WRI INDONESIA

PRIMSBot : AN EARLY WARNING SYSTEM CHATBOT FOR FIRE INDICATION IN PEATLANDS – CASE STUDY INDONESIA

Mochammad Fadhli Zakiy[1] - [1]World Resources Institute Indonesia, Jakarta, Indonesia - Corresponding author: fadhli.zakiy@wri.org

SCAN ME!

## I. INTRODUCTION

In 2015, Indonesia experienced big fires that razed more than 2.6 million hectares [1] which mainly occurred in peatlands. More than 800 million metric tons of carbon dioxide emitted into the atmosphere [2] and caused transboundary haze pollution towards neighboring countries. Since then fire monitoring has been prioritized, one of it is by harnessing technology. On the other hand, the rise of chatbot is growing globally which enables chatbot to provide users personalized services within chat applications. Combining the importance of peatland fire monitoring and chatbot personalized services, WRI Indonesia envisioned an early warning system chatbot for peatland fire indication. Utilizing data offered in Peatland Restoration Information Monitoring System (PRIMS) [3], the chatbot is developed under the name PRIMSBot as an add-on application from PRIMS

II. MATERIALS AND METHODS

II.A. Chatbot Technology

Figure II.1 General Communication within Chatbot
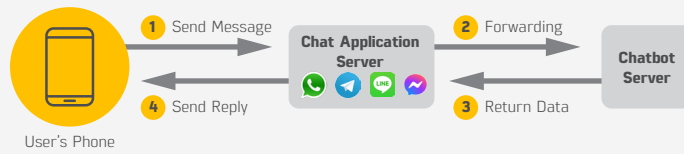
There are various chat applications supporting chatbot account around the world, however in Indonesia only four chat applications are popular which comprises of Whatsapp, Facebook Messenger, LINE and Telegram. Based on the table II.1, Telegram stands out from price and convenient standpoints which very suitable for prototyping a chatbot service like PRIMSBot.

Table II.1 Chatbot Activation Comparison between Chat Applications

Chat Application	Registration Process	App-roval	Free
Whatsapp	Register to Whatsapp Business API [6]	Yes	24 hours
Facebook Messenger	Register to Facebook for Developer API [7]	Yes	All time
LINE	Register to LINE Developer Portal [8]	Yes	All time
Telegram	Chat to @BotFather account [9]	No	All time

II.B. Peatland Fire Indication Analysis

PRIMS fire indication data refers to LAPAN's data that consist of three satellites: VIIRS, MODIS and Landsat and updates the data every three hours [8]. The PRIMS fire indication analysis overlays the fire indication data with peat ecosystem function data (Ministry of Environment and Forestry - MoEF, 2017); peatland data (BBSDLP Ministry of Agriculture – MoAG, 2019); and administration boundary (Geospatial Information Agency, 2017) [8]. Respectively these layers can determine whether the fire indications fall into protected or cultivation functions; which peat depth; and specific administration.

**Figure II.2** Overlay spatial analysis for pin-pointing fire indication
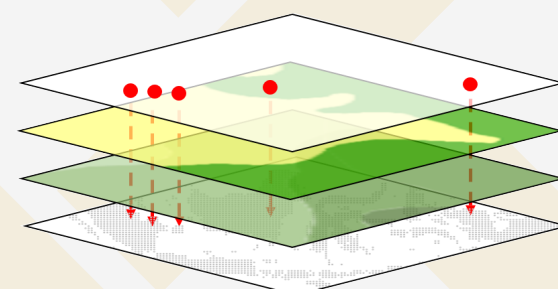
1. **Fire Indication** LAPAN, last 3 hours
2. **Peat Ecosystem Function** MoEF Indonesia, 2017
3. **Peatland Data** BBSDLP-MoAG Indonesia, 2019
4. **Administration Boundary** Geospatial Information Agency, 2017

III. RESULTS

III.A. Fire Indication Monitoring

PRIMSBot is accessible in Telegram application under **@PRIMSAutoBot** username. Currently, PRIMSBot is still limited for fire indication monitoring with confidence level > 80% that falls into **dangerous** category [9]. This option is opted to focus the result to the most likely confirmed data. Fire indication monitoring is accessible when the user interacts with PRIMSBot by specifying administration boundary they want to monitor in national, provincial or regional levels. These inputs will be forwarded into PRIMSBot server to generate specific HTTP request into PRIMS.

Figure III.1 Step-by-step PRIMSBot data transacion
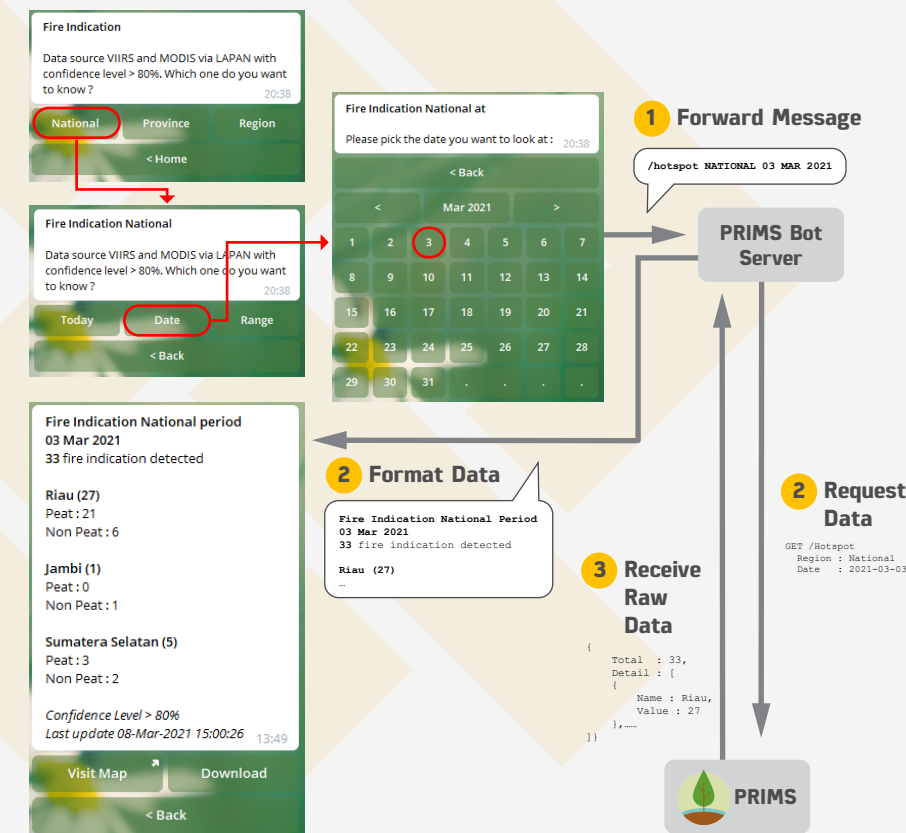
III.B. Push Notification and Subscription

PRIMSBot utilizes telegram push notification which behaves like a message notification in the user's end. Currently subscription option in PRIMSBot is limited to fire indication data, where users are required to determine their area of interest for PRIMSBot's reference. The users will start to receive daily push notification message which currently set for every 4 PM GMT+7.

Figure III.2 Example data download for hotspot fire indication
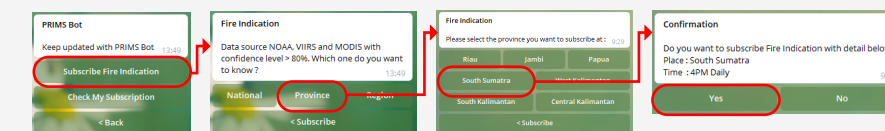
III.C. Download Data

Facilitating users that require detail information, PRIMSBot served a download option in spreadsheet format supported by telegram API [7]. Due to processing time varied from 1-3 minutes required to generate the spreadsheet, PRIMSBot implements callback method (Figure III.3.A). In this manner, user's requests are registered in a queue that will be sent back to the user once the spreadsheet is complete as depicted in Figure III.3.B.

Figure III.3 Download data feature: (A) Callback method scheme (B) Application layout for download
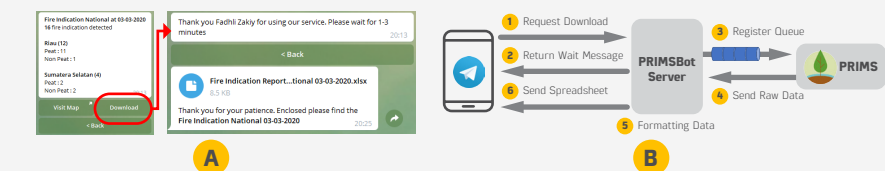
IV. CONCLUSION

Utilizing Telegram chatbot technology, PRIMSBot enables fire indication monitoring in a fast and convenient way. PRIMSBot also supports early warning system function that sends daily push notification to users for their specific area of interests. National level agencies which have interests of whole area and regional governments that only concern within their boundary can both utilize PRIMSBot. PRIMSBot fire indication monitoring offers different level of detail to serve common users for highlighting summary as well as researchers and analysts who require detail attribute. The fire indication data also includes coordinates which may be utilized for further field verification or on the ground fire extinguish activities. In South Sumatra, the office of environment unit adopted PRIMSBot technology and deployed their own chatbot **@SatgasKarhutlaBot** in Telegram for specifically monitor fire within South Sumatra administrative boundary.

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