

Information System of Remote Sensing Data Provisioning for Disaster Management
Widya Eka Prativi^{*)}, Kurnia Robiansyah, Ali Syahputra Nasution, Ayom Widipaminto,
Wismu Sunarmodo

Remote Sensing Technology and Data Center, LAPAN

^{*)}E-mail: wid.eka.p@gmail.com

ABSTRACT – *Either predictable or unpredictable disasters are one of problems that are often faced in Indonesia. Indonesia is a disaster-prone country due to its location between the three plates of the world, and in the ring area of fire. The disaster cycle is divided into four parts, namely: emergency response, recovery, prevention, mitigation, and preparedness. To cover the disaster cycle, the use of remote sensing data can be a solution. This research aims to provide solution for Ministries/Institutions, Army/Police, and Educational Institutions to get remote sensing data related to disaster areas easily, quickly, and accurately through information system. Users who need data just log in to the system, request the data needed through the website that can be accessed online, then the system will provide information via email notification to user when data is available and can be downloaded. User who have received remote sensing data can utilize the data by processing it into disaster information that is uploaded back into the system as a trigger. The method used in this research is a descriptive method which is a method that only describes and summarizes various conditions, situations or various variables to be collected into data that can support the development of this information system.*

Keyword: *Disaster, Information System, Remote Sensing Data*

1. INTRODUCTION

One of Remote Sensing's roles is to provide satellite imageries data, Remote Sensing Technology and Data Center (Pustekdata) - LAPAN is an institution that is committed to providing satellite imagery data of various spatial resolutions, from low to very high resolution. Satellite imageries are given freely to Ministries / Institutions, Army / Police and institutions. Based on Law No. 21 of 2013 concerning space, the Third Part of Remote Sensing Paragraph 4 Data Storage and Distribution Article 20 paragraph 1, LAPAN is obliged to hold data storage and distribution through BDPJN as a remote sensing data network node in the national spatial data network system. One of the benefits of satellite imageries data is that it is used as master data that can be processed into disaster information data.

The definition of disaster according to Law No. 24 of 2007 concerning disaster management, disaster is an event that threatens and disrupts people's lives and livelihoods caused by both natural factors and / or non-natural factors as well as human factors resulting in human casualties, environmental damage, property losses, and psychological impact.

National Board for Disaster Management (BNPB) said that Indonesia is a disaster-prone country, because its geographical condition. Indonesia is an archipelagic country with located at



the confluence of four tectonic plates. In the south and east of Indonesia there are volcanic belts extending from Sumatra, Java to Nusa Tenggara, and Sulawesi, whose sides are old volcanic mountains and lowlands which are partly dominated by swamps. These conditions make it vulnerable to disasters such as volcanic eruptions, earthquakes, tsunamis, floods and landslides. Indonesia is one of the countries that has a high seismic rate in the world, more than 10 times the seismic level in the United States (Arnold, 1986). Indonesia is also located in tropical climates, such climatic conditions combined with relatively diverse surface and rock topographic conditions produce fertile soil conditions, on the contrary these conditions can cause some adverse consequences for humans such as hydro-meteorological disasters such as floods, landslides, fires forest, and drought.

This research was made as part of the efforts of Pustekdata - LAPAN as the provider and distributor of remote sensing data for disaster management so that humans and their environment can be protected from various losses and adverse impacts of disasters. In addition, this research is part of an effort to cover the disaster cycle which consists of emergency response, recovery, prevention, mitigation, and preparedness. Through the Remote Sensing Data Provisioning Information System for Disaster is expected to facilitate and accelerate agencies that require remote sensing data related to disaster areas. Agencies that need data only register and log in to the system, then fill in the data request form, then the user will receive an email notification in the form of a timeline when the data is available and can be downloaded, if the data is available then the user can download the data, then the user processes data, and re-upload the processed data into disaster information into the system. This system allows users to get various spatial resolution image data with more specific, detailed, fast and precise.

2. METHODOLOGY

The method used in compiling this research is a descriptive method which consists of several stages, namely:

1. Summing up the conditions and situations needed by the Ministry / Agency, Army / Police, and other agencies related to disaster management efforts.
2. Collecting the variables needed to be processed into data that supports the application design and design process.
3. Create, test, and apply the system, then measure the extent of the benefits of this application.

In a conventional system of data provision and distribution of remote sensing data in Pustekdata - LAPAN, it hasn't used yet a system equipped with notifications and timelines for predicting the availability of imageries data. An information system does not have to involve a computer. (Kadir, 2003). According to Alter (1992) information systems are a combination of work procedures, information, people, and information technology that is organized to achieve goals in an organization. Figure 1 describes the workings of the Remote Sensing Data Provisioning Information System application for Disasters Management.

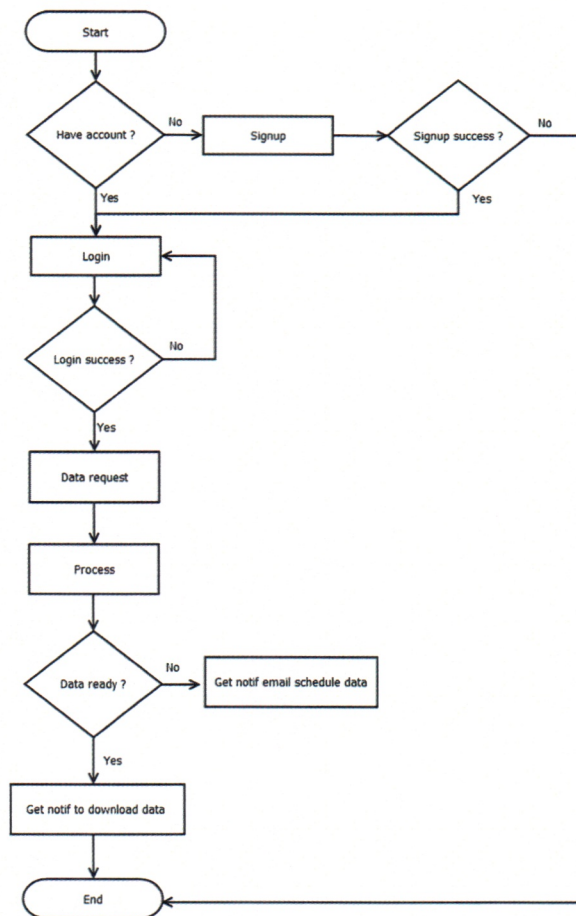


Figure 1. Flowchart of remote sensing data provisioning system for disaster management

From flowchart above, there are 4 main stages, namely account confirmation, data request, searching for data availability, sending email notifications. The system is a web-based using the PHP programming language and MySQL database. The system can be accessed online.

2.1 Account Confirmation

In this process users who have collaborated with LAPAN and need disaster imageries data can register online through the web application portal. Users who have been migrated can log into the system. Each agency is limited to having only one account so that there is no redundancy.

2.2 Data Request

Users who have logged in to the system can fill in the data request form both low to medium resolution imageries data, this data request is specifically intended for the requested disaster area.

2.3 Data Searching Process.

The data that has been requested by the user is then searched by the system, this searching process involves matching the scheduling of the satellite path, and reading the metadata from the image data recording.

2.4 Send Notification Email

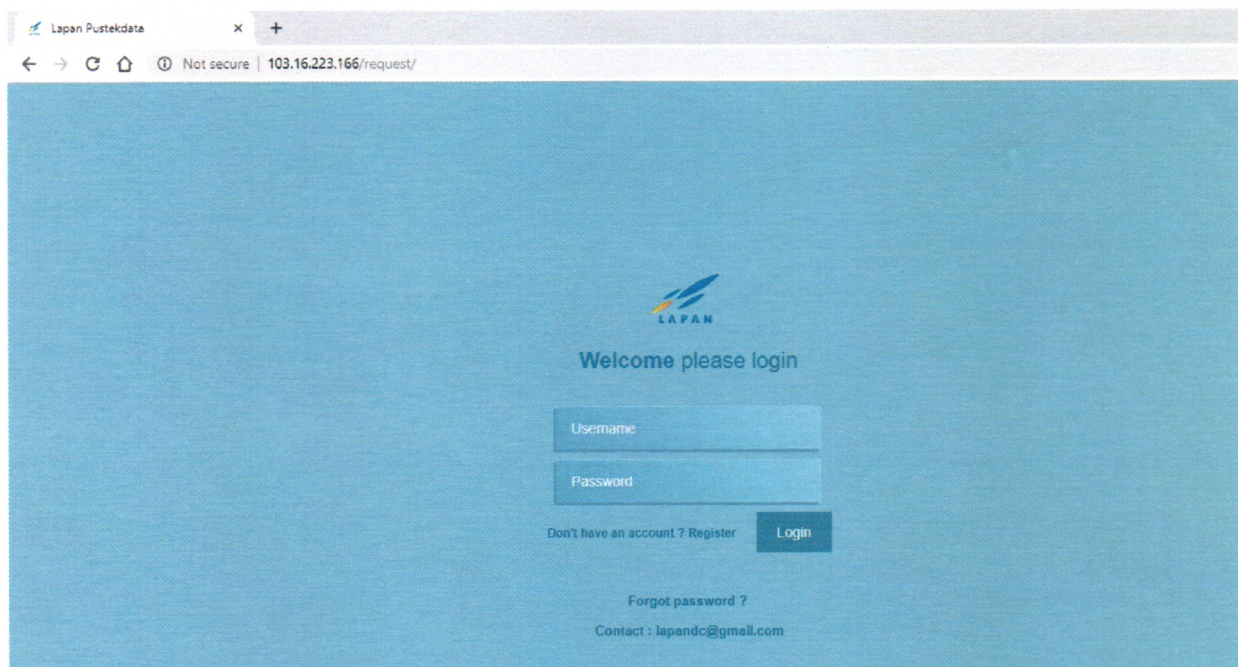
The system will send e-mail notifications according to the data requested by the user, if the data is not available then the system will send a schedule notification when the data will be available, if the data is available then the system will send information that the data can be downloaded.

3. RESULTS AND DISCUSSIONS

Information system of remote sensing data provisioning for disasters management is applied to facilitate Ministries, institutions and agencies in finding remote sensing data needs related to disaster locations. Considering that disaster is a phenomenon that needs to be handled immediately both before and after a disaster. The following is a description of the results of system testing.

3.1 Account checking

Account checking is done to validate users who will use the application. Users who have not registered can register, each agency and email agency is only allowed to register / have one account. Furthermore, if it has been migrated, the user can log into the system. Figure 2 shows the login form and picture 3 Shows the register form.



The image shows a web browser window with the address bar displaying "Lapan Pustekdata" and the URL "103.16.223.166/request/". The page content is a login form with a blue background. At the top center is the LAPAN logo, which consists of a stylized blue and yellow graphic above the text "LAPAN". Below the logo, the text "Welcome please login" is displayed. There are two input fields: "Username" and "Password". To the right of the "Password" field is a dark blue "Login" button. Below the input fields, there is a link "Don't have an account ? Register" and a link "Forgot password ?". At the bottom, the contact information "Contact : lapandc@gmail.com" is shown.

Figure 2. Login form

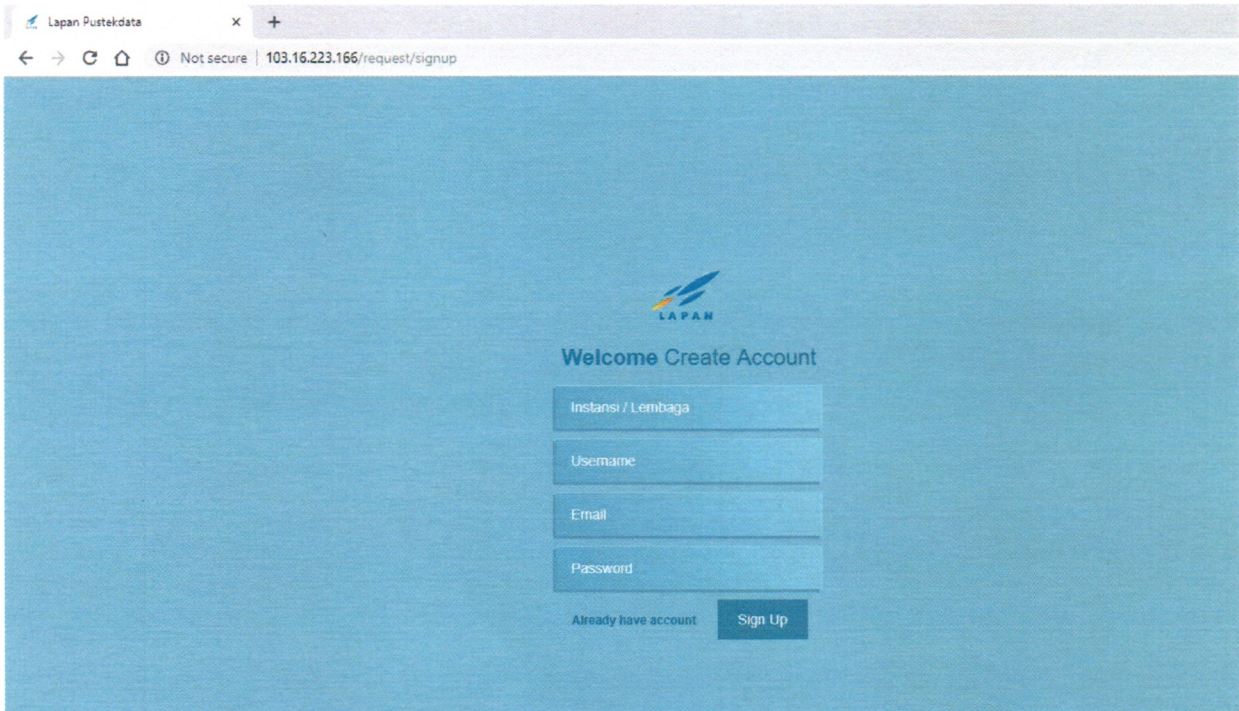
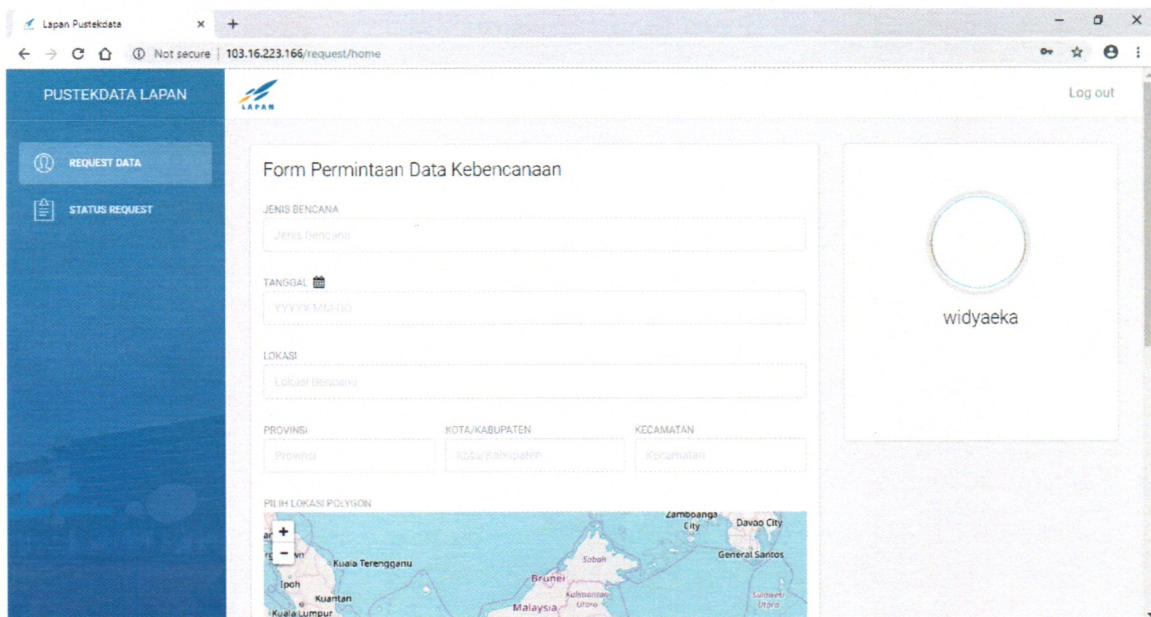


Figure 3. Registration form

3.2 Data Request

Users can fill in from data requests including type of disaster, date, location and type of image data needed. Disaster location data needed can be specifically set based on longitude and latitude. Figure 4 shows the data request form. Figure 5 shows Pop up data request status information that is bored or failed.



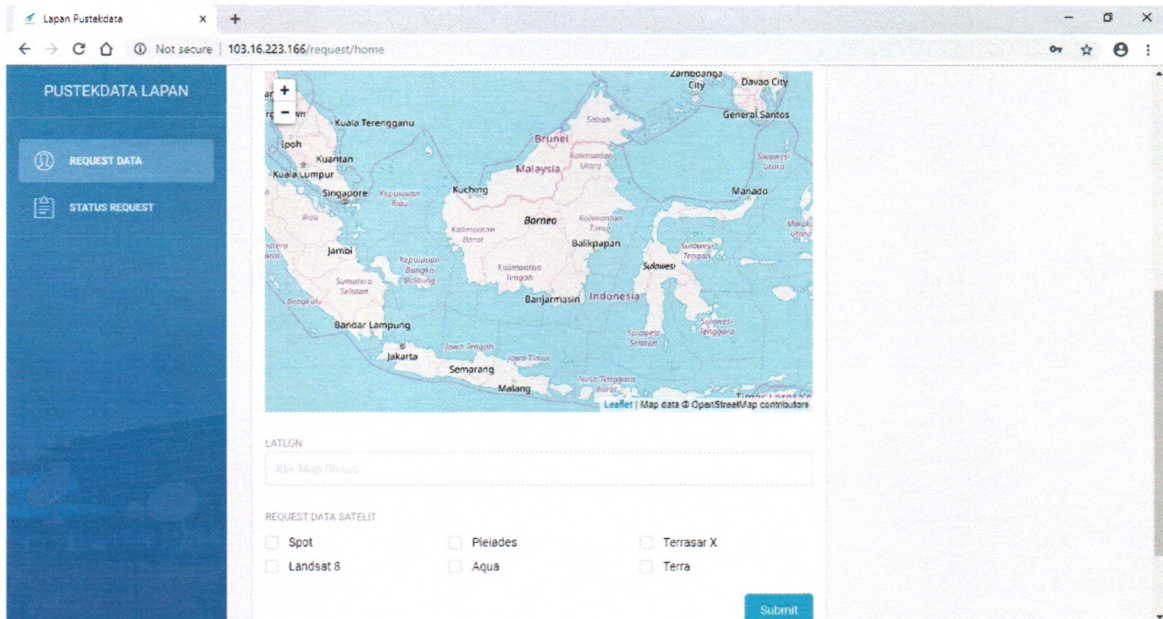


Figure 4. Request data form

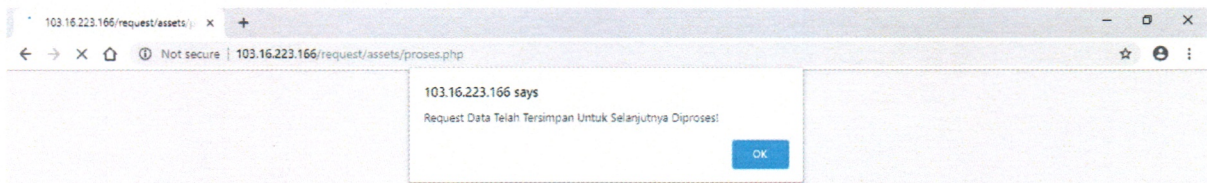


Figure 5. Pop up status information request data

3.3 Data Request Status Process

Data requests that have been sent then can be checked for status on the request status menu. Figure 6 shows the status of the data requests, it can be seen that the satellite data status table consists of satellites is the name of the requested satellite image data, the date means the date of giving the requested data, location, type of disaster data and status. If the requested data is not available, it will bring up information on the date the data is available, then if the data is available, the status will change to download data. Users can download data directly through the Remote Sensing Data Provider Information System for Disasters.

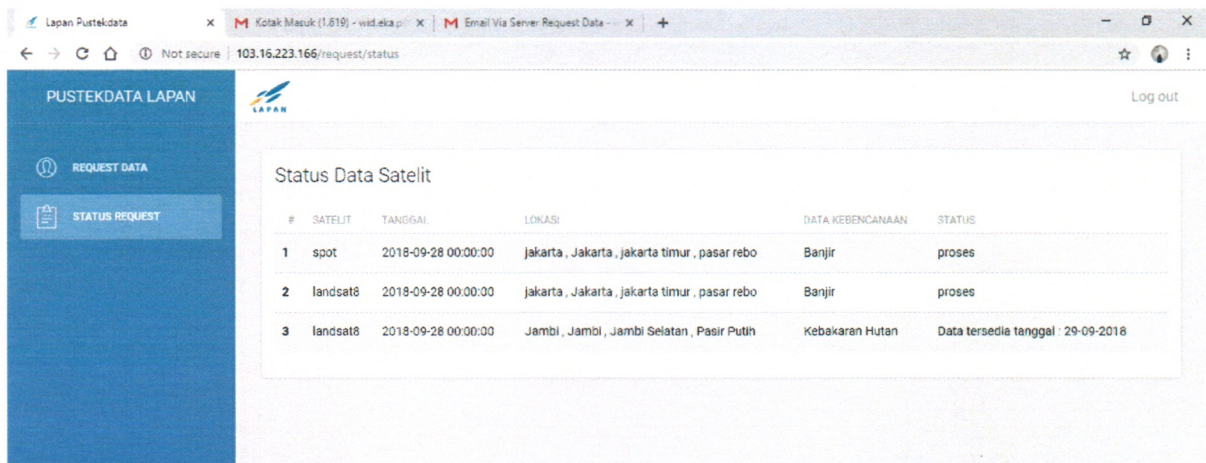


Figure 6. Request data status

3.4 Email Notification

Data requests that have been sent can be checked in the request status, can also be checked through email notifications. Email notifications make it easy for users to remember when their data needs are available and can be downloaded. Users will get a notification email twice when data is not yet available, the first e-mail notification gives info on the date the data is available, then the second e-mail notification gives information that the data is available and can be downloaded via the system. Figure 7 Shows e-mail notifications of requests for Landsat 8 data for analysis of types of forest fire disasters.

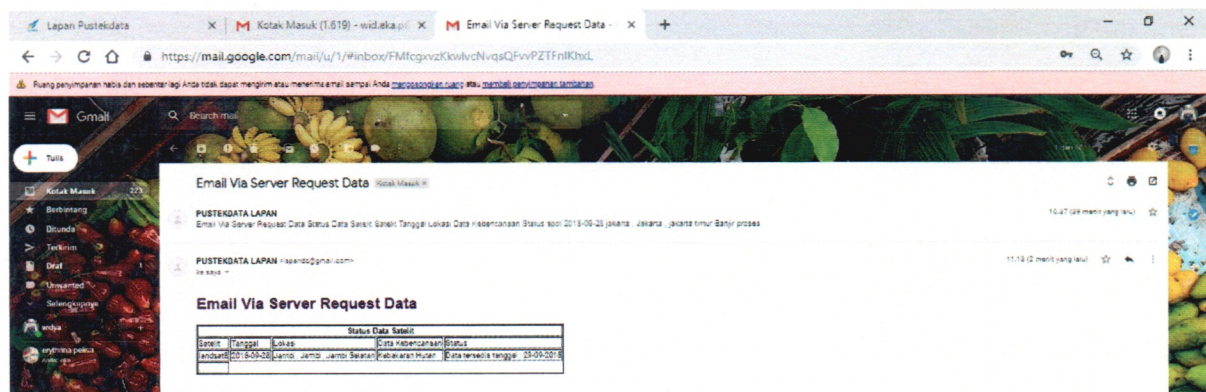


Figure 7. Email notification

4. CONCLUSION

Information System of Remote Sensing Data Provisioning for Disaster Management can be applied properly so as to facilitate and accelerate ministries, institutions and agencies in finding and using remote sensing data of various resolutions.

5. REFERENCES

- [1].LAPAN, (2013). UNDANG-UNDANG REPUBLIK INDONESIA NOMOR 21 TAHUN 2013 TENTANG KEANTARIKSAAN: Pemerintah RI: Jakarta.
- [2].BNPB, (2007). UNDANG-UNDANG REPUBLIK INDONESIA NOMOR 24 TAHUN 2007 TENTANG PENANGGULANGAN BENCANA: Pemerintah RI: Jakarta.
- [3].Kadir, Abdul. 2003. Pengenalan Sistem Informasi. Yogyakarta: Penerbit Andi Offset
- [4].Alter, Steven. 1992. Information Sistem: A Management Perspective. The Benjamin/Cummings Publishing Company Inc.
- [5].Noname. www.bnpb.go.id. Potensi dan Ancaman Bencana. Diakses tanggal 20 September 2018.