Utilizing The West Sumatera Geoportal For Monitoring The Land Cover Map Of West Sumatra Province Through Geoservices

Firdaus Ramadani[1] , Arie Yulfa[2*]
{Firdausramadani123@gmail.com[1], arieyulfa@fis.unp.ac.id[2]}

Geography Study Program,State University of Padang, Padang, Indonesia

Abstract. Utilization of the West Sumatra Geoportal examines monitoring of spatial data access through the Geoservices service. This study aims to monitor the available land cover maps in the West Sumatra Geoportal through the Geoservices available on the West Sumatra Geoportal. The method used in this study is descriptive quantitative with the Free and Open Source Software for Geospatial (FOSS4G) approach. The results of this study indicate 1. Open Source applications have benefits in utilizing spatial data on the West Sumatra Geoportal web 2. There are differences in the results of spatial information on each OPD (Regional Apparatus Organization) 3. The importance of building scenarios to facilitate data retrieval on the West Sumatra Web Geoportal.

Keywords: Utilization of the West Sumatra Geoportal, FOSS4G, Land Cover Monitoring

1 Introduction

In the last decade, many Geographic Information Systems have been operating worldwide, especially in administration. One of the problems is getting them to work together, especially at the data level, such as an institution that can be profitable. From data from other agencies from data from other agencies [1]. The issue of access to information and dissemination of data becomes critical so that the public and commerce are responsible for assisting the dissemination of information data through connecting network nodes in implementing government programs in one map (one map, one policy), namely the Geoportal. In recent years geographic information (GI) has become increasingly important

as a framework for describing patterns on the Earth'sEarth's surface. An extensive database has been created to provide an inventory of natural and cultural resources. [2] The Geoportal is a web-based application part of IDS that will help connect people with data [3]. The Geoportal is also a portal for searching services and using spatial data through internet media. Geoportal at IIG has a role in facilitating the publication, search, discovery and use of spatial data. Spatial data registered on the Geoportal can be accessed with existing standards, namely WFS and WMS. [4]

In 2019 the development of the West Sumatra Geoportal Network Node was in a developing status, namely the Geoportal already existed, the regulations did not yet exist, and the Network Node management unit did not yet exist. In the development of IDS, the role of net-

ICGEO 2022, November 19-20, Padang, Indonesia

DOI 10.4108/eai.19-11-2022.2332300

work nodes is to assist in organizing spatial data dissemination. In this case, the West Sumatra Geoportal is at the JIGD level. Regional Geospatial Information Network

Land cover is the physical appearance of the Earth'sEarth's surface. Land cover can describe the relationship between natural processes and social processes. [5] Problems Limited access to spatial data is a problem because, in this case, scattered spatial data is difficult to access due to a lack of information about its availability. Spatial data is essential to coordinate the exchange of data between stakeholders. SDI is basically a concept about facilitating and coordinating the discussion and sharing of spatial data between stakeholders from different jurisdictional levels in a spatial data community. [6] The current problem is the lack of information related to accessing services that make it easier for users to utilize spatial data without having to come directly to the relevant agency. Namely, lack of interoperability Interoperability has been a goal of the computer industry for many years and is essentially one view of the push for open systems. [7] The platform being developed helps make it easier for users to utilize spatial data, namely *Free and Open Source Software for Geospatial* (FOSS4G), the QGIS and Geoserver applications.

2 Method

This research was conducted using interview techniques and online observation on the West Sumatra Geoportal web. This study uses a quantitative method with a descriptive approach.

The sample used is a land cover map from the West Sumatra Geoportal web using the Request Response method.

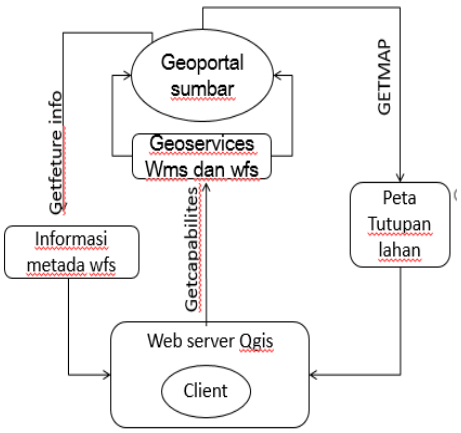


Fig. 1. West Sumatra Geoportal web

Geoportal study and implementation. West Sumatra uses Free and Open Source Software for the Geospatial (FOSS4G) application model, QGIS, and the Geoserver application. Spatial

data The purpose of this study is to identify problems related to data sharing in the West Sumatra Geoportal using Open Source applications and to implement scenarios in the utiliza-

tion of spatial data in the Regional Organizational Organization (OPD) environment in West Sumatra Province

2.1 Research Steps

2.1.1 The first step is

Literature study related to the use of Geoportal, namely literature review related to the use of spatial data according to Maguire (2005) and the Role of Geoportal according to Presidential Decree No. 39 of 2019 concerning One [8] Data Conducts interviews. The interview is a method used to find primary data and is a method that is widely used in interpretive research and critical research. Interviews were conducted when researchers wanted to dig deeper into respondents' attitudes, beliefs, behaviours, or experiences of social phenomena. [9]. Questionnaire on the use of the West Sumatra Geoportal at Bina Margacipta Government Workspace (BMKCTR)

2.1.2 The second stage

After Identification of Geoportal Problems in West Sumatra. Furthermore, the online observation of the West Sumatra Web Geoportal uses the Free and Open Source Software for Geospatial (FOSS4G) application. Qgis and GeoServer applications from the spatial data used.

Quantum GIS (QGIS) is cross-platform free (open source) desktop software on Geographic Information Systems (GIS). This application has the function of providing data, viewing, editing, and has spatial analysis capabilities [10] QGIS Application Function Designing spatial data retrieval from the West Sumatra Geoportal server.

The West Sumatra OGC IYeb Geoportal Request Standard service uses the HTTP protocol as the transaction medium. WMS requests such as GetCapabilities, GetMap, and GetFeature are sent with HTTP GET. The HTTP GET form is a URL. Some parameters are set based on implementation specifications. In response to the request, WMS renders spatial data in raster and vector format along with attribute data [11]

Requests from the Geoportal for West Sumatra land cover maps were then analyzed for differences in the resulting land cover maps.

Geoserver is a geospatial data provider application through a Web Service that can be accessed via the Web (HTTP), online mapping applications, and desktop applications (ArcGIS, WMS/WFS Client). The use of standards issued by OGC allows the resulting services to be open and accessible by other applications in combining geospatial information. [12]

The local host on Geoserver is used by server 8080 for shared data access

2.1.3 Third step

Build scenarios for the West Sumatra Geoportal using the Free and Open Source Software for Geospatial (FOSS4G) application.

3 Results And Discussion

3.1 Identification of Sumatra Geoportal problems

3.1.1 Interview

Based on the results of interviews related to the use of the West Sumatra Geoportal in each related Regional Apparatus Organization (OPD), it is still challenging to utilize existing data in the Geoportal because they do not yet know information on using the Geoservice service, so that each OPD related to spatial data requests still manually directs data to the relevant agency utilizing the letter. Therefore the interviewee hopes that there will be information on overcoming problems associated with Geoservices services in the West Sumatra Geoportal. It can be concluded that the results of the interview require information about Geoservices. Geoservices are urgently needed by related Regional Apparatus Organizations (OPD) in utilizing spatial data so that interoperable coordination between OPDs in using the West Sumatra geoportal

3.1.2 List of Questions

Based on the results of utilizing the West Sumatra Geoportal related to Geoservices services, the survey results showed that 50% already knew about Geoservices services. In comparison, 50% of respondents did not know about Geoservices services.

Fig. 1. The results of filling in the Geoservices Questionnaire

3.2 The results of spatial data requests using the QGIS application

Requests available on the Sumatra Geoportal The server Geoservices on the Sumatran geoportal using OWS requests on the QGIS 3.14 application displays data requests that result in both map server services, web map servers, and feature web services

http://geoportal.sumbarprov.go.id:80/geoserver/ows?service=WMS&request=GetLegendGraphic&format=image%2Fpng&width=20&height=20&layer=PENUTUP_LAHAN_AR

3.2.1 Request Web Map Services (WMS)

The West Sumatra Geoportal requests access via the West Sumatra geoportal using requests from the OGC Web Services (OWS) Server displaying server requests of two types of requests, namely WMS and WFS, namely OWS In XML (Extensible Markup Language) Format Monitoring land cover maps using recommendations from the West Sumatra Geoportal generates all data Spatial data in the West Sumatra Geoportal.

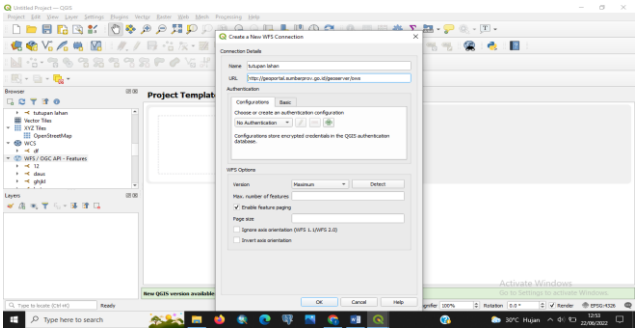


Fig. 2. Request using the QGIS Application

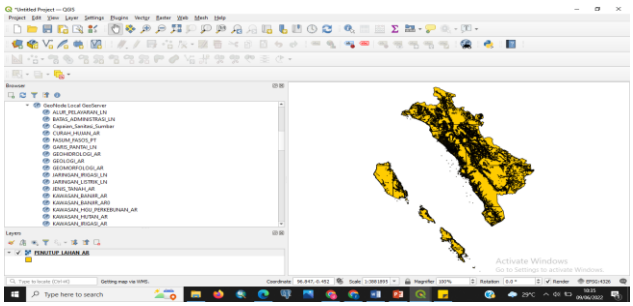


Fig. 3. The results of the Request Wms layer land cover map

Wms layer land cover map Result of request from WMS server (Web Map Services) spatial data Land cover, for the server (Web Map Service), generates raster data so that the resulting data does not have Geometry attributes on the data attribute layer only displays the format (PNG, JPG, TIFF)

3.2.2 Request Web Feature Services (WFS)

The WFS Request layer land cover map provides quite complex request data. The data request returns attribute data and geometric data as

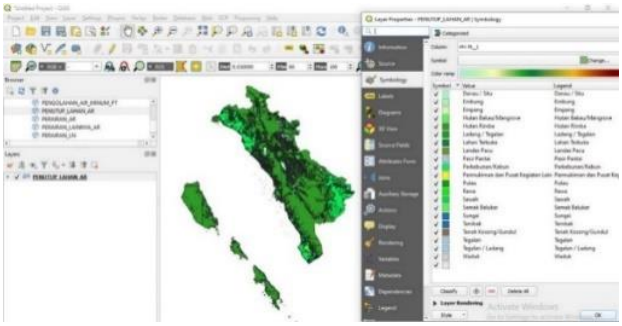


Fig. 4. WFS Request layer land cover map

3.2.3 Service Request Differences

Table 1. Differences in WMS and WFS Request Results

Differences in service requests	
WMS	WFS.
Show rater data	Displays Vector data
overall in displaying the map	the long process of displaying maps depending on the dataset
does not display data	display attributes
connected to the internet	connected to the internet
Cannot be edited by the client	Editable by client
Provides graphical and geographic views	Provide actual features
Format Jpg, tiff png	Format Gml, shpfile , json

3.3 Spatial Data Monitoring

Comparison of the land cover map from the West Sumatra Geoportal with the land cover map sourced from the Ministry of Environment and Forestry seen using the Swipe Plugin in the QGIS application :

a. Monitoring using the Swipe Plugin

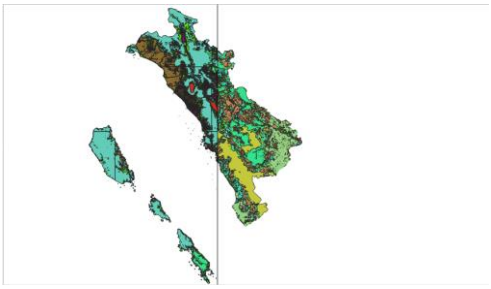


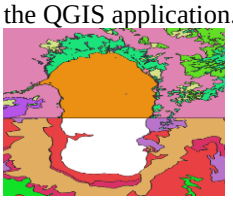
Fig. 5. Swipe display of differences in land cover

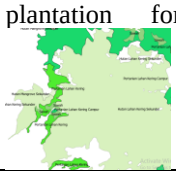
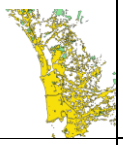
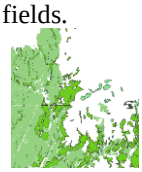
Tolls Swipe in the QGIS Plugin describes the difference in data generated from a land cover map request from the Geoportal web server. The data request displays the difference in data, namely from the Web Geoportal and the land cover map data of the Ministry of Environment and Forestry. This shows that there is no synchrony in describing spatial data. Based on the results of the Swipe Analysis, the differences in the data produced by the two regional organization organizations (OPD), from the analysis results, that there are differences in the land cover maps produced by the two organizations are sourced from the Geoportal. From the results of a request from the West Sumatra Geoportal that there are differences in land cover and classification of land use types based on the BSN classification (2010) available on the West Sumatra Geoportal With Land Cover Maps Sourced from the KLHK. The same spatial data

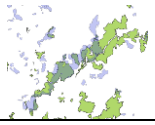
with different Regional Organizations (OPD) is essential to access Geoservices services.

b. The land cover map resulting from the West Sumatra Geoportal Request consists of Garden Forests and Shrubs. Empty land Awakened land, Empty land the results of the analysis using the swipe tool describe the differences in data produced by two different organizations, namely the geoportal web with land cover map data from the Ministry of Environment and Forestry (KLHK).

Table 2. Analysis Results using Tolls Swipe

Classification	West Sumatra Geoportal Resources Land cover map	Source KLHK Land Cover Map	Land cover classification (Swipe process)
Waterbody	- Water bodies on the geoportal web are identified as having the land cover on water bodies - Water bodies on the Geoportal website are identified as orange, rivers, pond lakes, beach sand ponds - The area of the body of water on the West Sumatra geoportal web has a place.	- The agency at the source of the Ministry of Environment and Forestry was not identified based on the data. - Water bodies are shown in white because there are no water bodies identified.	Differences in the appearance of water bodies. Map swipe tools swipe on the QGIS application. 
Forest	- Forests on the West Sumatra Geoporta l resource web can	- Forests at the source of West Sumatra KLHK can be classified, namely Primary dryland	Differences in the appearance of forest areas Map swipe tools swipe on the QGIS application.

Forest	be classified as mangrove forests and jungle forests. 	forest, and secondary mangrove forest. Primary mangrove forest, secondary swamp forest, primary swamp forest, plantation fores 	
Built Land	- Built-up land based on the classification of West Sumatra Geoportal web sources land use for settlements, ponds, dry fields, reservoirs 	- Built-up land, based on the source classification of the West Sumatra Klhk, is defined as built-up land areas consisting of mining settlements. 	Differences in the appearance of Built-up Land Areas Map swipe tools swipe in the QGIS application Display in yellow is the source of the Geoportal, and red is the source of the KLHK land cover map. 
Plantation	- Plantations based on the classification of the West Sumatra Geoportal web resource, land use consists of plantations, rice fields, and fields. 	- Plantations based on the classification of KLHK resources in West Sumatra use of plantation land, rice fields, fields 	- The difference in the appearance of the Built-up Area Map swipe tools swipes on the QGIS application. 

Empty land	- Vacant land based on the Geoportal web resource classification of open land use 	- Vacant land, based on the classification of KLHK sources, West Sumatra land use consists of open land 	- Differences in the appearance of vacant land areas Map swipe tools swipe in the QGIS application Differences in land cover results display an orange impression sourced from the Geoportal web land cover but different views of land cover from the KLHK source. 
Bush	Shrubs based on the classification of the West Sumatra Geoportal web source land use open swamp land, shrubs 	Shrubs based on KlHK source classification, West Sumatra land use consists of shrubs and swamps. 	- Differences in the appearance of bush areas Map swipe tools swipe in the QGIS application Differences in land cover results display a green impression sourced from the Geoportal web land cover but a different appearance of land cover from the Ministry of Environment and Forestry source with light blue colour. 

3.4 Access QGIS application data sharing Connection with Geoserver

Geoserver is a data uniform application from various types of GeoServer data and a data link application that can be in the form of WMS and WFS Requests online. The results of spatial data sharing were analyzed for differences in data connections between Geoservers. The GeoServer is used as a spatial data repository and bridges the differences in data from each Regional Apparatus Organization (OPD) so that it is easier to retrieve server data from one organization to another through access to data sources on Geoserver.

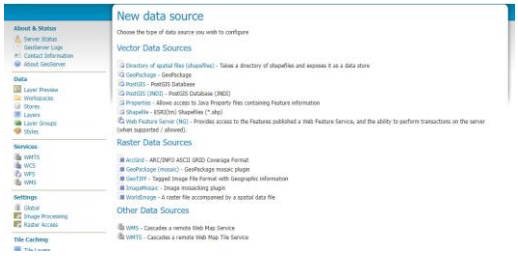


Fig. 6. Extracting data Source sharing data using Geoserver

Spatial data that has been edited can be edited with the respective database to obtain spatial data in WMS and WFS formats through the Geoserver application.

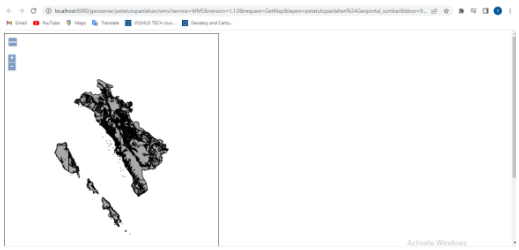


Fig. 7. the result of the WMS Geoserver open-layer request

Analysis result data can be online on the server from the portal of each localhost OPD using Geoserver port 8080. This access request link displays WMS requests only displaying images from the results of spatial data requests in other formats which display images only: Pdf, Png, Jpeg, Tiff.

http://localhost:8080/geoserver/petaTutupanlahan/wms?service=WMS&version=1.1.0&request=GetMap&layers=petaTutupanlahan%3AGEoportal_sumbar&bbox=98.59650191506576%2C-3.5730200001862364%2C101.8928829%6400.36

Fig. 8. WFS Geoserver Requests WFS Open Layer Results

The Request View displays the Geometry view of the request result in JSON format, another format which indicates the Geometry in various forms, namely: Csv, Gml, Gjson, Kml shapefile, Text/CSV

http://localhost:8080/geoserver/landcovermaps/ows?service=WFS&version=1.0.0&request=GetFeature&typeName=peta TutupanLahan%3AGEoportal_sumbar&maxFeatures=50&outputFormat=application%2Fjson

3.5 Scenario for using the West Sumatra Geoportal using the QGIS web application

a. The Regional Apparatus Organization (OPd) requesting data related to spatial data requested the West Sumatra Geoportal website
b. Enter the Sumatra geoportal and load the West Sumatra Geoportal HTTP weblink
c. On the Geoportal, Service functions are available on the West Sumatra Web Geoportal: search, metadata, depiction, and data service.
   1) The search function utilizes the West Sumatra Geoportal, which makes it easy for clients to use Google web services, Chrome, Microsoft Edge

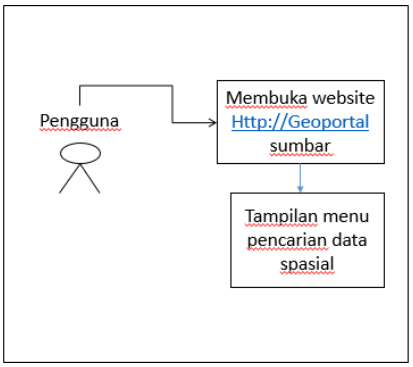


Fig. 9. Search Function

   2) Function Users can also view the spatial data information metadata that they wish to request using the metadata menu.

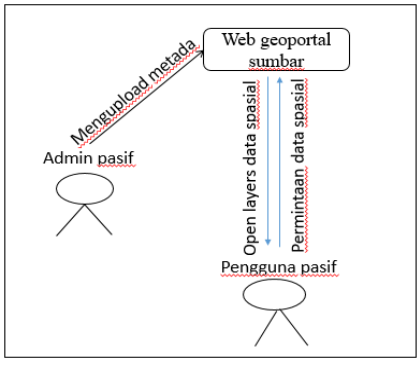


Fig. 10. Function Metadata

3) Prostar Once the data is searched, the spatial data can be viewed.

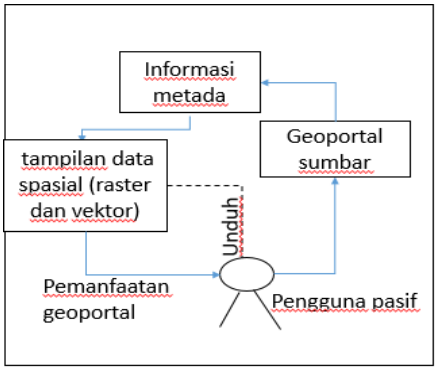


Fig. 11. Display Function in Geoportal

4) The data service function, i.e. WMS service and WMS Service, displays a link which can be copied to get the requested spatial data on the Geoportal.

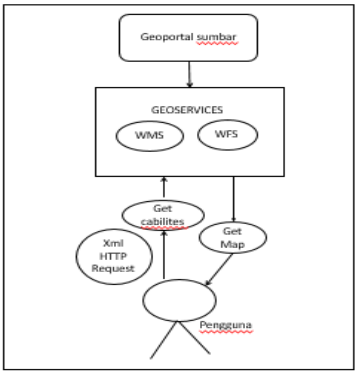


Fig. 12. Data Service Function

5) Once able to access WMS and WFS services, they are accessed using the QGIS application as a connection application that shares spatial data copy links in the QGIS application with WMS and WFS requests, OWS On tools available in QGIS.

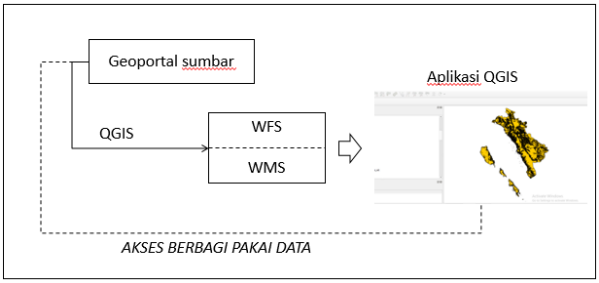


Fig. 13. Data Sharing Function

6) Spatial data from the QGIS and Geoserver application connections will then load spatial data in the form of being able to go online with the result of getting MAP WMS and WFS services.

Fig. 14. Geoserver web data online

4 Conclusion

The West Sumatra geoportal IDS service helps in developing network nodes; from the results of the study, it can be concluded

a. The current problem of the West Sumatra Geoportal is that the human resources for the development of the West Sumatra Geoportal are insufficient in collecting data from agencies related to mapping. Data requests are made manually, namely, directly to the agency responsible for developing the West Sumatra Geoportal using a letter.
b. From the results of online observations from the West Sumatra Geoportal, the QGIS application can retrieve data from the West Sumatra Geoportal without losing the requested geometry of the map via the Geoservices service.
c. In assisting One Map Policy, namely one map one policy, the land cover maps produced from the West Sumatra Geoportal web are still different from other agencies. This is due to the lack of synchronization in making maps so that they often depict the same thing. Objects in various organizations.
d. from the results of online observations of the West Sumatra Geoportal web that there is a connection between the QGIS application and Geoserver in sharing access to spatial data needed by clients
e. the importance of scenarios makes it easier for clients to retrieve spatial data on the West Sumatra Geoportal web

Acknowledgement

Thank you for teh supervisor ,Geography lecturer ,and ICGEO 2nd Committee,as well as students involved in assisting the paper

References

[1] SA Mehdi, M. Ali, G. Nima, R. Zahra, B. Peyman, and K. Kunci, "How to Implement Government Open Source Geoportals," pp. 275–285, 2014.

[2] DJ Maguire and PA Longley, "The emergence ofGeoportals and their role in spatial data infrastructures," *Comput. Environment. Urban System.* , vol. 29, no. 1 SPEC. ISS., pp. 3–14, 2005, DOI: 10.1016/j.compenvurbsys.2004.05.012.

[3] A. Yulfa, T. Aditya, and H. Sutanta, "Spatial Data Infrastructure Enrichment Using Crowdsourced Data for Emergency Response," *Maj. Science. GLOBE*, vol. 21, no. 2, pp. 95–104, 2019.

[4] AKN Syafitri and R. Azeriansyah, "Use of geoportal in visualizing the landslide hazard map in Karanganyar Regency based on simulated levels of rainfall intensity," *J. Geod. and Geomatics*, vol. 02, no. 01, pp. 1–8, 2019, [Online]. Available: https://ejournal2.undip.ac.id/index.php/elipsoida/article/view/3438

[5] R. Sampurno and A. Thoriq, "Land Cover Classification Using Landsat 8 Operational Land Imager (Oli) Imagery in Sumedang Regency," *J. Teknotan*, vol. 10, no. 2, pp. 61–70, 2016, DOI: 10.24198/.vol10n2.9.

[6] P. Meeprom, K. Nualchawee, F. Geoinformatics, U. Burapha, L. Had, and R. Bangsean, "Machine Translated by Google WEB MAP SERVER INTERFACE: STANDARDIZATION AND APPLICATION DEVELOPMENT IN THAILAND AND ITS TRENDS Machine Translated by Google," 2017.

[7] M. Sondheim, K. Gardels, and DANK Buehler, “GIS interoperability,” pp. 347–358.

[8] Government of the Republic of Indonesia, "Regulation of the President of the Republic of Indonesia No. 39 of 2019 concerning One Indonesian Data," *Regulation. Pres.*, no. 004185, pp. 1–35, 2019, [Online]. Available: https://peraturan.bpk.go.id/Home/Details/108813/perpres-no-39-tahun-2019

[9] RD Winardi, "Interview Method," *Method. Collection and Tech. Anal. Data*, no. September 2018, pp. 53–99, 2018, [Online]. Available: https://www.researchgate.net/publication/331556677_Metoda_Interview

[10] A. Ariyanto, DE Kurniawan, and A. Fatulloh, "Design and Build WebGIS Applications for Mapping Socio-Economic Conditions in Batam City," *J. Appl. Informatics Comput.* , vol. 2, no. 1, pp. 27–30, 2019, DOI: 10.30871/jail.v2i1.904.

[11] A. Nurwidyantoro, "Implementation of web feature services and web map services in distributed geographic information systems," 2008.

[12] DS Pramdhana, "Design and Implementation of Geospatial Information Systems Using Geoserver Applications," *J. Tek. and Informs.* , vol. 1, no. 1, pp. 75–90, 2019.