



Geo – Information Policy 2018



National Land Commission Secretariat
Royal Government of Bhutan

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1. POLICY NAME

Geo-Information (GI) Policy

2. PRINCIPLE

The policy is founded on the fundamental principles of **availability, reliability, accessibility and affordability**; by reducing duplication of efforts and cost and enhancing capacity to keep abreast with rapid changing technology. The use of geo-information must transcend technical and procedural **inconveniences** to empower every citizen and ensure national wellbeing.

3. BACKGROUND

Bhutan's drive to value geo-information stems from its difficult and fragile geographical and environmental settings. The pursuit of Gross National Happiness as the development philosophy and the aspiration of harmonious existence with nature require mastery over the information of one's own surrounding.

The information that has 'spatial context' is commonly regarded as geo-information. Since all human activities tend to confine within a space or surrounding, geo-information is indispensable for taking any decision.

Most of the people of Bhutan depend on the income generation directly or indirectly from natural resources. Therefore, the maintenance of intricate balance between socio-economic development and environmental conservation is crucial. This is also the essence of most of the seventeen sustainable development goals of the United Nations.

Without clear understanding and knowledge of the symbiotic relationship between social, economic and environmental dimensions the pursuit of sustainable development

goals remains farfetched. Thus, reliable geo-information with proper technology, legal and institutional framework becomes necessary.

The geo-information at present are held with different institutions with varied standards and there is no system to keep track of where, how and what is available. If not managed systematically geo-information is sometimes considered as a “double-edged sword which gives power to access vast amounts of data and the opportunity to abuse, misinform and invade privacy” at the same time. While the Constitution of Bhutan and gamut of policies, acts and regulations advocate and acknowledge citizen’s right to information and the benefits of empowering them, the way geo-information is produced, managed and used must invariably be founded on sound policy.

In November 2003 the Royal Government of Bhutan established the National GIS Coordination Committee, for which the Centre for GIS Coordination (CGISC) was instituted under the Department of Survey and Land Record, Ministry of Agriculture. In 2007, with the enforcement of the Land Act 2007, the Department of Survey and Land Record along with the Centre for GIS Coordination was delinked from the Ministry and established as the National Land Commission Secretariat. This clearly indicates the importance attached to development of geo-information systems from the highest authority. Since then, considerable progress has been made, but in order to reap maximum benefits, necessary legal and institutional framework need to be in place. This calls for envisioning an overarching geo-information policy, for ethic the concept was appreciated and approved by the Cabinet in December 2015.

The value of geo-information comes from its use. Realizing this, Bhutan became early adopters of GIS technology; initially for land use mapping and cadastre application. However, the lack of updated and reliable information and institutional set up, technical capacity, silos data collection, absence of data standards and sharing mechanism and myriad of issues affected the actual use of geo-information for years. Although projects and activities related to geo-information collection, processing and dissemination have hitherto been largely driven by donor assistance and the financial burden on the

national exchequer owing to duplication of efforts is significant. GIS has proliferated into many agencies and institutions and the geo-information technology itself has taken different dimension due to the advent of cloud, web and mobile technologies. Geo-information contributed by citizens through crowd sourcing forms a big part of the repository.

It is estimated that during the 10th and 11th Five Year Plans the Royal Government has invested over Nu.2 Billion in geo-information related activities, particularly cadastre, base mapping and urban planning. This is a significant investment by any comparison. If further investments are required, it is time for the country to think beyond the purpose of serving specific project or activity. There should be a point beyond which no major investments are necessary. This can only be realized with proper regulation and management of geo-information creation and dissemination.

As an example, the National Land Use Zoning is initiated as one of the major collaborative activities in the 11th and 12th FYP in order to facilitate comprehensive geo-information creation and form a basis for regulation and management of geo-information in the country.

Therefore, the rationale for geo-information policy is conjured in the context of these changes and achieving a fine balance between socio-economic development, environment conservation and increasing demand for efficient service delivery and good governance. The policy underpins the very principle of GNH.

It envisage to streamline and enhance geo-information production, management and use, which largely anticipate reduce in cost, enhance good governance, increase capacity for natural resource management and creating resilient communities in the wake of increasing disaster and development risks.

The policy is inclusive; in the sense that the roles of different sections of societies, including but not limited to, the burgeoning private sector and individual citizens are consciously considered.

4. OBJECTIVE

The key objectives of the GI Policy are:

- 4.1. To ensure availability of reliable geo-information;
- 4.2. To institute inclusive institutional and legal framework;
- 4.3. To enhance data discovery, accessibility and sharing mechanism without duplication or silos in operation; and
- 4.4. To promote sustainable and optimal use of geo-information and technologies.

5. DEFINITIONS

- 5.1. **CGISC** – Center for Geographic Information System Coordination.
- 5.2. **Datasets** – a collection of related sets of information that is composed of separate elements but can be manipulated as a unit by a computer.
- 5.3. **Fundamental data** – datasets that are the foundation or reference on which other spatial datasets and applications are built, and the term is interchangeably describes as reference, core, base, foundation or framework data.
- 5.4. **Geographic Information** – also geo-information, meaning information derived from spatial data.
- 5.5. **Geo-Information Science** – the scientific field that attempts to integrate different disciplines studying the methods and techniques of handling spatial information. The related terms include geoinformatics, geomatics and spatial information science which have same meaning through slight approach differences to deal with problems and computational solutions.

- 5.6. **Geographic Information System (GIS)** – is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data.
- 5.7. **Geo-portal** – is a type of web portal used to find and access geographic information (geospatial information) and associated geographic services (display, editing, analysis, etc.) via internet.
- 5.8. **Geospatial data** – data related to locations on (the surface of) the earth, which usually termed as spatial data.
- 5.9. **Geo-referencing** – The process of assigning spatial coordinates to data that is spatial in nature, but has no explicit geographic coordinate system.
- 5.10. **GI Producer** – any agency that produces Geo-information or related geographic or spatial data.
- 5.11. **GNSS** – Global Navigation Satellite System that is used to pinpoint the geographic location of a user's receiver anywhere in the world. Examples are GPS (Global Positioning System) and GLONASS (Global Orbiting Navigation Satellite System).
- 5.12. **Interoperability** – It is the ability of different information technology systems and software applications to communicate, exchange data, and use the information that has been exchanged.
- 5.13. **ICT** – Information and Communication Technology.
- 5.14. **Metadata** – a set of data that describes and gives information about other data.
- 5.15. **National Spatial Data Infrastructure (NSDI)** – It is to denote a framework of technologies, policies, and institutional arrangements that together facilitate the creation, exchange, and use of geospatial data and related information resources across an information-sharing community.
- 5.16. **Ownership** – custodian or respective agencies who creates the GI data.
- 5.17. **Standards** – as defined by the International Organization for Standardization, are "documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics, to ensure that materials, products, procedures, and services are

fit for their purpose" and the standards facilitate data sharing and increase interoperability among GIS.

5.18. Thematic data – qualitative or quantitative data maintained based on specific themes and requirements, which is considered as critical to thematic analysis/ purpose.

5.19. Topographic map – a map that represents the vertical and horizontal positions of features, showing relief in some measurable form, such as contour lines, hypsometric tints, and relief shading.

5.20. Thematic map – a map designed to convey information about a single topic or theme, such as population density, agriculture or geology.

5.21. TWG – Technical Working Group

6. POLICY STATEMENT

The Royal Government of Bhutan (RGoB) recognizes geo-information as important aspects of realizing GNH goals. It is indispensable tool for proper planning and decision making process.

In order to realize the objectives the following policy statements are adopted:

6.1. Institutional and legal framework.

The CGISC which was instituted in 2003 does not have dedicated resource and proper institutional set up. Over the period, it has lost its relevancy due to drastic change of geo-information technology and procedure. Some of the common challenges and needs are not applicable any more.

In order to keep abreast with the fast changing GI technology and reap maximum benefits, it is important to strengthen and streamline the institutional coordination and legal framework.

There shall be an enabling environment for awareness, cooperation and exchange of technology, information and knowhow within the context of the changing environment through the establishment of a dedicated entity, as:

- 6.1.1. CGISC shall be the coordination center and administratively under National Land Commission Secretariat;
- 6.1.2. The CGISC shall be responsible for coordinating in developing, promulgating and enforcing bylaws, regulations and standards covering all aspects of geo-information, including important roles of private sectors; and
- 6.1.3. The CGISC shall spearhead in NSDI development in the Country.
- 6.1.4. The CGISC shall form TWG comprised of geo-information focal person from the relevant GI producers and users in the Country.

6.2. Availability of reliable geo-information.

Cognizant of numerous benefits of geo-information, increasing importance of NSDI and use of geo-information and allied technology, and the growing aspirations of modern Bhutanese society, sustained efforts shall be made to compile and create comprehensive and reliable geo-information, encompassing all aspects of topographical, cadastral, environmental, social and economic realms taking into account that:

- 6.2.1. Geospatial data shall be categorized as fundamental data and thematic data.
- 6.2.2. The fundamental data sets on a nationwide scale shall be made available on periodic basis.
- 6.2.3. The CGISC shall ensure single source of truth identifying responsible agencies in producing fundamental as well as thematic GI data.
- 6.2.4. The identified responsible agencies shall ensure the reliability of geo-information for entire users establishing the appropriate access protocol and security features.

6.3. Data discovery, accessibility and sharing mechanism without duplication or silos in operation.

Data sharing is generally limited to point-to-point contacts, commonly attributed to the lack of effective sharing mechanism, inadequate copyright protection and absence of clear policy direction. Technical and institutional limitations often tend to impede data sharing, particularly with the advent of web and cloud technologies. On top of that the users are unaware of the existence of the data. Further, investment in geo-information needs to be planned and coordinated to minimize redundancy of data and to avoid duplication of efforts and resources.

However, data standard is necessary to ensure conformity within the specific application domain providing a common platform for integration and analysis through:

- 6.3.1. Development of guidelines to categorize geo-information into restricted, common and open categories without undermining the national security. Open data shall be openly and freely accessible; common data shall be shared among the government agencies without cost and with the costs for corporate and business entities; and the restricted data shall be used only by the authorized government agencies. The guidelines in this regard shall be developed by the TWG under coordination of CGISC.
- 6.3.2. Through a common data portal managed by the CGISC, it shall be mandatory to submit metadata and data for integration by all agencies including private sector. These data must conform to the national and international standards.
- 6.3.3. Ensuring geo-information creation that ascribes to the principle of “one time creation, multiple times use”, whereby, for any development projects there shall be no cost for creation of geo-information that already exists.

6.4. Affordable geo-information with realistic pricing mechanism

In order to foster affordable access to geo-information, pricing shall be based on realistic scientific structure. This can be determined through,

6.4.1. Introducing dynamic pricing mechanism for sustainability.

6.4.2. Implement existing data pricing 'cost + model' until pricing mechanism is introduced based on the recommendation of GI pricing committee.

The enabling power of geo-information and GIS are unlimited and necessary, but comes with significant cost. Keeping abreast with the fast changing technology is sometimes more of a customary than necessity. Therefore, any investments in the technology shall be rationalized and well planned.

6.5. Sustainable and optimal use of geo-information and technologies

As the sustained and optimized utilization of geo-data is a cornerstone for the development of geo-information sector,

6.5.1. The Government shall support education, research and innovation in the field of geo-information and its optimum utilization.

6.5.2. The CGISC in collaboration with educational institutions shall promote and develop standardized learning program for geo-information technologies.

6.5.3. Sustained effort shall be made to mainstream the use of geo-information and GIS for national planning, decision making for dispensing citizen services effectively.

6.5.4. The GI Rules and Regulations shall be formulated in line with the policy and implemented to ensure the overall sustainability and optimal use of GI data and technologies.

6.5.5. Agencies shall work closely on sharing expertise, technology and resources. Seeking technical assistance and hiring of experts from outside shall be avoided and resorted only as a last option.

7. LEGISLATIVE COMPLIANCE

The policy is formulated based on the following policy and legal provisions promulgated by the Royal Government of Bhutan:

7.1. Constitution of the Kingdom of Bhutan

- Article 7.3 – A Bhutanese citizen shall have the right to information.
- Article 9.23 – The State shall encourage free participation in the cultural life of the community, promote arts and sciences and foster technological innovation.

7.2. Land Act of Bhutan 2007, Section 10 (e)

- [...] National Land Commission shall be responsible to constantly update and improve the mode of cadastral survey, land registration systems and land administration procedures under the purview of this Act.

7.3. Bhutan e-Government Master Plan

- Develop common standards to enable sharing of data and interoperability of services.
- Establish a single source of truth through the development of common data hubs.
- All agencies generate and manage information in the course of government service delivery. However, there are many sources of related and duplicate information which makes it challenging to obtain reliable information and value of this information is not maximized.
- Consider open source software over proprietary software to address system incompatibility, cost of maintenance and ease of procurement.
- Establish policy on ICT security.

7.4. Strategy for Gross National Happiness

- [...] aims at achieving holistic economic development for Bhutan through high-quality planning, development and use of the spatial resources and values of Bhutan.

7.5. National Framework for GIS Infrastructure in Bhutan

- A clear focus and direction has to be defined and pursued in order to provide the GIS community with a proper national perspective of GIS.
- There is a need for a well-defined, conceptually clear and easy to follow policy guidelines.

7.6. Mines and Minerals Management Act 1995

- Section 14 (I &vii) underlines the systematic geo-scientific investigation and the preparation and publication of maps and reports with proper recording of all mining leases.

8. IMPLEMENTATION PROCEDURE/ ACTION PLAN

The implementation procedure for GI Policy shall be based on the action plan developed by the CGISC in consultation with the concerned agencies. The action plan shall identify the lead and collaborating agencies with the clear baseline and target for specific time period.

However, the implementation procedure shall consider institutional structure and mandatory roles and responsibilities as follows:

8.1. Institutional structure

- 8.1.1. The CGISC shall be strengthened both in terms of human capacity and resource allocation and continue to function as coordinating center for geo-information activities in the country.
- 8.1.2. The CGISC shall institute and coordinate GI High Level Committee (GHLC) for GI decision making purposes comprising committee members from the key

agencies who are responsible or creates/ uses maximum core/ critical GI data.
The GHLC committee shall be chaired by the Secretary, NLCS.

- 8.1.3. The existing CGISC member agencies shall be the de facto members and formally registered with immediate effect from the date of policy approval.
- 8.1.4. Any new application for membership shall be reviewed by TWG and approved by GHLC.
- 8.1.5. The CGISC shall develop the terms of reference for the GHLC and endorsed in the first Committee concord.
- 8.1.6. The key roles and responsibilities of the GHLC shall,
 - 8.1.6.1. Function as decision making body for developing, promulgating and enforcing bylaws, regulations and standards covering all aspects of geo-information, including important roles of private sector; and
 - 8.1.6.2. Form the TWG for GIS technical formulation and implementation involving the relevant stakeholders.
- 8.1.7. The CGISC as coordination center under National Land Commission Secretariat shall access resources for both fiscal and capacity development from the government fiscal outlay.

8.2. Mandatory roles and responsibilities

- 8.2.1. The concerned agencies shall classify data into restricted, common and open categories and make accessible through common portal maintained by CGISC.
- 8.2.2. The agencies shall ensure the data security indicating the high, medium and low levels of securities in respective agencies, however, data that are accessible to public domain shall be regulated by the CGISC with appropriate security features.
- 8.2.3. The data and metadata with respect to ownership and copy right shall be vested to the concerned GI providers or the agencies who created or produced the data.
- 8.2.4. The concerned agencies shall archive the categories of data maintained, except the open level of data that are on the common portal.

- 8.2.5. The routine maintenance of data on the portal shall be carried out by CGISC while respective agencies shall conduct timely update and ensure accessible on the portal.
- 8.2.6. To adopt national and international standard for geospatial data developing appropriate guidelines or rules and regulations shall be vested to CGISC.
- 8.2.7. CGISC shall monitor the national data standard before it is made accessible on portal.
- 8.2.8. CGISC shall ensure that there is simple and affordable transfer and exchange of data through a portal.
- 8.2.9. GI software which are proprietary in nature and required by agencies shall be reviewed and render possible technical support by CGISC.

9. MONITORING AND EVALUATION

The GI Policy shall establish parallel documents to exercise the Policy Principles. However,

- 9.1. Its action plan and Rules and Regulations shall form the basis for Monitoring and Evaluation of the implementation of the policy provisions.
- 9.2. The CGISC and the concerned agencies shall monitor the activities of the action plans and its indicators on periodic basis.
- 9.3. GNHC shall evaluate the policy impact at national level in line with the Evaluation Protocol and Guidelines.
- 9.4. CGISC shall review and propose for necessary amendments in the changing context of Technology, GI users and Systems.

10. APPROVAL DATES

31st July 2018
