

XUAN MAI GREEN TECHNOLOGY TRADING JOINT STOCK COMPANY

FOREST MONITORING SYSTEM FOR LAM DONG

User manual, function introduction



RECOFTC



United States
Forest Service
Department Of Agriculture

Forest Fire Monitoring System in Lam Dong province – Xuan Mai Green
Technology Trading, JSC.

TABLE OF CONTENT

1. WEBSITE.....	7
1.1 Introduction of the website.....	7
1.2 Configuration and Software Requirements.....	7
1.3 Functional Interface.....	8
1.3.1 Home Page.....	8
1.3.2 Forest Fire Warning.....	9
1.3.3 Statistics.....	9
1.3.4 Contact.....	10
1.3.5 Administration.....	10
1.4 Main Functions.....	11
1.4.1 Forest Fire Warning Function.....	11
1.4.2 Statistics and Reporting Function.....	17
1.5 Administration Function.....	18
1.5.1 Manage Mail Registration List.....	18
1.5.2 Pre-Burn Registration.....	20
1.5.3 Fire Point Management.....	20
1.5.4 Fire Report Approval.....	21
1.5.5 Map Data Extraction.....	21
1.5.6 Map Management.....	22
1.5.7 Map Backup.....	23
1.5.8 User Management.....	23
2. Mobile.....	25
2.1 Main Interface.....	25
2.2 Login and Registration.....	25
2.3 User Information Interface.....	27
2.4 Forest Fire Warning Map.....	27
2.4.1 Map Setup.....	28
2.4.2 Fire Points List.....	30
2.4.3 Contact List.....	33
2.4.4 User's Location Function.....	33
2.4.5 Offline Map Function.....	34
2.5 Forest Fire/Deforestation Detection Function.....	37

Forest Fire Monitoring System in Lam Dong province – Xuan Mai Green
Technology Trading, JSC.

2.5.1	System-Detected Fire Points.....	37
2.5.2	Fire/Deforestation Points Reported by residents.....	39
2.5.3	Report Fire/Deforestation point.....	40
2.6	Pre-Burn Registration Function.....	43
2.6.1	The main screen of Pre-Burn Registration.....	43
2.6.2	Pre-Burn Registration.....	45
2.6.3	Edit Pre-Burn Registration Form.....	46
2.7	Forest Carbon Estimation Function.....	47

LIST OF FIGURES

Figure 1 Home page interface.....	7
Figure 2 Forest fire warning interface.....	8
Figure 3 Statistic interface.....	9
Figure 4 Contact interface.....	9
Figure 5 Login interface.....	10
Figure 6 Main Functions interface.....	10
Figure 7 Forest Fire Warning Function interface.....	11
Figure 8 Description of selecting current status - fire level map display.....	11
Figure 9 Description of fire warning map filter display.....	12
Figure 10 Retrieve attribute information of current status map layer.....	13
Figure 11 Retrieve attribute information of fire level map layer.....	13
Figure 12 Description of selecting fire warning points display.....	13
Figure 13 Fire points detected from satellite.....	14
Figure 14 Satellite fire point information.....	15
Figure 15 Information displayed when clicking on fire point.....	15
Figure 16 Fire point verification form.....	16
Figure 17 Statistical data results by table.....	17
Figure 18 New Mail Registration Form.....	18
Figure 19 Customize information to recipient's mail.....	18
Figure 20 Registered mail list.....	19
Figure 21 Approve pre-burn registration confirmation.....	19
Figure 22 Reject pre-burn registration confirmation.....	19
Figure 23 List of Fire points.....	20
Figure 24 Fire point verification information approval results.....	20
Figure 25 Data extraction type selection function.....	21
Figure 26 New map file addition form.....	21
Figure 27 Map type options when adding new maps.....	21
Figure 28 List of uploaded maps.....	22
Figure 29 List of Map Backup Copies.....	22
Figure 30 New account addition form.....	22
Figure 31 Account permissions.....	23
Figure 32 List of System accounts.....	23

Forest Fire Monitoring System in Lam Dong province – Xuan Mai Green
Technology Trading, JSC.

Figure 33 Forest monitoring application for Lam Dong main interface.....	24
Figure 34 App login interface.....	25
Figure 35 App account registration interface.....	25
Figure 36 User information on app.....	26
Figure 37 Forest Fire Warning Map function location on app.....	26
Figure 38 Main screen of the Forest Fire Warning Map function on app.....	27
Figure 39 Explanation of Fire Level Map Setup Icons.....	27
Figure 40 Fire level map.....	28
Figure 41 Forest status map.....	28
Figure 42 "Fire Points List" icon.....	29
Figure 43 24h – fire points list.....	29
Figure 44 Window of filter fire list.....	30
Figure 45 Window of filter fire point by time range.....	30
Figure 46 Fire point list by selected time range.....	31
Figure 47 Form of fire point verification on app.....	31
Figure 48 Contact button.....	32
Figure 49 Contact list.....	32
Figure 50 Uset's location function icon.....	33
Figure 51 Offline map icon.....	33
Figure 52 Offline map window.....	34
Figure 53 Window of download offline map.....	34
Figure 54 Offline Map Display Customization.....	35
Figure 55 Displayed Offline Map Layer.....	35
Figure 56 Location of Fire/Deforestation Detection Function on the App.....	36
Figure 57 Fire warning point list of system.....	37
Figure 58 Fire point information.....	37
Figure 59 Window of fire points filter.....	38
Figure 60 List report by residents.....	38
Figure 61 Detail information of report.....	39
Figure 62 Report Fire/Deforestation point.....	40
Figure 63 Choose location of fire detection.....	40
Figure 64 Report pending network connection for submission.....	41
Figure 65 Pre-Burn Registration Function.....	42

Forest Fire Monitoring System in Lam Dong province – Xuan Mai Green
Technology Trading, JSC.

Figure 66 The main screen of Pre-Burn Registration.....	43
Figure 67 Detail information of registration form.....	43
Figure 68 Burn registration form on the app.....	44
Figure 69 Pre-burn registration waiting for network connection to send request.....	45
Figure 70 Edit icon of Pre-burn registration.....	46
Figure 71 Position of the forest carbon estimation feature on the app.....	47
Figure 72 Main screen of Forest Carbon Estimation Function.....	48
Figure 73 Tree information window.....	48
Figure 74 Calculate and save cacbon results.....	49
Figure 75 Window of enter result description of calculated result.....	49
Figure 76 View the calculation history icon.....	50
Figure 77 Detail information and delete calculated result.....	50

1. WEBSITE

1.1 Introduction of the website

Forest Monitoring Website for Lam Dong Province consists of two main components:

- Forest Loss Detection Component: Landsat-8, Sentinel-2, and Sentinel-1 satellite images are used to monitor forests in Lam Dong province at various administrative levels. The software allows detecting locations of forest loss and extracting information down to individual forest plots based on the annual forest change maps. Data can be downloaded or shared with organizations and individuals via email, including composite color satellite images (GeoTIFF format) from the beginning and end of the period, a list of forest plots with changes (CSV format), and a map of the forest plots with changes (GeoJSON format).

- Forest Fire Detection Component: This component includes the following features: (1) detecting fire points from MODIS satellite images in near real-time, which are filtered for noise and displayed on the screen with VN-2000 coordinates. When a fire is detected, the system automatically sends warning information to the registered email address or mobile phone number; (2) automatically creating forest fire risk warning maps based on weather conditions at local monitoring stations and international satellite systems using the Nesterov method, adjusted by Pham Ngoc Hung (1997). The fire risk level is adjusted according to the forest status, and the fire risk warning level is also automatically sent to the registered email address.

Additionally, the software includes an administrative module for administrators to manage users, email addresses, and user phone numbers.

1.2 Configuration and Software Requirements

The software operates online on either Windows Server or Linux platforms, utilizing the .NetFramework and connecting to the Google Earth Engine Platform. The auxiliary software required to run the application on the server includes:

- + PostgreSQL Database Management System: Used for storing and managing forest resource information, weather data, user data, etc.

- + GeoServer Software: Used for managing and displaying forest resource maps, forest fire risk warning maps, satellite images, forest change maps, and more.

- + Tomcat Software: Manages the open-source services of the system.

- + A Domain Name (or IP Address): Allows access to the system. The system can be accessed at the address: <https://gsrdaqyn.xuanmaijsc.vn/>.

Forest Fire Monitoring System in Lam Dong province – Xuan Mai Green Technology Trading, JSC.

+ An SMS Transmission Device: Equipped with a mobile phone SIM card (active and with sufficient balance).

Additionally, the workstation must be connected to the internet and have a web browser installed, such as Internet Explorer, EDGE, Google Chrome, Firefox, Opera, etc. The web version is compatible with all browsers on both computers and mobile devices.

1.3 Functional Interface

The application utilizes an "Average design" approach combined with modern "Responsive" interface technology. This enhances compatibility with all popular browsers and display devices.

Detailed technology platforms used for designing the application interface include: HTML5, Bootstrap4, CSS3, AngularJS 1.7, jQuery 3.3, Leaflet JS 1.5.1, Google Map API, Google Font, and Font Awesome.

For the web version, the interface is designed with a common framework that includes the header and menus. The basic applications are designed as separate components and embedded into the common framework of the software: the forest fire monitoring component, the forest loss monitoring component, the statistical component, and the administration component. The elements of the web interface include:

1.3.1 Home Page

This page provides a general overview of the software's structure, where users can access other components of the software through a dashboard containing links to each component. The interface of the home page is as follows:

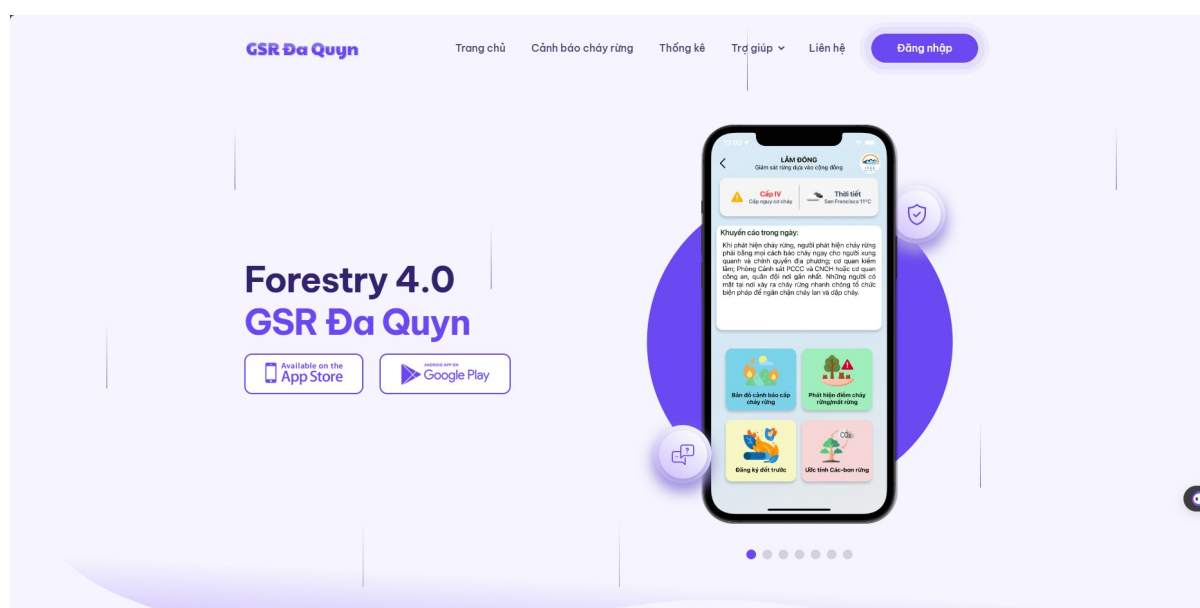


Figure 1 Home page interface

1.3.2 Forest Fire Warning

This page provides information about the current state of the forest and real-time forest fire risk points. The data for forest fire risk points is automatically updated from NASA sources (MODIS and VIIR-2 satellite images). Forest fire warnings are generated based on an independent calculation algorithm using data from NASA, meteorological and hydrological information, forest status, and field warnings from the community, etc.

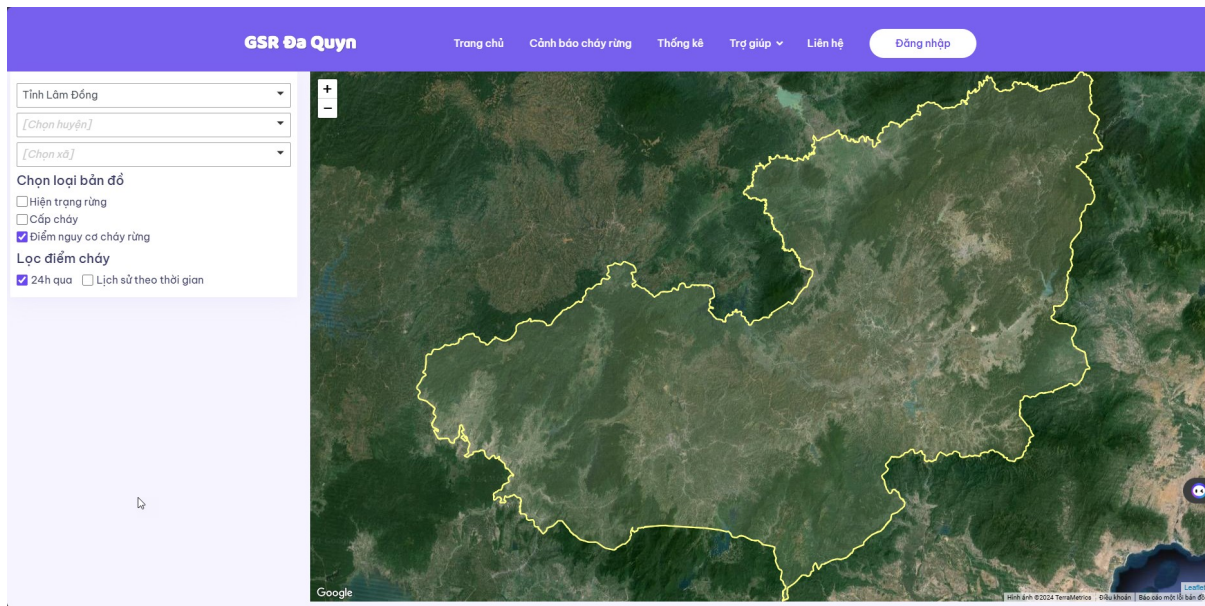


Figure 2 Forest fire warning interface

1.3.3 Statistics

This page includes options to select the data year, administrative unit, and data summary templates (according to Circular 33/2018/TT-BNNPTNT), with the main screen displaying the statistical results. The interface includes a download button for users to save the statistical tables to their personal computers.