REPUBLIC OF ZAMBIA

ZAMBIAN PUBLIC SERVICE

NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI)

POLICY

2025

REPUBLIC OF ZAMBIA

NATIONAL SPATIAL DATA INFRASTRUCTURE POLICY

Foreword

Text

Acknowledgements

Text

Working Definitions

Fundamental geospatial dataset	A geospatial dataset that has been identified as being the minimum primary set of geospatial information that cannot be derived from other geospatial datasets, and that is required to spatially represent phenomena, objects or themes important for the realization of economic, social and environmental benefits, consistently across the nation.
Geospatial dataset	An identifiable collection of related geospatial information.
Geospatial data custodian	A public sector entity or organization, appointed by the National Geospatial Information Council, which captures, maintains, manages, integrates, archives, distributes or uses geospatial information.
Geospatial information	Information about geographical phenomena or objects and their attributes, which may appear or occur on, below or above the earth's surface, and which may be abstract, physical or human-made, and of a temporal nature. It includes spatial information, geo-referenced information, and geographical information.
Metadata catalogue	A technical system for the capture and dissemination of metadata records of available geospatial datasets, primarily to provide for

	discoverability and determination of fitness for use of geospatial datasets.
National Spatial Data Infrastructure	An infrastructure implementing a framework of policies, data, standards, systems and tools, people, and interconnections for the management of the collection, maintenance, dissemination and use of geospatial information, at the national level.
NSDI Coordinating Committee	Committee established under the NSDI Policy.
NSDI Technical Committee	Committee established under the NSDI Policy.
NSDI Technical Unit	Established under the NSDI Policy.
NSDI Working Groups	Established under the NSDI Policy.

Acronyms

GIS	Geographic Information Systems
ICT	Information and Communication Technology
ISO	International Organization for Standardization
IT	Information Technology
MLGRD	Ministry of Local Government
MLNR	Ministry of Lands and Natural Resources
MNDP	Ministry of National Development Planning
MoE	Ministry of Energy
MGEE	Ministry of Green Economy and Environment
MoMMD	Ministry of Mines and Mineral Development
NLA	National Land Audit
NRSC	National Remote Sensing Center
NSDI	National Spatial Data Infrastructure
SDI	Spatial Data Infrastructure
ZDA	Zambia Development Agency
ZEMA	Zambia Environmental Management Agency
ZESCO	Zambia Electricity Supply Corporation Limited
ZILAS	Zambian Integrated Land Administration System
ZILMIS	Zambia Integrated Land Management Information System

TABLE OF CONTENTS

Chapter I: Introduction

Zambia is working towards a strong National Spatial Data Infrastructure (NSDI). Although some progress has been made, such as a draft NSDI policy in 2021 and the formation of committees, challenges remain. Limited awareness of the draft policy and insufficient support from institutions and stakeholders have slowed its implementation.

Past efforts to create the NSDI revealed key issues: weak institutional capacity, unclear roles, lack of funding, and no solid legal framework for data sharing. Poor communication with data custodians and undefined standards has also held back progress.

The NSDI Policy aims to fix these problems by creating a clear vision and framework for collaboration among government, businesses, and civil society. It emphasizes the role of stakeholders in achieving a successful NSDI, promoting transparency and sustainable use of spatial data for national growth. The policy will define the needed institutional arrangements, technical standards, and data governance to ensure an effective NSDI in Zambia, providing legal support for its implementation.

This document presents a framework for developing the NSDI policy. It starts by analyzing the current issues and explaining the need for a revision. Then, it outlines a vision for the NSDI with guiding principles, objectives, and an implementation strategy, including action plans and resource allocation. It also suggests necessary legal changes to support the policy. While it includes key definitions and technical standards, detailed instructions are available in additional documents and international references.

Chapter II: Situation Analysis

2.0 Background

The development of the National Spatial Data Infrastructure (NSDI) in Zambia began in 2014 to enhance land management, improve access to geospatial data, and support national development goals. Led by the Ministry of Lands and Natural Resources (MLNR), the NSDI aimed to produce high-accuracy maps and establish a centralized geospatial database, while also implementing the Zambia Integrated Land Management Information System (ZILMIS) for managing cadastral data.

The initial phase focused on mapping the country using aerial photography and satellite imagery at different resolutions, creating a foundational geospatial dataset for urban planning and resource allocation, along with a digital terrain model for infrastructure planning. Governance included a Steering Committee and a Technical Committee to oversee implementation and policy drafting, alongside significant capacity-building efforts for staff.

However, by 2018, challenges arose, including the launch of the Zambia Data Hub, which complicated data management and created inefficiencies. The NSDI faced issues with maintenance, outdated datasets, and reliance on expensive commercial software. Governance weaknesses led to inactivity in the NSDI committees, and while a draft policy was completed in 2021, conflicting mandates and legislative gaps hindered its approval. Over time, the NSDI's focus shifted primarily to cadastral data management, leaving other critical datasets underdeveloped and resulting in staff retention issues.

2.1 Institutional Challenges

Governance and coordination of the National Spatial Data Infrastructure (NSDI) are weak, significantly hindering its effectiveness. The NSDI Steering and Technical Committees have become largely inactive, resulting in oversight gaps that cause delays and inefficiencies in achieving objectives. Additionally, the absence of a dedicated full-time coordinator and technical team has led to inconsistent updates and stakeholder engagement.

Responsibilities for the NSDI are often fragmented, complicating focus and momentum. Collaboration among stakeholders, including various ministries and data custodians, is limited, as many organizations are reluctant to share their datasets or lack the capacity to integrate them into the NSDI framework. This lack of coordination undermines the synergy needed for a robust and effective geospatial infrastructure.

2.2 Policy and Legislative Gaps

The NSDI operates without a formal legislative framework, significantly hindering its development and implementation. Although a draft NSDI policy was created in 2021, it has not yet been approved, leaving the initiative without proper legal guidance for its operations. This lack of an approved policy has caused delays in establishing standardized practices for data sharing, metadata cataloging, and data quality management. As a result, there are inconsistencies across the platform, which undermines its overall reliability.

Additionally, overlapping responsibilities among institutions further complicate the situation. For instance, the Statistics Act grants the Zambia Statistics Agency independent authority over spatial data management, resulting in jurisdictional conflicts with the Ministry of

Lands and Natural Resources, which is responsible for overseeing the NSDI. These conflicts lead to confusion, hinder progress, and distract from the goal of implementing a cohesive geospatial strategy.

Moreover, the absence of comprehensive metadata, mapping, and data-sharing standards negatively affects the quality, interoperability, and usability of geospatial data, preventing the NSDI from realizing its full potential.

2.3 Technological Limitations

The technological framework of the NSDI encounters several challenges, particularly due to its dependence on expensive commercial software solutions like ESRI ArcGIS and Oracle. While these platforms are powerful, they place considerable financial strain on the Ministry of Lands and Natural Resources, which struggles to keep up with the annual subscription fees. As a result, the NSDI portal and Zambia Data Hub often experience service disruptions due to unpaid subscriptions, compromising their reliability and accessibility.

Another major issue is the lack of integration between the NSDI portal and the Zambia Data Hub. These two essential components of Zambia's geospatial framework function as separate entities, which reduces efficiency and leads to duplicated efforts. Additionally, performance bottlenecks hinder the user experience; for instance, vector layers on the NSDI platform load slowly, even with robust hardware. This inefficiency is primarily due to poor optimization of the platform's software and data structures.

Furthermore, the platform lacks crucial features, such as automated workflows for data updates and metadata management, making it difficult for users to effectively search for, access, or download geospatial data.

2.4 Data and Content Challenges

The NSDI suffers from outdated and incomplete spatial layers, which limit its effectiveness for decision-making and planning. Although the cadastral layer is regularly updated, most other datasets remain static and outdated. Most geospatial information is not grounded in the national geodetic reference frame. This inconsistency diminishes the relevance of the NSDI and its capacity to meet current geospatial needs.

Data duplication and inconsistencies are also common due to poor coordination among data custodians. Without clear agreements or collaborative frameworks, efforts to collect and maintain spatial data often overlap, wasting resources and leading to variations in data quality.

Additionally, the NSDI lacks several critical datasets, including comprehensive land cover and land use layers. This absence prevents the platform from offering a comprehensive view of Zambia's geographic and spatial dynamics, thus limiting its usefulness in vital areas such as land management, urban planning, and environmental monitoring.

2.5 Capacity and Resource Constraints

A major challenge facing the NSDI is the lack of capacity and resources within the ministries and agencies responsible for its implementation. Many organizations do not possess the technical expertise needed to effectively manage and utilize spatial data. Training programs on GIS tools, data management, and metadata creation have been insufficient, resulting in a significant skills gap.

Moreover, the infrastructure at the district and provincial levels is inadequate. Many offices lack essential hardware, such as high-performance computing equipment, and reliable internet connectivity, which hampers their ability to contribute effectively to the NSDI.

Retaining skilled personnel is another critical issue. Many experts trained during the initial implementation of the NSDI have left their positions due to insufficient incentives and limited career development opportunities. This has led to a reliance on external consultants for system maintenance and troubleshooting, which is neither sustainable nor cost-effective.

These combined challenges have significantly hindered the NSDI's ability to serve as a comprehensive and effective tool for geospatial data management in Zambia. Addressing these issues will require coordinated efforts, robust policy reforms, technological upgrades, and substantial investments in capacity building and infrastructure. Only through such concerted actions can the NSDI fulfill its potential to support national development goals.

Chapter III: Vision, Rationale and Guiding Principles

3.1 Vision

A well-connected Zambia where everyone has access to reliable spatial data, empowering informed decisions and promoting sustainable development for all by the year 2030.

3.2 Rationale

The rationale for the National Spatial Data Infrastructure (NSDI) centres on improving the management and sharing of spatial data. It aims to foster collaboration among organizations, enhance decision-making processes, support national development, and enable the efficient use of resources. By providing accurate and standardized geospatial information, the NSDI helps ensure that all stakeholders can access the

data they need to make informed decisions and contribute to sustainable development.

The NSDI Policy in Zambia addresses critical areas such as the lack of formal government commitment, limited NSDI Committee activity, insufficient funding, and inadequate stakeholder understanding of NSDI's importance. It aims to foster ownership, improve coordination, enhance commitment among stakeholders, and increase data availability while linking to the ZILAS cadastre system. By establishing clear goals and guidelines, the policy promotes collaboration among government, businesses, and communities, prioritizes funding, and enhances accountability through oversight and transparency, ultimately creating a supportive environment for innovative solutions.

3.3 Guiding Principles

The implementation of this Policy will be guided by the following general principles:

Transparency: Open access to data that fosters trust and informed decision-making.

Inclusivity: All segments of society benefit from geospatial data, especially marginalized groups.

Collaboration: The best use of resources among government, private sector, academia, and civil society.

Innovation: Advocating for modern technologies to drive growth and adaptability.

Sustainability: The geospatial infrastructure serves long-term goals.

Security: Protecting data from misuse while balancing privacy concerns.

Chapter IV: Objectives and Measures

4.1 Overall Objective

The overall objective of the NSDI Policy is to ensure accessible and usable high-quality geospatial information for Zambian policymakers, planners, and community leaders, facilitating effective decision-making across all sectors. The policy aims to establish standardized, regularly updated geospatial data, promote efficient data management platforms, and create clear legal guidelines for data sharing and privacy. It seeks to cultivate skilled professionals and institutions to support the NSDI, ensure adherence to national standards, and enhance cooperation among stakeholders while prioritizing metadata provision to improve data discoverability and quality.

4.2 Measures vs. Objectives

The following measures designed to achieve the objectives of the National Spatial Data Infrastructure (NSDI) in Zambia focus primarily on addressing the challenges identified in the earlier Situation Analysis section.

Objective 1: *To meet the institutional challenges, good governance and leadership for geospatial information on management is ensured.*

Measures:

i. Improve the legal framework to ensure the effective operation of the NSDI;

ii. Establish a clear governance and leadership structure for the NSDI that includes all stakeholders and creates collaboration synergy between them: and

iii. Renew the NSDI's institutional organization by appointing dedicated members and setting clear roles, responsibilities, and regular meeting schedules.

Objective 2: *To meet the policy and legislative gaps, the NSDI is operating with a solid legislative framework and policy guaranteeing standardized practices for data sharing, metadata cataloging and data quality management.*

Measures:

i. Prescribe that providing metadata for all the fundamental geospatial information is compulsory;
ii. Make the metadata available for all the geospatial datasets;
iii. Prescribe that metadata should comply with the ISO standards; and
iv. The mandatory or recommended standards for geospatial information are determined.

Objective 3: *To meet technological limitations, the NSDI involves a seamlessly integrated, user-friendly platform that leverages open-source solutions, automated processes, and optimized performance to provide reliable, accessible, and up-to-date geospatial data for effective decision-making.*

Measures:

i. Adopt Open-Source Software;
ii. Implement Cost Management Strategies;
iii. Enhance System Integration;
iv. Optimize Performance;
v. Develop Automated Processes; and
vi. Conduct Regular System Audits.

Objective 4: *To meet the data and content challenges, the availability, accessibility, transparency and usability of relevant geospatial information, particularly the fundamental geospatial datasets are ensured.*

Measures:

i. Encourage the sharing of geospatial information among geospatial data producers and other stakeholders;
ii. Obligate the stakeholders to share their data with formal agreements or if necessary, with legal frameworks;
iii. Name a custodian for each fundamental dataset;
iv. Renew the NSDI application;
v. Highlight the transparency and the principle of open data and timely access to it;
vi. Ensure that geospatial information is accessible to all citizens, as well as to the public and private sectors by default;
vii. Make the fundamental data sets available online; and
viii. Promote the idea that geospatial datasets, especially fundamental data, should be regarded as a public good, and that maintaining this fundamental geospatial information or datasets should be financed through public funds.

Objective 5: *To meet the Capacity and Resource Constraints, to ensure sufficient capacity and know-how in the NSDI operating environment.*

Measures:

i. Assess Capacity Needs;
ii. Enhance Training Programs;
iii. Upgrade NSDI Infrastructure;
iv. Implement Retention Strategies; and

v. Foster Collaboration among the Experts.

Chapter V: Implementation Framework

5.2 Institutional Arrangements

To implement the aforementioned measures, it will be essential to review the coordination responsibilities of the NSDI as well as the functions and composition of its key institutions as follows:

5.2.1 NSDI Coordinating Committee

The NSDI Steering Committee's is responsible for central policy development, overall decision-making and stakeholder coordination of the NSDI.

The Committee is chaired by the Smart Zambia Institute, and it has members from the key Ministries and Institutes.

5.2.2 NSDI Technical Committee

The NSDI Technical Committee is responsible for technical support and supervision of the implementation and operations of the NSDI.

The Committee is co-chaired by the Ministry of Land and Natural Resources and Zambia Statistical Agency, and it has members from the key Ministries and Institutes.

5.2.3 Technical Working Groups

The Technical Working Groups are supporting the Committees in their specialty areas.

Working Group 1 - Geospatial Data is chaired by the Ministry of Land and Natural Resources, and it has members from the key Ministries and Institutes.

Working Group 2 – Standards is co-chaired by the Zambia Statistical Agency and Smart Zambia Institute, and it has members from the key Ministries and Institutes.

Working Group 3 - IT and Clearinghouse is co-chaired by the Smart Zambia Institute and the Zambia Statistical Agency and, and it has members from the key Ministries and Institutes.

5.2.4 Technical NSDI Unit

The Technical NSDI Unit supports the Committees and Working Groups, and it is responsible for the maintenance of the NSDI operating and equipment environment. It ensures a fully operational NSDI system and geoservices.

The Unit established under the Smart Zambia Institute, and it has a Director and Expert Officers for the key NSDI function areas.

5.3 Stakeholder Engagement and Collaboration

In developing stakeholder engagement and collaboration between the government, private sector, academia, and civil society the following approaches and measures are to be taken:

Approach 1: *Involving all key stakeholders in decision-making processes to ensure they have a voice in shaping policies and strategies*.

Implementation: Institutional arrangements to involve all key stakeholders in the decision-making processes of NSDI ensure stakeholder engagement and collaboration.

Approach 2: *Outlining clearly the common NSDI goals and benefits that align with stakeholders' interests*.

Implementation: The vision with common goals and benefits of the stakeholders is presented.

Approach 3: *Providing training, technical assistance, and resources to stakeholders to empower them to contribute effectively.*

Implementation: Capacity development of stakeholders is conducted by following the NSDI Training Plan and Technical assistance is implemented through three Technical Working Groups and through the NSDI Technical Unit.

Approach 4: *Encouraging regular dialogue through workshops, forums, and online platforms where stakeholders can share feedback, ideas, and challenges.*

Implementation: Workshops, forums, and online platforms are organized by the NSDI institutional units.

Approach 5: *Offering incentives such as data access, funding, or recognition for active participation, making collaboration more appealing.*

Implementation: Two-way data access is used as one incentive to encourage stakeholders to share their data.

Approach 6: *Establishing transparent, standardized data-sharing agreements that make collaboration easier and more predictable for all parties.*

Implementation: Data-sharing agreements are prepared between key data providers and users.

Approach 7: *Promoting transparency, accountability, and regular feedback mechanisms to build trust among stakeholders.*

Implementation: A public awareness and communication plan for the implementation phase is prepared under .

Approach 8: *Ensuring there is strong leadership and a coordinating body that facilitates engagement and collaboration, resolving conflicts, and guiding efforts.*

Implementation: Leadership, coordination, facilitating engagement and collaboration, resolving conflicts, and providing guiding are designated as the NSDI Coordinating Committee tasks .

5.4 Legal Framework

The following legislation is related to the implementation of the NSDI. Some of these regulations require harmonization and updates, particularly the fundamental ones, to fully support the NSDI initiative.

(a) Land Survey Act (1963)

(b) Statistics Act, (2018)

(c) Standards Act, (2017)

(d) Information and Communications Technology Act (2009)

(e) The Electronic Communications and Transactions Act (2009)

(f) Access to Information Act (2023)

(g) Environmental Management Act (2011)

(h) The Urban and Regional Planning Act (2015)

(i) Lands Act (1995)

(j) National Archives Act (2016)

(k) The Science and Technology Act (2016)

5.5 Data Policy and Standards

The various stakeholders have certain roles in managing geospatial data. Government agencies act as data custodians, managing and sharing authoritative datasets. The private sector contributes data and services, while academia utilizes spatial data for research. The general public and NGOs use and provide feedback on the data.

Data accessibility is promoted through open data principles, while stakeholders are accountable for data sharing. The NSDI Technical

Committee oversees data governance, establishing guidelines for data ownership and access. A focus on standards ensures consistency in data quality and interoperability, advocating for the adoption of international standards.

Robust measures for data security and privacy are implemented to protect sensitive information. Clear policies for licensing and intellectual property rights govern data use. The NSDI also emphasizes the need for regular data updates and maintenance, accurate metadata, and stringent quality assurance processes.

Data privacy protocols are designed to safeguard sensitive information while maintaining public access to non-sensitive data. The NSDI Coordinating Committee ensures transparent fee structures for data access, and guidelines for data storage and archiving are established to secure long-term data preservation and retrieval.

5.6 Technical Infrastructure and Platforms

The Smart Zambia Institute will be responsible for hosting the foundational elements of the NSDI. It will provide the necessary administrative and support services to ensure that the NSDI components are both accessible online and functioning effectively. Furthermore, Smart Zambia will proactively address issues related to data protection and the information security of the NSDI.

The core components of the NSDI include an information portal that serves as an entry point containing various information related to the NSDI, as well as a data catalog that functions as a database for publishing metadata records that describe different spatial datasets, allowing users to search and query these records. Additionally, there is an interactive map viewer that enables users to view and navigate various spatial layers, search for specific data, and add layers from the data catalog, while also

selecting features to view their attributes. Lastly, a map server will be utilized to publish and provide access to various spatial datasets through OGC-compliant map services.

5.7 Resource Mobilization and Financing

Effective implementation of the National Spatial Data Infrastructure (NSDI) Policy relies on mobilizing both local and external resources aligned with policy objectives. Institutions are required to nominate representatives to the NSDI Steering Committee, Technical Committee, and three Working Groups, with the Smart Zambia Institute playing a key role in staffing the NSDI Technical Unit. It is essential to ensure these units remain fully staffed and trained in the future.

The Smart Zambia Institute will also be responsible for providing the necessary equipment for NSDI operations. Adequate long-term financing is critical for the sustainability and effectiveness of the NSDI. Budget allocations should focus on essential projects to guarantee resources for technology, training, and infrastructure. Long-term funding models, such as public-private partnerships, can encourage innovation and investment while promoting collaboration between government and private sectors.

5.8 Resource Development

Resource development through various initiatives aim at enhancing skills and knowledge in spatial data management. Training programs for government agencies and stakeholders, led by the NSDI Technical Committee, focus on best practices in data collection, sharing, and usage by utilizing workshops, webinars, and hands-on exercises. The goal is to develop a skilled workforce capable of making informed decisions and improving service delivery.

Capacity development for technical experts and data managers within the NSDI Technical Unit is also critical. Training ensures these specialists

have the skills to implement the best practices and adapt to changing data needs, thereby strengthening the overall capability of spatial data management.

Educational initiatives targeting universities aim to build NSDI skills by integrating relevant concepts into academic curricula and fostering partnerships for joint programs. Practical experience is provided through internships, guest lectures, and collaborative research projects. The NSDI Coordinating Committee and Technical Committee oversee the implementation of these resource development efforts.

5.9 Monitoring and Evaluation

Monitoring and evaluation (M&E) of the National Spatial Data Infrastructure (NSDI) is led by the NSDI Coordinating Committee, which directs M&E activities to the NSDI Technical Committee, Working Groups, and Technical Unit. These groups are responsible for regularly reviewing and reporting their metrics to the Steering Committee. The Steering Committee may also commission Annual External Evaluations of the NSDI.

The NSDI Coordinating Committee ensures that the overall objectives and outcomes of the NSDI policy are met effectively, including assessing progress in improving spatial data availability, quality, and accessibility. The M&E process evaluates the utilization of resources and addresses stakeholder needs while measuring the broader societal, economic, and environmental impacts of NSDI implementation.

Risk management is another key responsibility of the NSDI Coordinating Committee. This involves identifying potential challenges related to data security, compliance issues, and resource constraints. The committee implements proactive measures to mitigate these risks, ensuring data integrity and availability, and establishes contingency plans to address unforeseen events, thereby enhancing the resilience and effectiveness of the NSDI framework.