other areas. This will further help in improving relevant policies and laws in the country.

## 6. PROCESS AND INDICATIVE TIMELINE

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The formulation of policy will require hiring of experienced and qualified national or international professionals (e.g. National Consultant, World Bank consultant, JICA, USGS, BGS etc.). Its preparation will therefore primarily depend on the support of the RGOB in terms of securing TA and budget. TOR will be developed once the concept note is approved by the Cabinet and TA and budget is secured.

The policy will be aligned with the national policies and laws, and therefore no conflict is anticipated in development and implementation of the Policy.

The major stakeholders (but not limited to) for consultations are as follows:

1. Gross National Happiness Commission
2. Department of Roads, Ministry of Works and Human Settlement
3. Department of Human Settlements, Ministry of Works and Human Settlement
4. Department of Engineering Services, Ministry of Works and Human Settlement
5. Bhutan Standards Bureau
6. Department of Disaster Management, Ministry of Home and Cultural Affairs
7. National Land Commission
8. National Environment Commission
9. Department of Hydropower and Power Systems, Ministry of Economic Affairs
10. Department of Local Government, MoHCA
11. Local Governments (Dzongkhags, Gewogs and Thromdes)
12. National Center for Hydrology and Meteorology (NCHM)
13. Department of Culture, MoHCA
14. Ministry of Agriculture and Forests
15. College of Science and Technology, Royal University of Bhutan
16. Construction Development Board
17. Druk Green Power Corporation Ltd.
18. Insurance companies

### **Plan of Action**

<b>Activity</b>	<b>Indicative Timeline</b>
Drafting and Submission of Concept Note to GNHC	<i>January 2020</i>
Review of Concept Note by GNHC and Approval by Cabinet including securing TA and budget	<i>June 2020</i>
Selection of the Consultant for drafting the policy	<i>September 2020</i>
Submission of the 1 <sup>st</sup> Draft Policy by the Consultant	<i>December 2020</i>
Consultations with Stakeholders on Draft Policy	<i>January to April 2021</i>
Submission and Screening of Final Draft Policy to GNHC	<i>May-July 2021</i>
Revisions of Draft Policy based on feedback from GNHC and Re-submission to GNHC	<i>August 2021</i>
Endorsement of the Policy by GNHC	<i>October 2021</i>
Approval of the Policy by Cabinet and Launch	<i>January 2022</i>

## **7. MAJOR IMPEDIMENTS OR RISKS FORESEEN IN THE DEVELOPMENT OF THE POLICY**

Government's support in terms of according approval and securing TA and budget will be key to the development of the policy. Cooperation of stakeholders and their participation during consultation will be critical. No other major impediments or risks are foreseen in the development of the policy.