MInDSEt: A GEOSPATIALLY ENABLED INTEGRATED DATA SHARING ENVIRONMENT FOR MINDANAO, PHILIPPINES

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ABSTRACT: MInDSEt, or the Mindanao Integrated Data Sharing Environment, is an online geospatial data and information sharing facility/geospatial data infrastructure established in Caraga State University, Philippines. MInDSEt was developed using Geoserver for data storage and OGC services, and Geonode for data cataloguing and visualization. It was originally developed as data sharing facility of the stakeholders of the Geo-SAFER Mindanao, an R&D program which focused on generating detailed flood hazard maps of flood-prone river basins and watersheds in Mindanao, Philippines through numerical simulations using LiDAR-derived elevation datasets. Initially, MInDSEt was aimed to cater the needs for LiDAR-derived datasets (DTM, DSM) and flood hazard information (e.g., maps and GIS files) for Mindanao, as well as a venue to data sharing of its stakeholders that includes Geo-SAFER Mindanao implementing educational institutions and Local Government Units. Recently, MInDSEt's functionality was expanded to allow registered organizations and users to store and share any kind of geospatial data and information. One of the features of MInDSEt is its capability to categorize stored datasets as restricted (i.e., a specific organization or member of that organization can only access the data/information), controlled (i.e., data/information can be accessed by an organization or user after approval of data request), or public (i.e., anyone, even unregistered users can access the data. MInDSEt is also capable of handling externally stored data/information, wherein only the links to the external data/information are stored instead of the data/information files. This capability is advantageous to accommodate a greater amount of data/information with minimal effect to the facility's data storage. Through MInDSET, it is envisioned that geospatial datasets and information of Mindanao and for Mindanao will be come easily accessible by anyone.

1. INTRODUCTION

Accessing and sharing, over the internet, relevant multisource and distributed geospatial data is crucial to support decision makers in reducing disaster risks (Sterlacchini et al., 2018). Such is the case of the MInDSEt, or the Mindanao Integrated Data Sharing Environment, an online geospatial data and information sharing facility and geospatial data infrastructure established in Caraga State University, Philippines.

From 2017-2019, the Caraga State University implemented the Geo-SAFER Mindanao Program, or "Geo-Informatics for the Systematic Assessment of Flood Effects and Risks toward a resilient Mindanao (Geo-SAFER Mindanao, 2017), with support from the Philippines' Department of Science and Technology – Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD). With a total of five projects under it, the program aims to conduct detailed flood hazard mapping of flood prone river systems in Mindanao Island, Philippines (Figure 1) using LiDAR-derived data products such as Digital Terrain Model (DTM) and Digital Surface Model (DSM) and application of relevant GIS and flood modeling and hazard mapping methodologies and approaches. To ensure that outputs of the program are easily accessed by the end users and stakeholders, it was necessarily to establish a data sharing facility that will serve as the storage of the program's outputs. This facility is called MInDSET, and its establishment was seen to play a big role for the sustainability of the program outputs and services. One of the objectives of the program is to distribute these outputs and make them available anytime to end users and stakeholders for disaster management, land use planning, and related applications.

Initially, MInDSEt was aimed to cater the needs for LiDAR-derived datasets (DTM, DSM) and flood hazard information (e.g., maps and GIS files) for Mindanao, as well as a venue to data sharing of its stakeholders that includes Geo-SAFER Mindanao implementing educational institutions and Local Government Units (Figure 2). Recently, MInDSEt's functionality was expanded to allow registered organizations and users to store and share any kind of geospatial data and information. The objective of this paper is to present details and capabilities of MInDSEt as an integrated data sharing environment for Mindanao, Philippines.

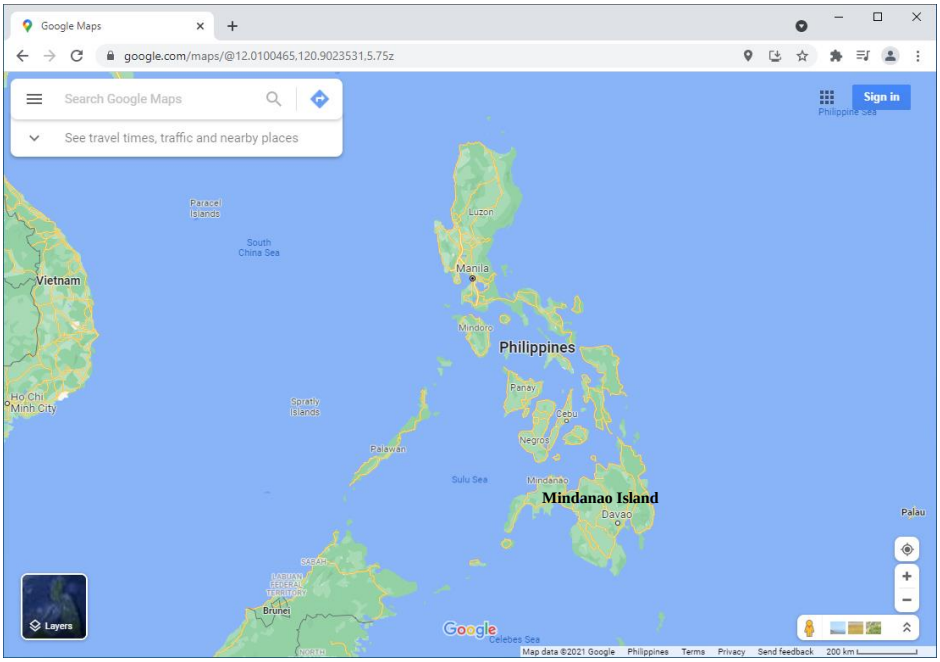

Figure 1. Map showing Mindanao, Philippines. (Credits: Google)

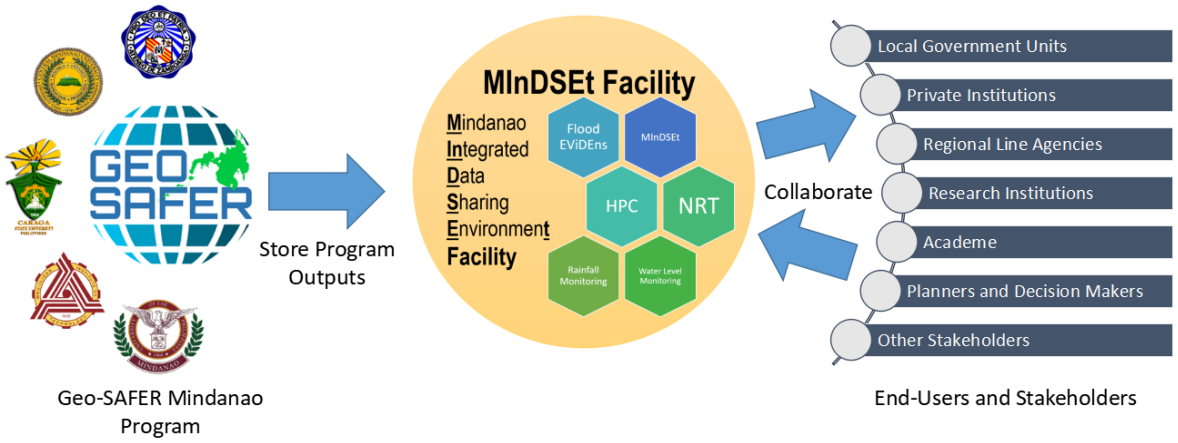

Figure 2. The MInDSEt original conceptual framework.

2. DEVELOPMENT OF MInDSEt

MInDSET was developed using Geoserver for data storage and OGC services, and Geonode for data cataloguing and visualization. By utilizing the data management tools built into GeoNode, MInDSEt was able to benefit the integrated creation of data, documents, link to external documents and map visualizations. Each dataset in the system can be shared publicly or restricted to allow access to only specific users.

MInDSEt comes with a portal that is accessible at http://mindset.ccgeo.info:81/ (Figure 3). Through this portal, stakeholders, and the community of end-users, both from private and government sectors can collaborate, have access to and/or exchange of datasets and information not limited to flood hazards. Primarily, this application was expected to serve as a portal to simplify the request and download of numerous raw and processed geoscientific resources of Mindanao.

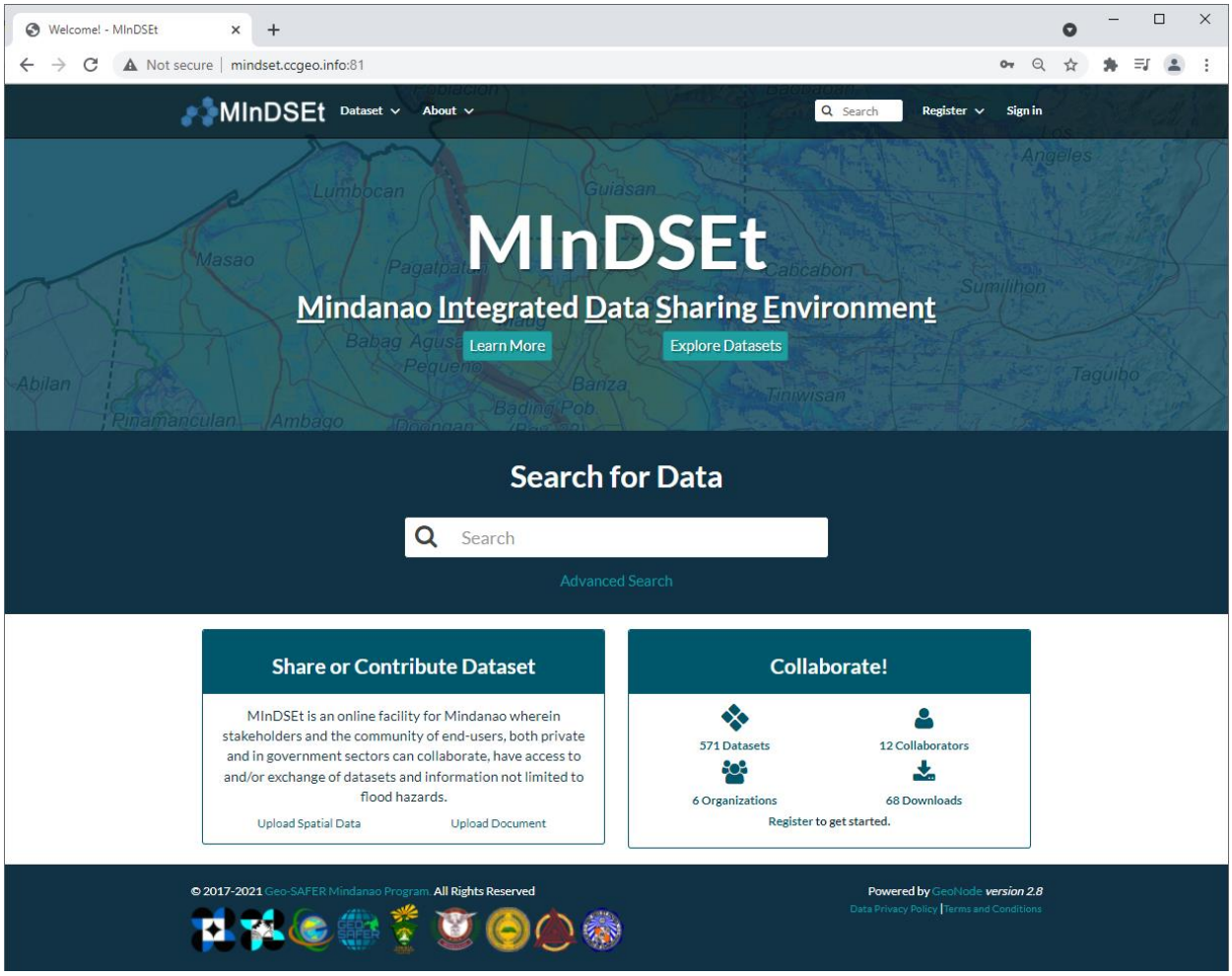

Figure 3. The MInDSEt portal at http://mindset.ccgeo.info:81/

3. FUNCTIONALITIES AND CAPABILITIES OF MInDSEt

3.1 Accessing MInDSEt

A user does need to register to search datasets in MInDSET.

The type of users can either be of the following:

- Public User – a user that is not registered or logged in to the portal.
- Registered User (Insider) – a registered user who is a member of a certain organization.
- Registered User (Outsider) – a registered user who wants to gain access to the controlled datasets (organization specific datasets) of another organization.
- Registered User (Others) – a registered user who requests access/download only to the publicly available and controlled datasets (organization specific datasets). This type of user cannot upload datasets.
- Content Manager – a registered user who is assigned by the Super Admin as the head of a certain organization. This user also provides a listing of the possible users from their organization.
- Super Admin - a user who has the universal access of the portal.

All datasets uploaded are searchable. Also, many of the datasets are readily downloadable, particularly datasets on flood hazards. If a dataset, e.g., a LiDAR-derived DTM, is not downloadable (i.e., restricted), it requires a user to register first. A restricted data can either be of the two: it can only be accessed by registered users (i.e., a user can download it once registered and signed-in), or a data that requires a registered user to request access to it. If the latter is the case, a form needs to be accomplished by the user indicating the reason for requesting access to the file.

3.2 Application Interface

There are several web pages that the user must interact with in the web portal. There are pages which shares common toolbar while other varies depending on the type of information shown. There are buttons and links that are only available for authenticated users and site administrator which may not be available for public users. Basically, each page consists of the *Portal Banner*, *Navigation Toolbar*, *Page Contents*, and the *Page Footer*. The *Navigation Toolbar* contains quick links to view spatial data, maps, documents, and quick search fields. *Sign In* and *Register* links are also available in the said toolbar. The *Content Area*, essentially shows a variety of information related to geospatial data uploaded, its metadata and other geoscientific information.

The *Search* page contains a wealthy of options for customizing a search for various information on this portal (Figure 4). While a simple search box is available at the top of every page, this search form allows for much more fine-tuned searches.

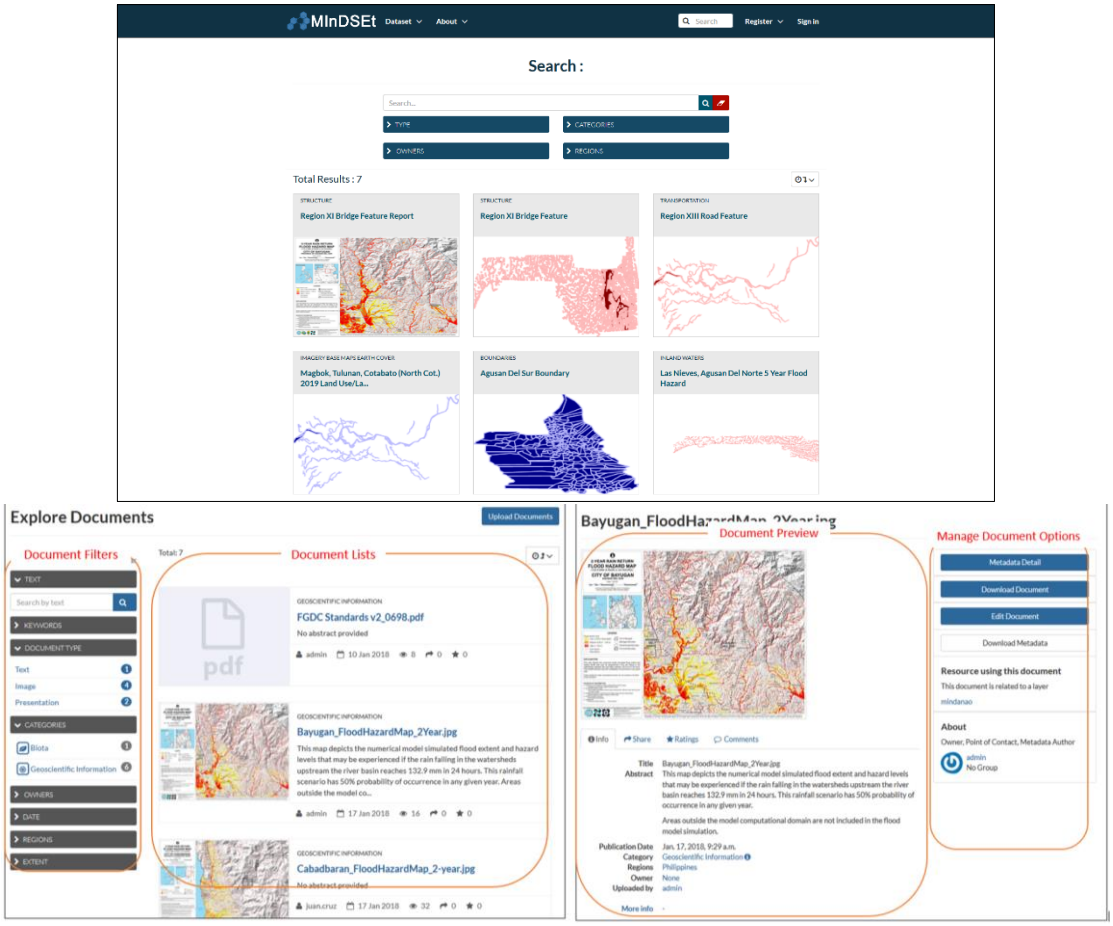

Figure 4. MInDSEt's *Search* and *Explore Documents* pages.

3.2 Stored Datasets

MInDSEt can store both spatial and non-spatial (document) data sets covering various watershed as well as provinces and municipalities of Mindanao (Figure 5). Among the data sets already uploaded in MInDSET are the following:

- LiDAR-derived DTM
- LiDAR-derived DSM
- Flood Hazard Layers for various scenarios (Vector)
- Flood Hazard Maps for various scenarios (Image)
- Building Footprints
- Roads
- Tree Plantations
- Technical Reports

MInDSEt is also capable of handling externally stored data/information (referred to as "external resource"), wherein only the links to the external data/information are stored instead of the data/information files. For example, an archived GIS shapefile (in zip format) is stored in Google Drive, and the link to this Google Drive is the one "uploaded" in MInDSEt (Figure 6). This capability is advantageous to accommodate a greater amount of data/information with minimal effect to the facility's data storage. When a user accesses this data, and assuming the user is entitled to access the data, the user will be directed to the Google drive file. The only disadvantage here is when the Google Drive file is restricted, such that the Data Manager still need to approve the Google Drive access request sent by the user.

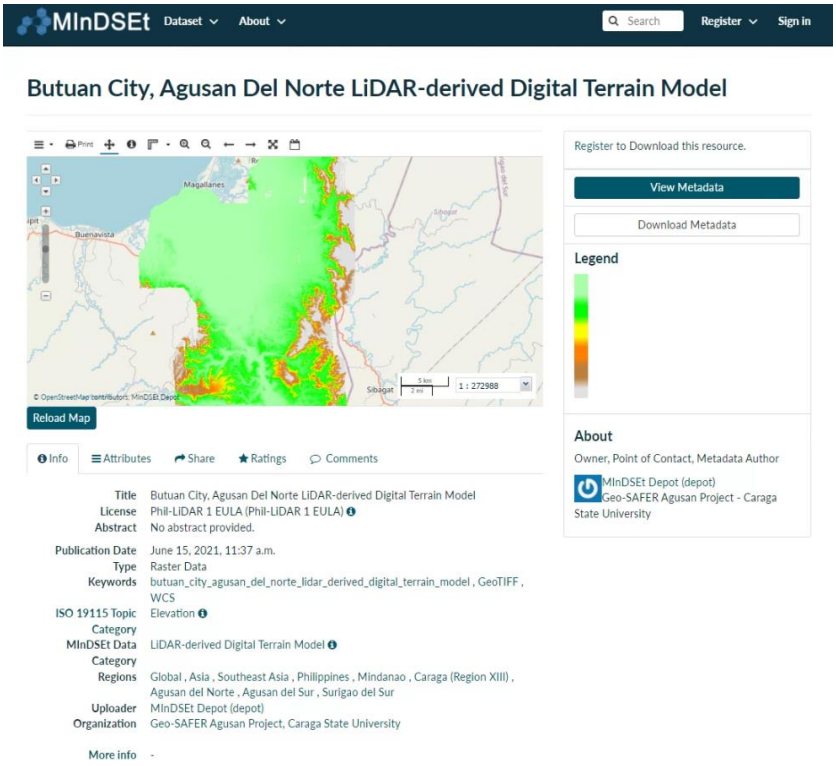

Figure 5. Example data uploaded in MInDSEt.

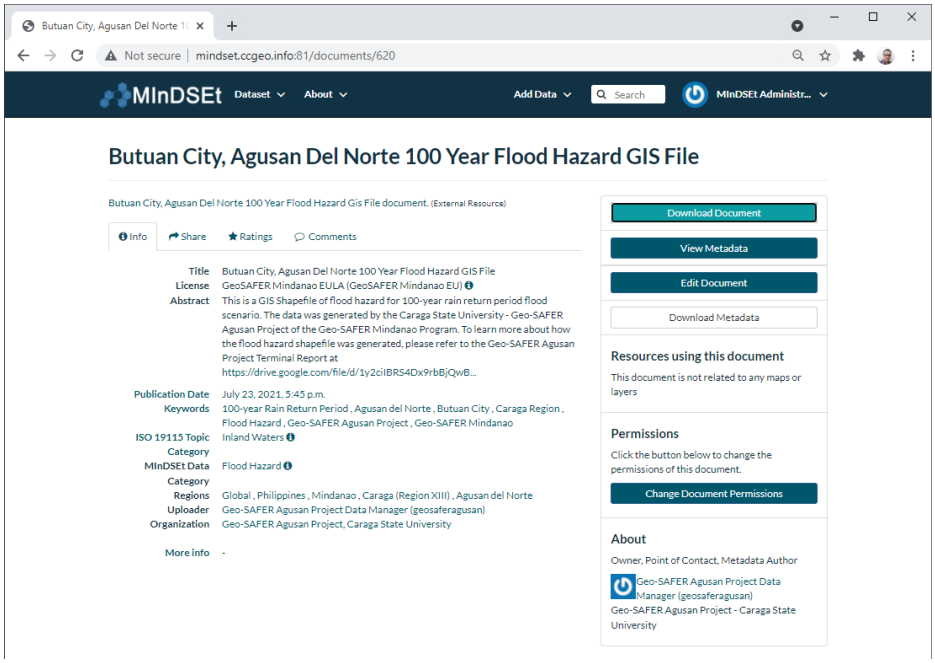

Figure 6. Example of an external resource (e.g., a dataset stored in Google Drive; the "Download" link will forward the use to the Google Drive file).

4. ACKNOWLEDGEMENTS

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5. REFERENCES

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