UN environment programme | CTCN UN Climate Technology Centre & Network

UN Climate Technology Centre and Network (CTCN), an operational arm of UNFCCC

Ministry of Forests and Environment, Government of Nepal

Customized weather and climate information system for climate-resilient agriculture in Nepal

Contract No.: UNEP/2022/339 (Umoja # 4700023937)

Output-3: Framework & User Manual of Designed API for the Automatic Dissemination of Location-Specific Customized 3-Days Weather Forecast to the Farming Communities

Accepted and approved for payment.
Bangkok, 27 January 2024

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22nd December 2023

THE SMALL EARTH NEPAL-2001

RMSI

Acknowledgements

This Technical Assistance (TA) awarded by the UN-CTCN to RMSI a firm based in New Delhi (India) is duly acknowledged.

The study team would like to acknowledge and express heartfelt gratitude to Ms. Clara Landeiro (Regional Manager, Asia-Pacific, UN-CTCN) for providing her valuable support and directions in this project. We are also grateful to Mr. Sharad Babu Pageni (Under Secretary, CCMD, Ministry of Forests and Environment, Govt. of Nepal) and Dr. Buddi Poudel (Joint-Secretary and Chief, Ministry of Forests and Environment, Govt. of Nepal) for their guidance and support.

We would like to extend our sincere gratitude to Mr. Dhiraj Pradhananga (Project Proponent) from The Small Earth Nepal (SEN) for his support from the very onset of the TA.

Finally, we would like to extend our special thanks to all other stakeholders for providing necessary data and information required for the project and extending their full cooperation in this TA.

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List of Acronyms

API	Application Programming Interface
CCMD	Climate Change Management Division
CPU	Central Processing Unit
GB	Gega Byte
GHz	Gega Hertz
ICT	Information and Communications Technology
ICWFDS	ICT-based Customized 3 Days Weather Forecast Dissemination System
IIS	Internet Information Services
JJASO	June July August September October
JRE	Java Runtime Environment
OGC	Open Geospatial Consortium
RAM	Random Acess Memory
SEN	Small Earth Nepal
SPI	Standardized Precipitation Index
SSD	Solid State Drive
TA	Technical Assistance
TB	Tera Byte
UN-CTCN	United Nations Climate Technology Centre and Network
WCS	Web Coverage Service
WFS	Web Feature Service
WMO	World Meteorological Organization
WMS	Web Map Service

1 Getting Started

- Open the web browser and type **URL-**http://115.124.116.200/ICWFDS_nepal in the address bar to launch the Application Programming Interface (API) named ICT-based Customized 3 Days Weather Forecast Dissemination System (ICWFDS).
- The homepage of the application opens up as shown in Figure 1.

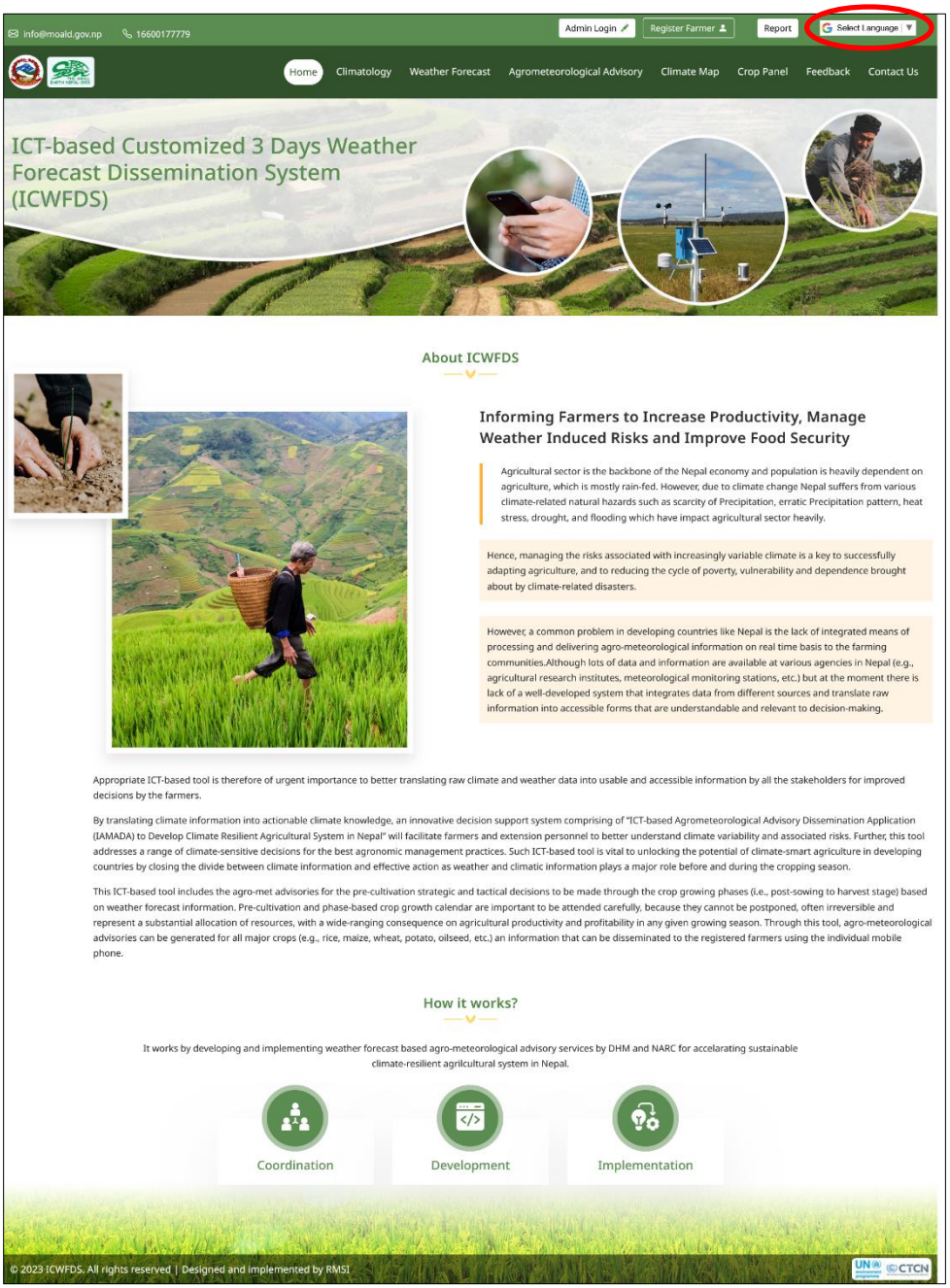


Figure 1: API (i.e., ICWFDS) Home screen (in English)

- The Homepage of the application is divided into three parts:
    - Top Panel;
    - Centre Panel; and
    - Footer.

It should be noted that the API is available in three different languages viz., English, Hindi, and Nepali. One can change the language by changing the language option provided at top right button of the homepage marked with red circle in Figure 1. For example, homepage in Nepali language has been portrayed in Figure 2. Similarly other pages can also be viewed in Nepali language.

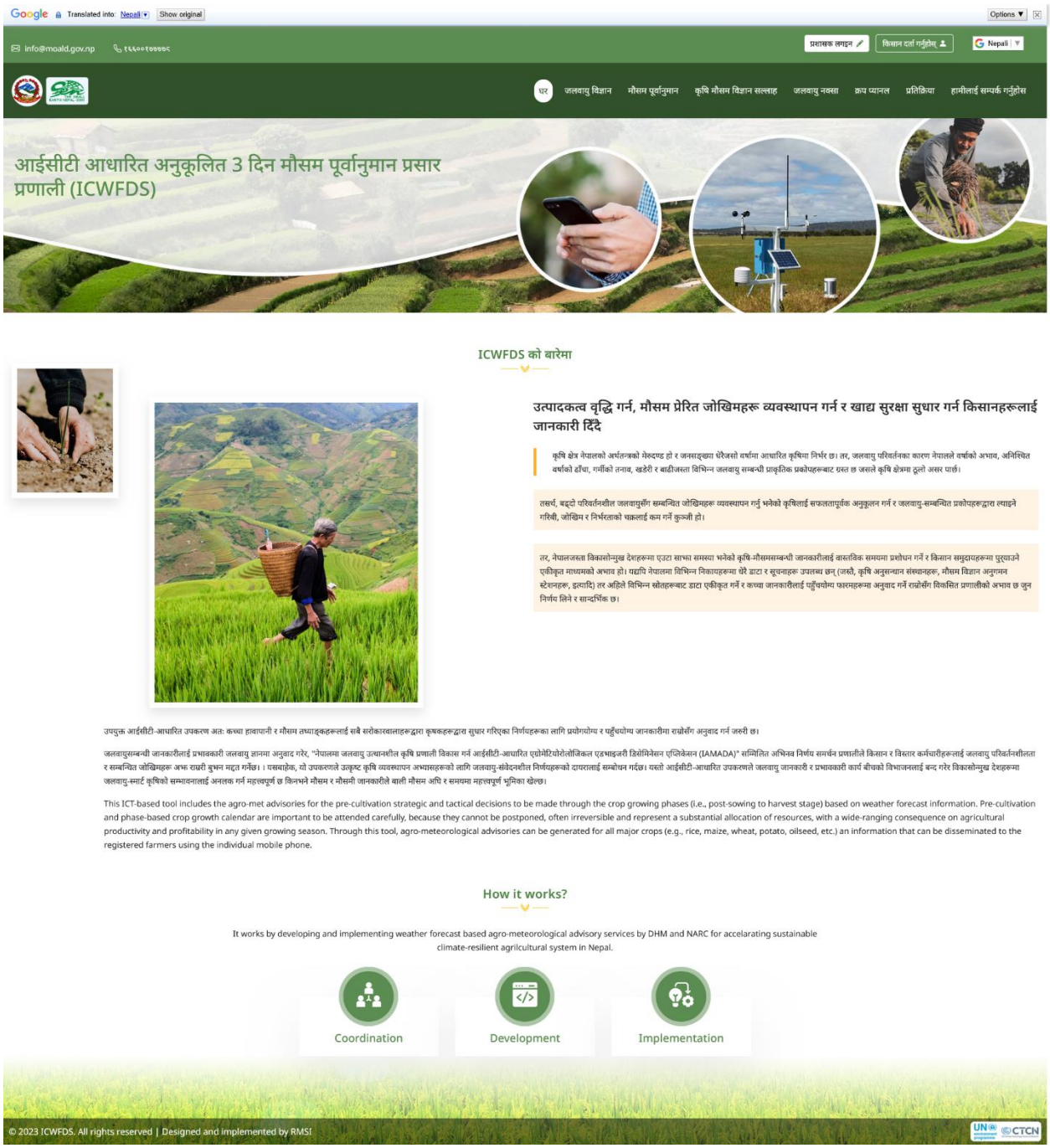


Figure 2: API (i.e., ICWFDS) Home screen (in Nepali)

1.1 Top Panel

The top panel of the Homepage comprises following options:

- At the top right corner lies the flag of Nepal with an option of select language of the website as shown in Figure 1.
- The center top has options of Admin Login, Register Farmer and Report.

- The top left corner has the point of contact Phone no and Email address.
- Bottom of Top panel has following tabs as the different modules of the API application:
    - Home
    - Climatology
    - Weather Forecast;
    - Agro- Met Advisory;
    - Weather Maps;
    - Crop Panel;
    - Feedback; and
    - Contact Us.

1.1.1 Admin Login

Click on the Admin Login button to open the "Admin Login" page where user can enter the login credentials (Username: "Admin_RMSI" and Password: "admin@rmsi1234") click on Login button to logged in the application as shown in Figure 3.

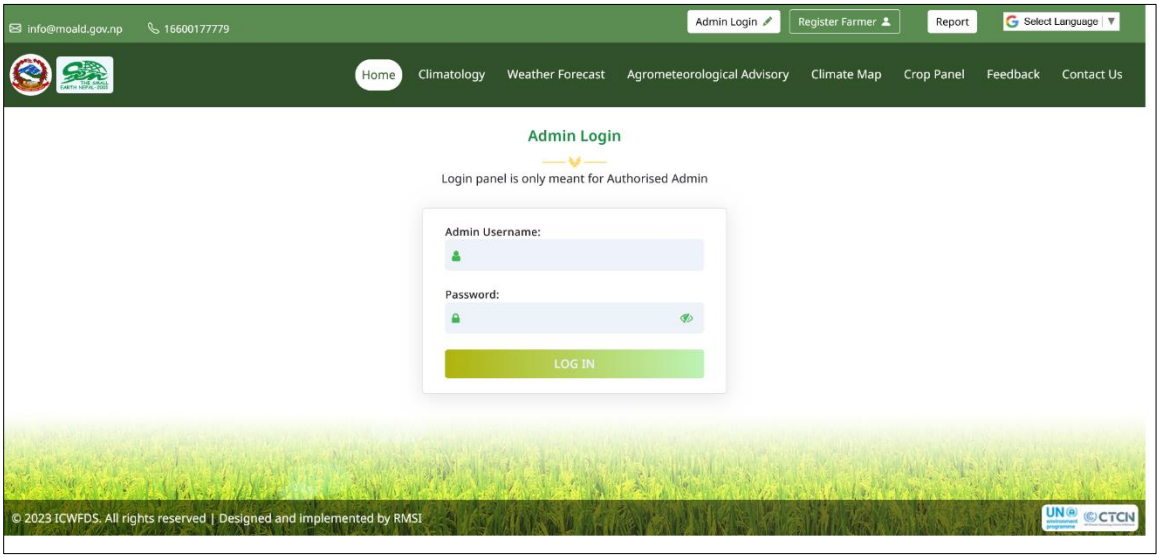


Figure 3: Admin Login screen

1.1.2 Admin Panel

- Click on the Admin Panel to view the Registered User Details and Crop Management panel as shown in Figure 4, only admin user has the right to access the Admin Panel.

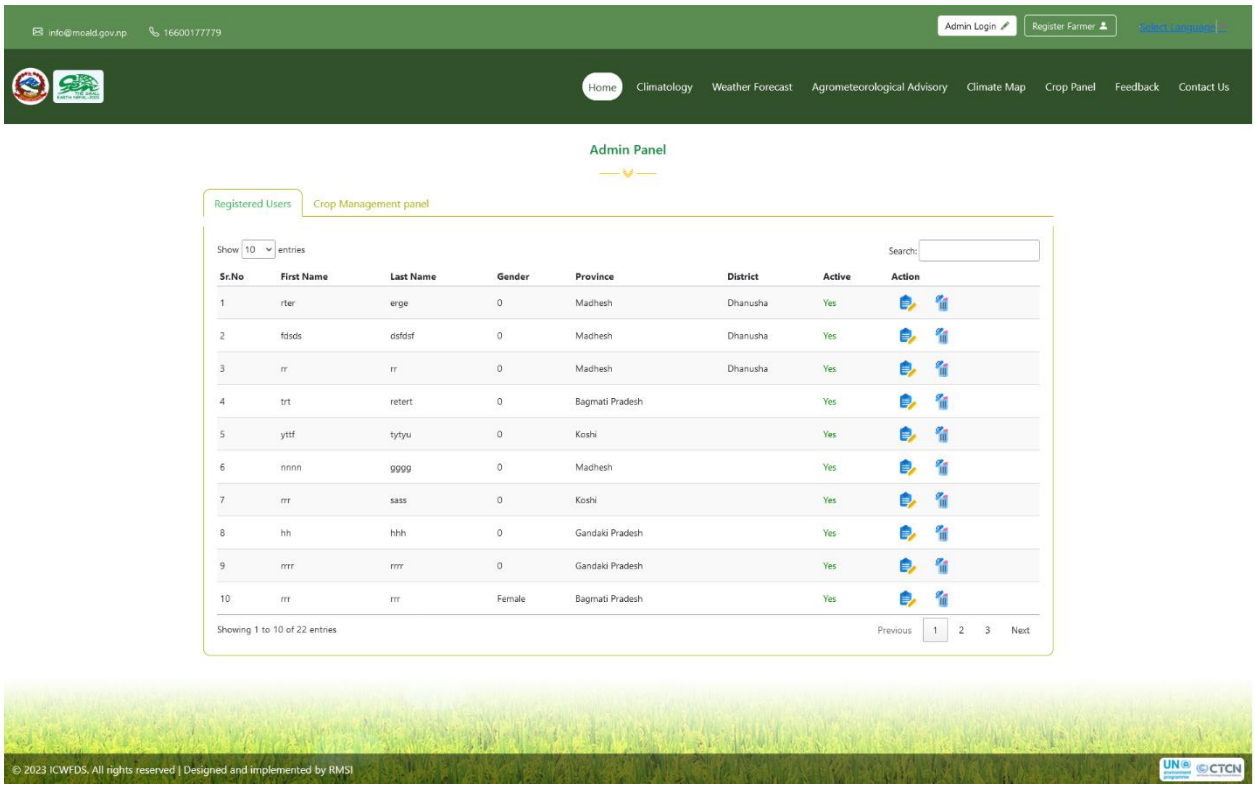


Figure 4: Admin Panel screen

1.1.2.1 User Details

- In this section, admin user can search, edit and delete the users.
- Click on the Edit link, highlighted with blue box as shown in Figure 4 to open the edit pop up screen. Edit the details and click on Update button to update the changes as shown in Figure 5.

Figure 5: Edit user screen

- Click on the Delete link, highlighted with red box as shown in Figure 4, a confirmation message appears asking admin user's confirmation to delete the user.

1.1.2.2 Crop Management Panel

Crop Management panel has following sections:

- Crop Information;
- Growth Stages Information;
- Agro Advisory Update; and
- Farmer's Feedbacks Update.

1.1.2.2.1 Crop Information

- In this section, user can add new crops by selection cropping season, adding crop name, adding cropping start date, cropping end date and pheno-phase days then click on Add New Crop button to add new crop as shown in Figure 6.
- User can also search the crop by searching the crop name at the search bar.
- User can also delete the added crops by clicking on the delete button.

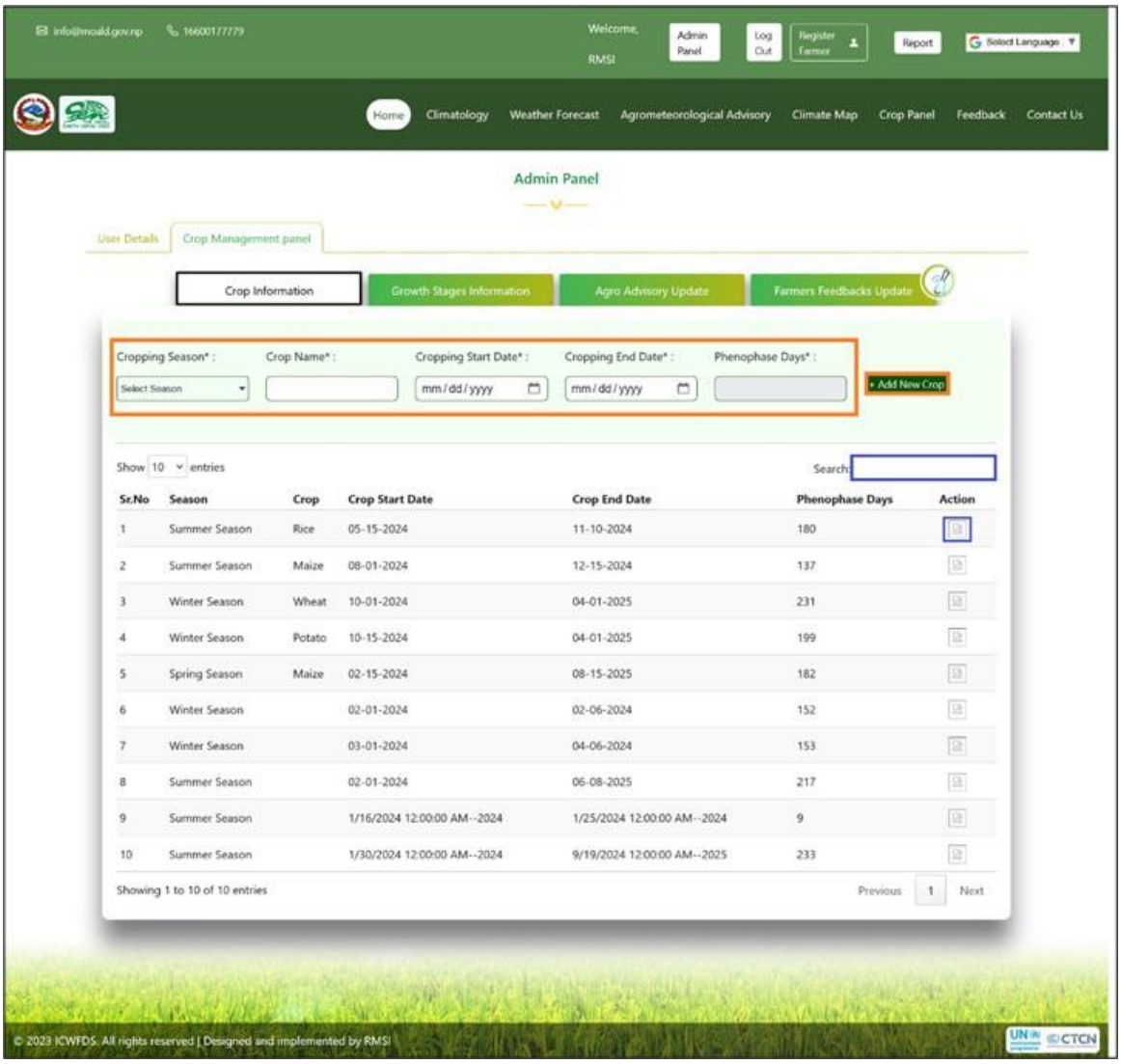


Figure 6: Crop Information screen

1.1.2.2.2 Growth Stages Information

- In this section, user can add the growth stage by typing in the textbox and clicking on the Add New Growth button.
- User can view the Growth Stage Name in the alphabetical order by clicking on the alphabets under Growth Stage Name Alphabetically as shown in Figure 7.
- User can also delete the growth stage by clicking on the delete button.

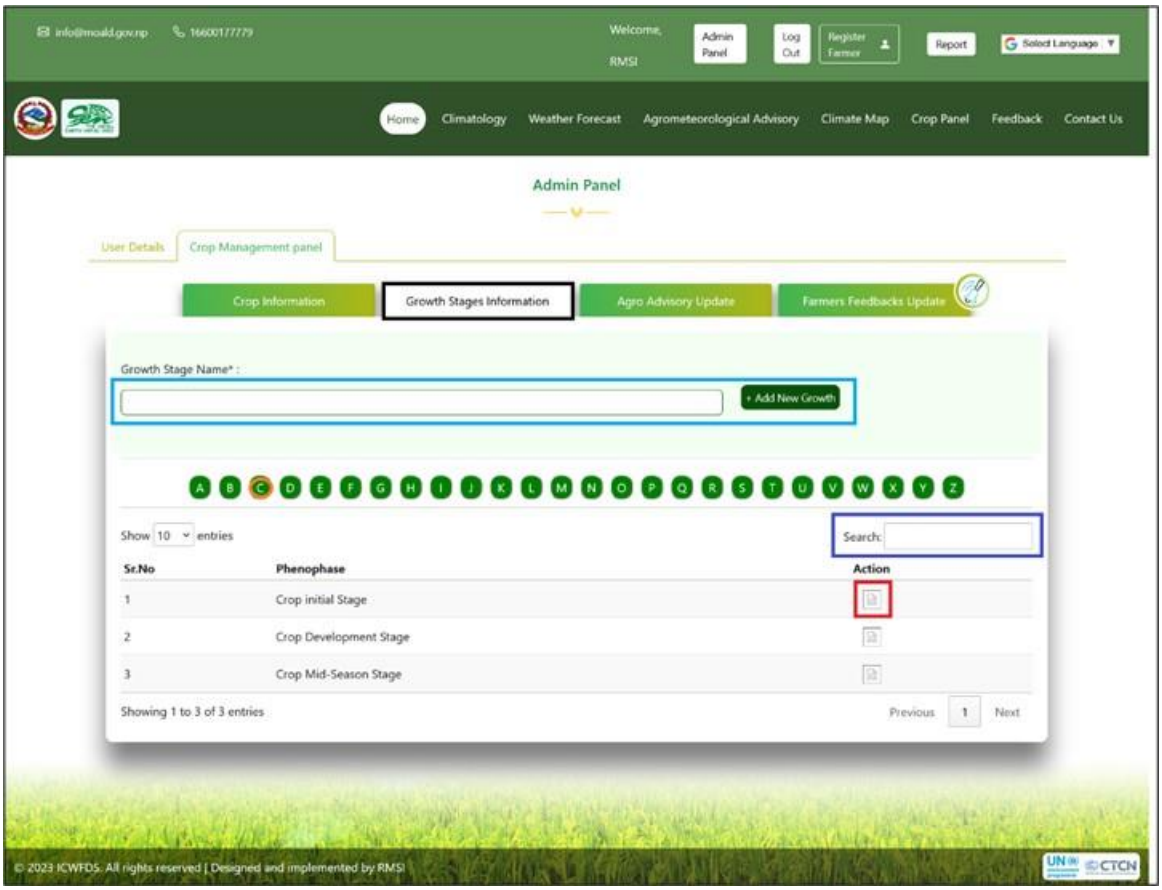


Figure 7: Growth Stages Information screen

1.1.2.2.3 Agro Advisory Update

In this section, user can update the following advisories as shown in Figure 8:

- Advisory for Crop type and Variety selection;
- Advisory for Deficit/ Excess Rainfall; and
- Advisory for Post-Harvest Date.

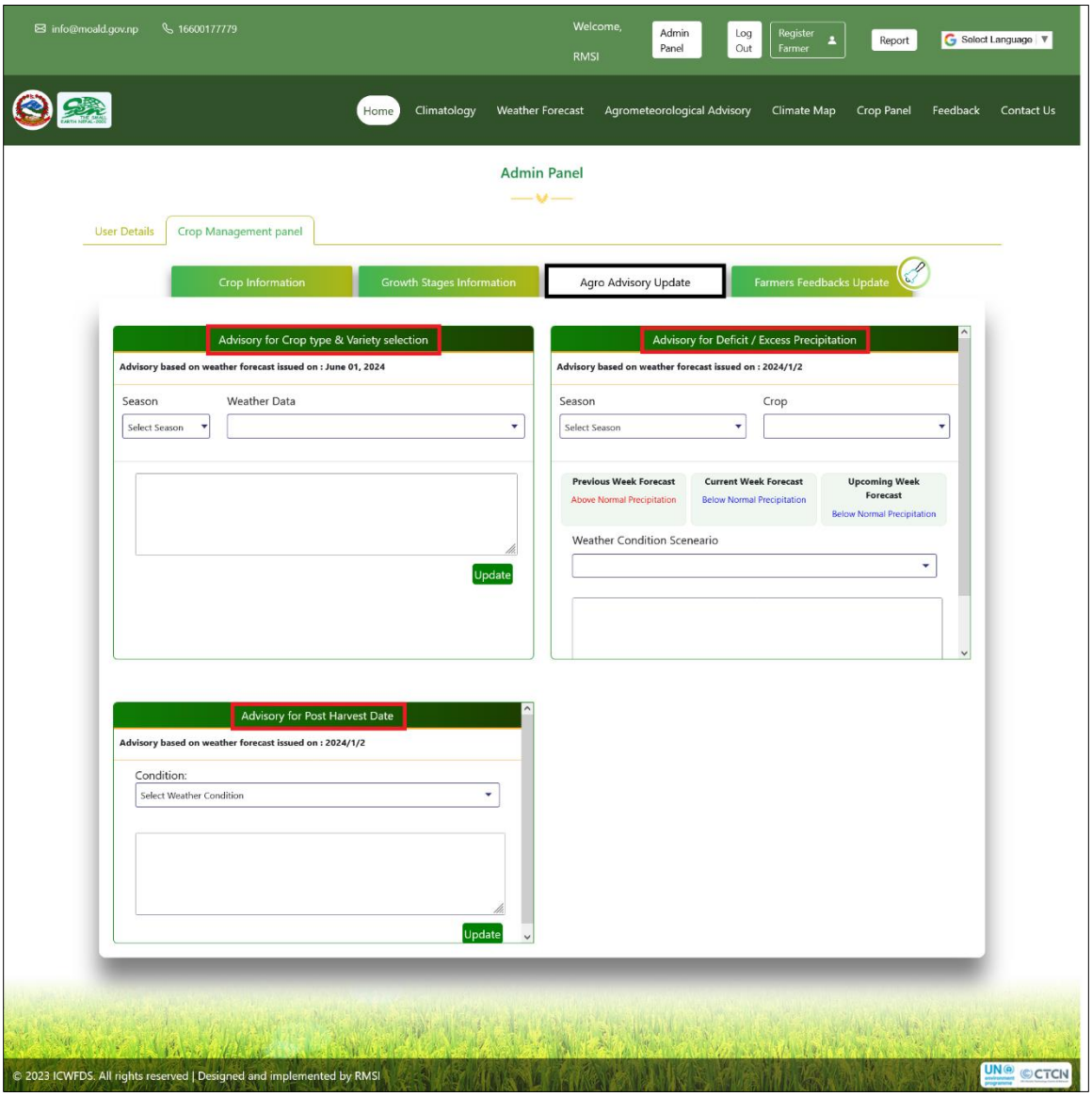


Figure 8: Agro Advisory Update screen

1.1.2.2.4 Farmer's Feedback Update

- Click on Farmer's Feedback Update module, of the Crop Management Panel.
- There are following subcategories on the Feedback Update page:
  - Not Seen;
  - Pending;
  - Resolved;
  - Rejected and
  - Reopen
- Not Seen tab is selected as default as shown in Figure 9.

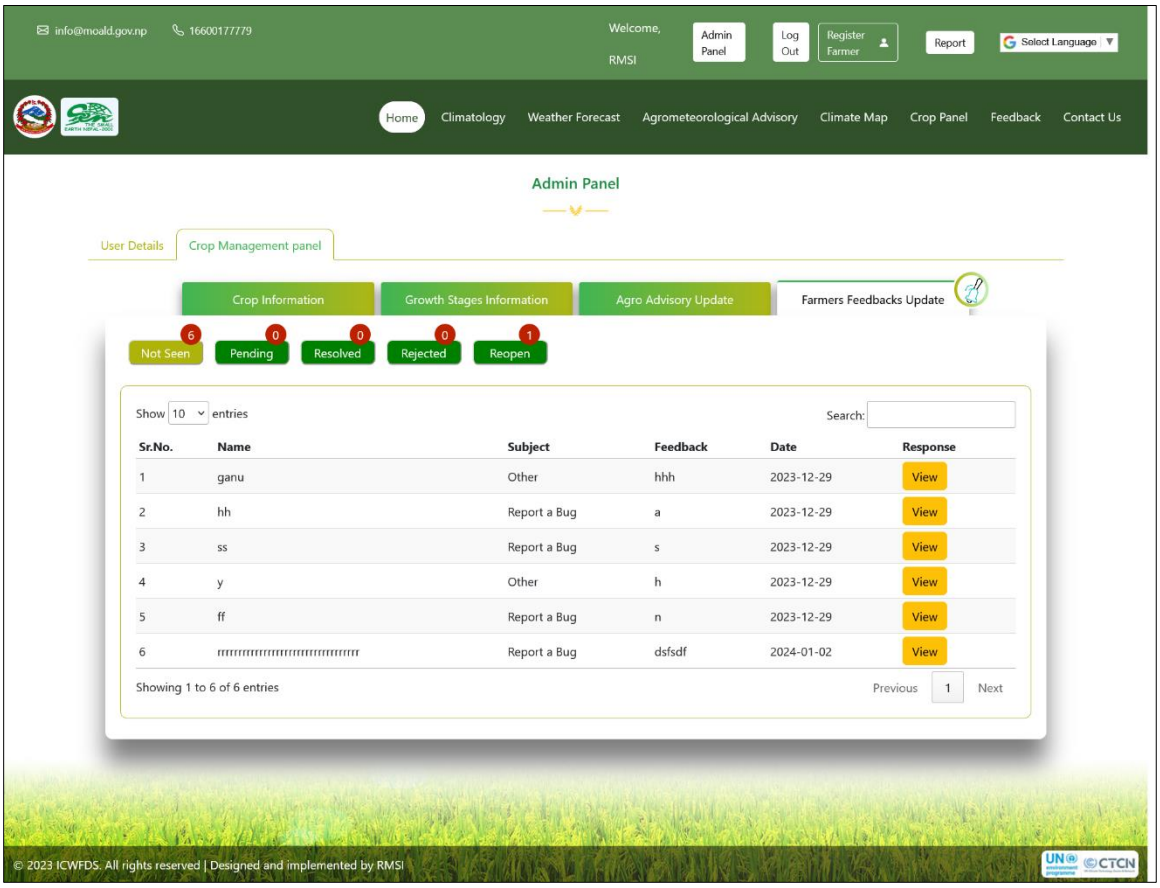


Figure 9: Farmers Feedbacks Update screen

- Click on View button in Response to view the data as shown in Figure 9.
- Admin User has the option to reply the comment or reject the comment.

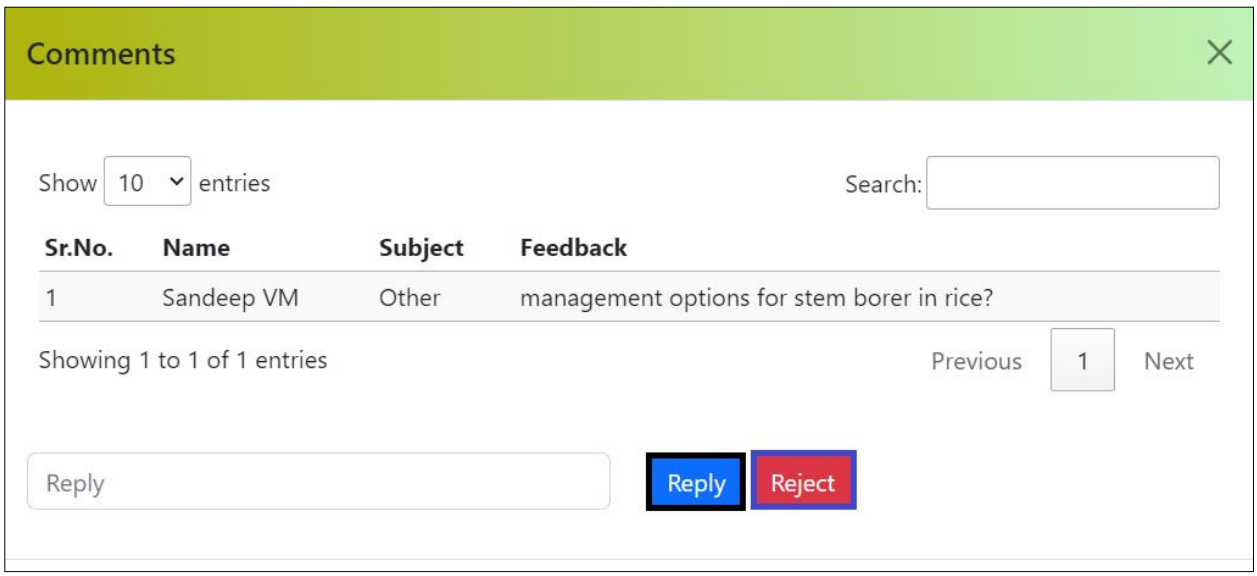


Figure 10: Comment screen

- In the resolved and rejected section, click on view button and admin user has the right to reopen the feedbacks.

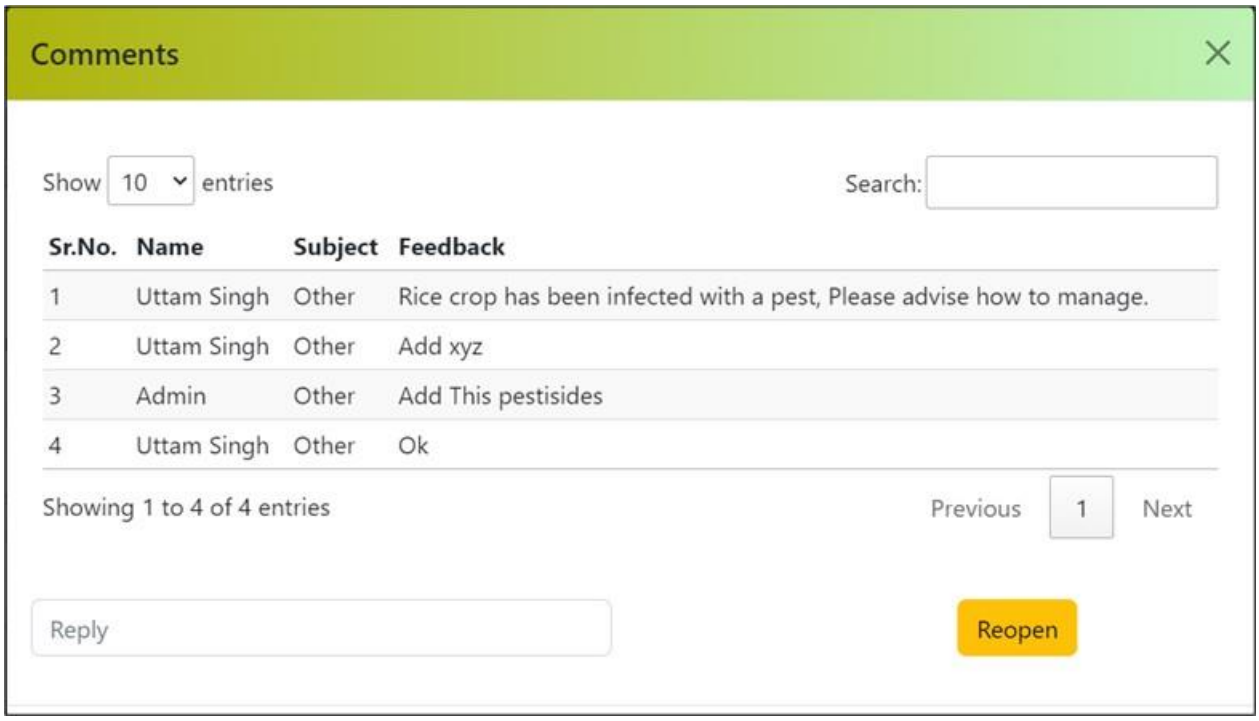


Figure 11: Reopen Comment screen

- Reopen section will display all the reopen feedbacks of resolved and rejected section.

1.1.3 Register Farmer

- Click on the Register Farmer button to open the Register Farmers page where user can enter the Farmer Details and click on Submit button to register the farmer as shown in Figure 12.

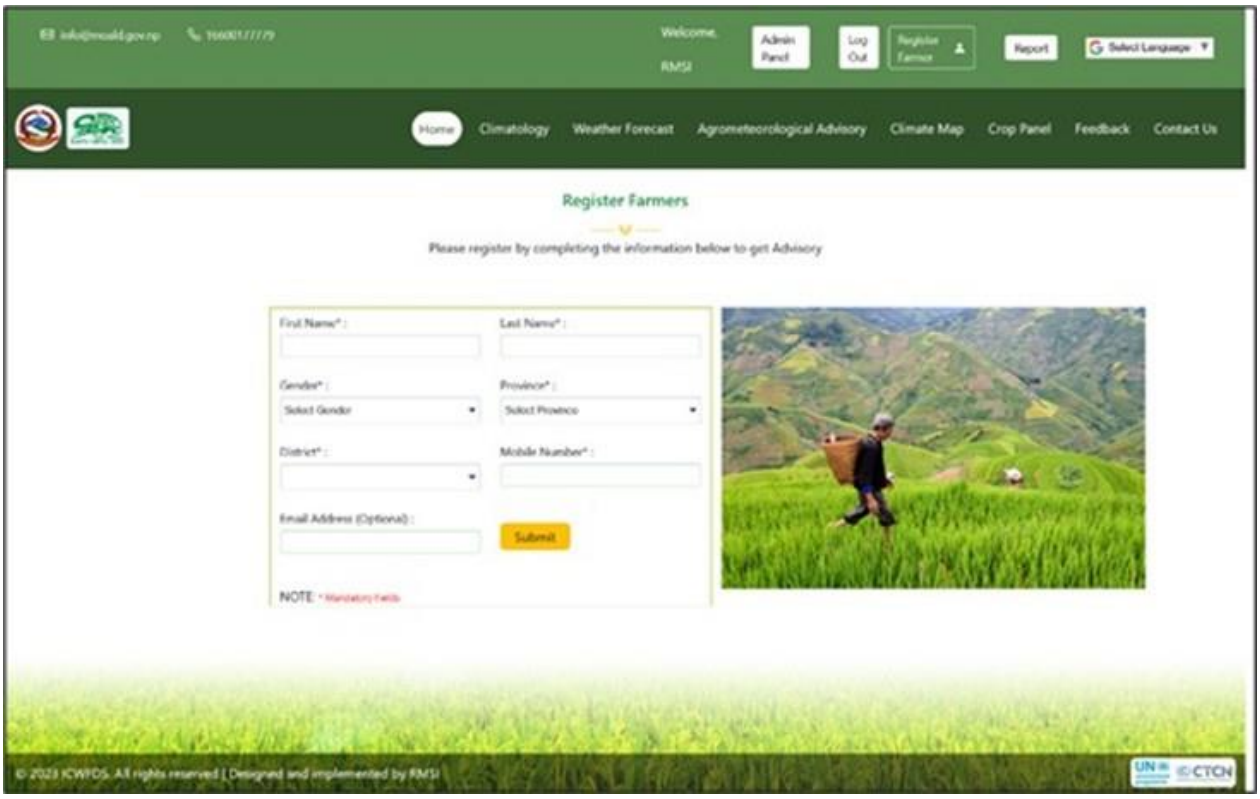


Figure 12: Register Farmer screen

1.1.4 Report

This section is under maintenance

1.1.5 Home

- Click on Home tab from the top panel as shown in Figure 1.
- It will redirect the user to the Homepage as shown in Figure 13.

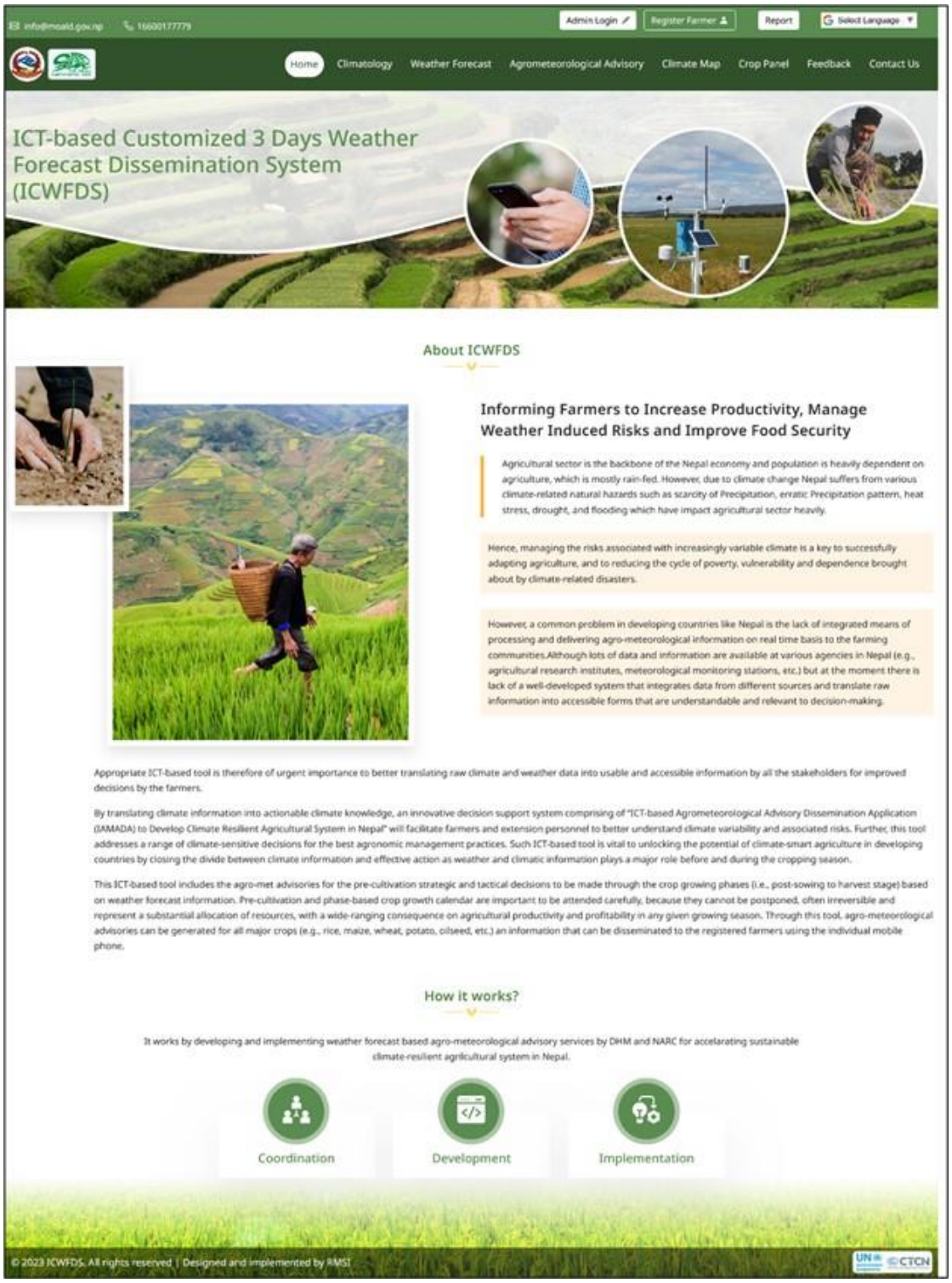


Figure 13: Homepage screen

1.1.6 Climatology

- Click on Climatology tab on Homepage, Climatological Characteristics page opens up as shown in Figure 14.
- Select Province, District, Session and Crop from the dropdown.
- Click on Search button to view the Climatological Normal graph.
- In the graph, the Y-axis at left is showing the Temperature (Degree C) and at right depicting the Rainfall (mm).
- X-axis is depicting the various crop stages as follows:
    - Crop Initial Stage;
    - Crop Development Stage;
    - Crop Mid-Season Stage; and
    - Late-Season Stage.
- Legends of Rainfall, Min Temp, and Max Temp are showing at the top.
- At the top of the graph, using the scroll bar user can view the crop stages of Day 1 to Last day.

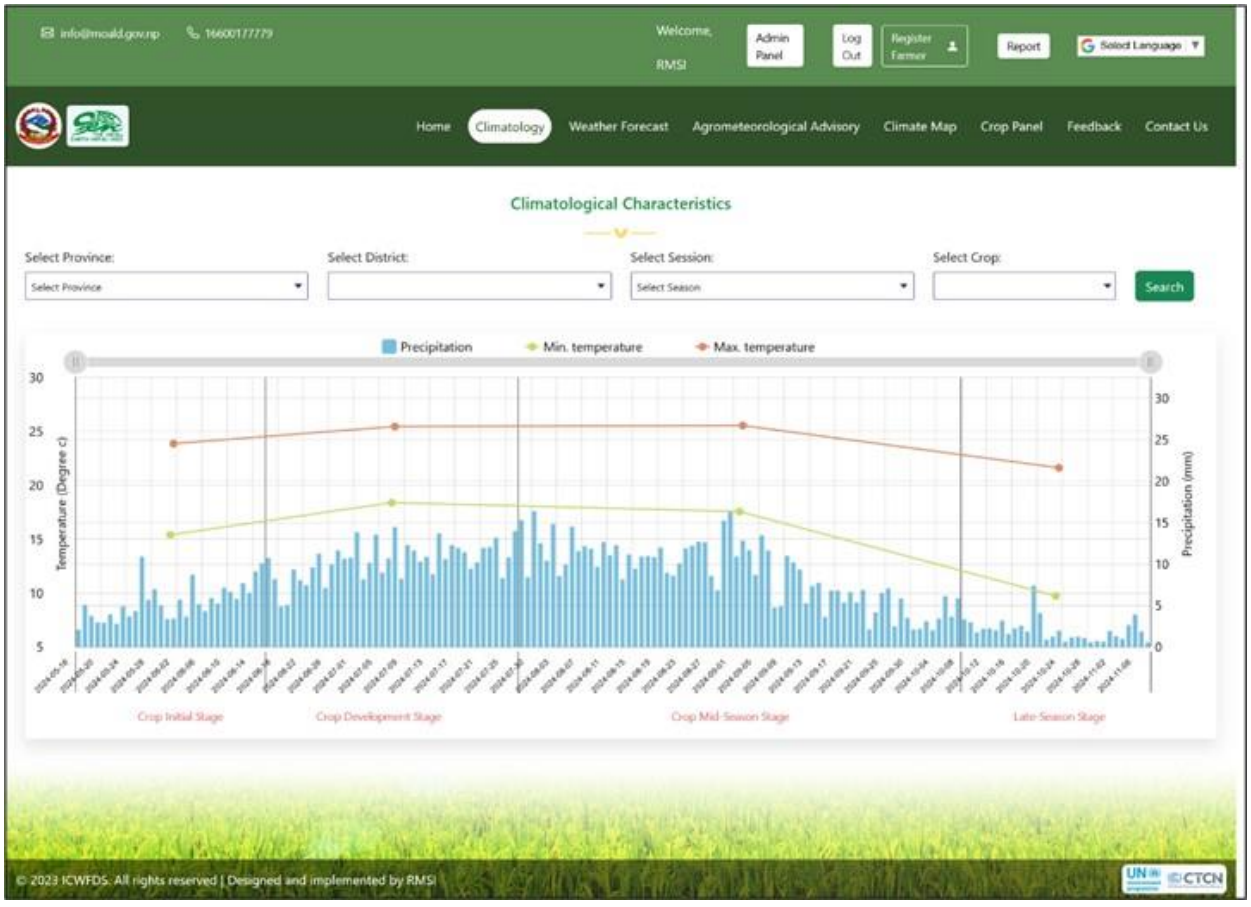


Figure 14: Climatological Characteristics screen

1.1.7 Weather Forecast

- Click on Weather Forecast tab on top panel of Homepage.
- Weather Forecast page opens up with following tabs at the top of the page:

- 3 Days Forecast;
- 7 Days Forecast; and
- Seasonal Forecast.

1.1.7.1 3 Days Forecast

- There are following tabs under this module:
  - Precipitation;
  - Max Temperature;
  - Min Temperature;
  - Relative Humidity; and
  - Wind Speed.
- By default, Precipitation screen is showing to the user as shown in Figure 15.
- Precipitation screen is showing a map viewer with Forecasted Precipitation layer of Day 1 on the map.
- At the top left of the Map viewer lies the Forecasted Day 1, Forecasted Day 2 and Forecasted Day 3.
- Click on + and – buttons at the top left corner of the map to Zoom-in and Zoom-out respectively.
- User can view the layers of Forecasted Day 2 and Forecasted Day 3 by clicking the respective buttons at right top corner.
- Similarly, user can view the Max Temperature, Min Temperature, Relative Humidity and Wind Speed layers by changing the tabs.

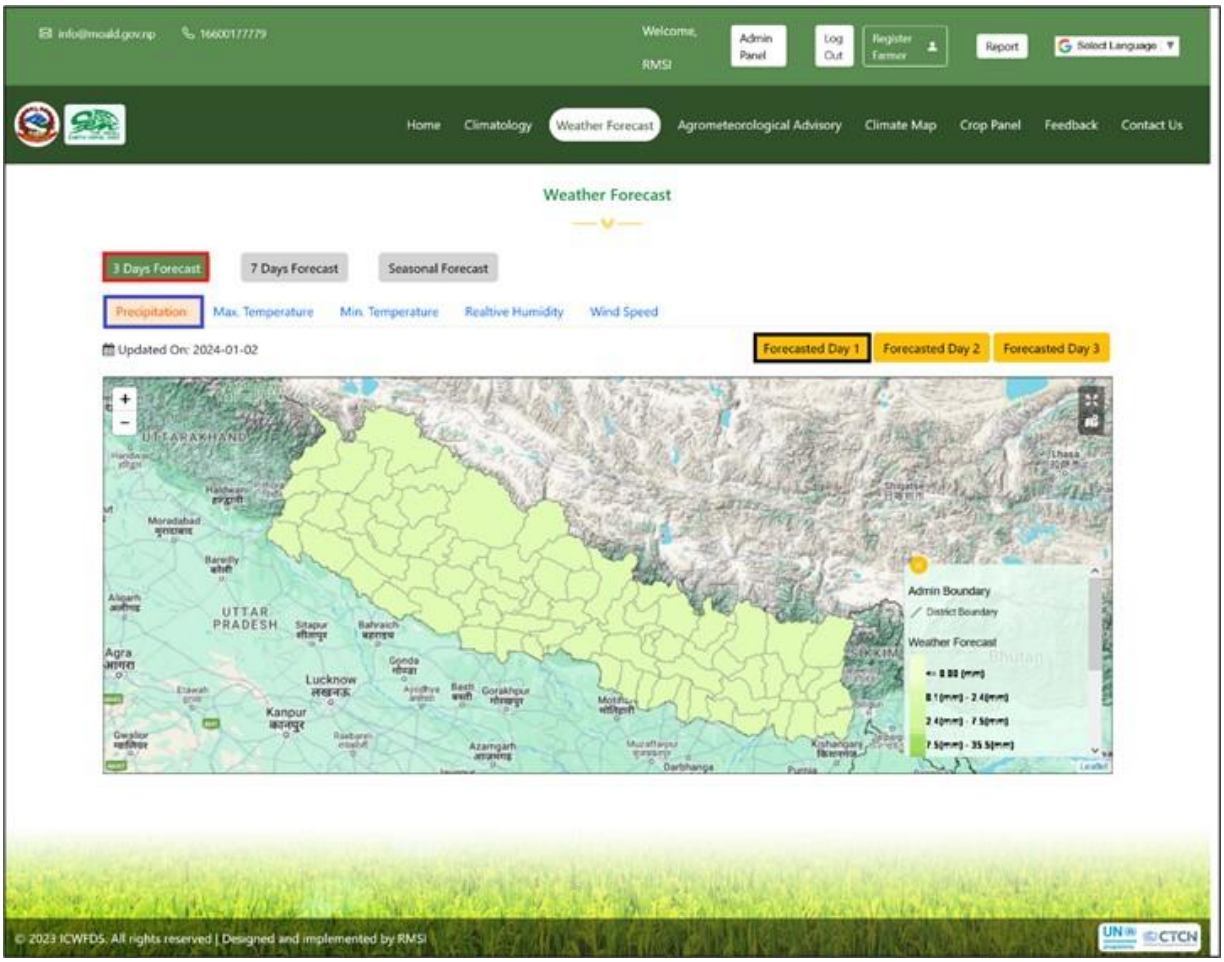


Figure 15: 3 Days Forecast Precipitation screen

1.1.7.2 7 Days Forecast

- There are following tabs under this module:
  - Precipitation
  - Max Temperature
  - Min Temperature
  - Relative Humidity
- By default, Precipitation screen is showing to the user.
- In this case, we have selected Max Temperature layer to show on the map viewer as shown in Figure 16
- Click on + and – buttons at the top left corner of the map to Zoom in and Zoom out respectively.
- Similarly, user can change the tabs to view different layers.

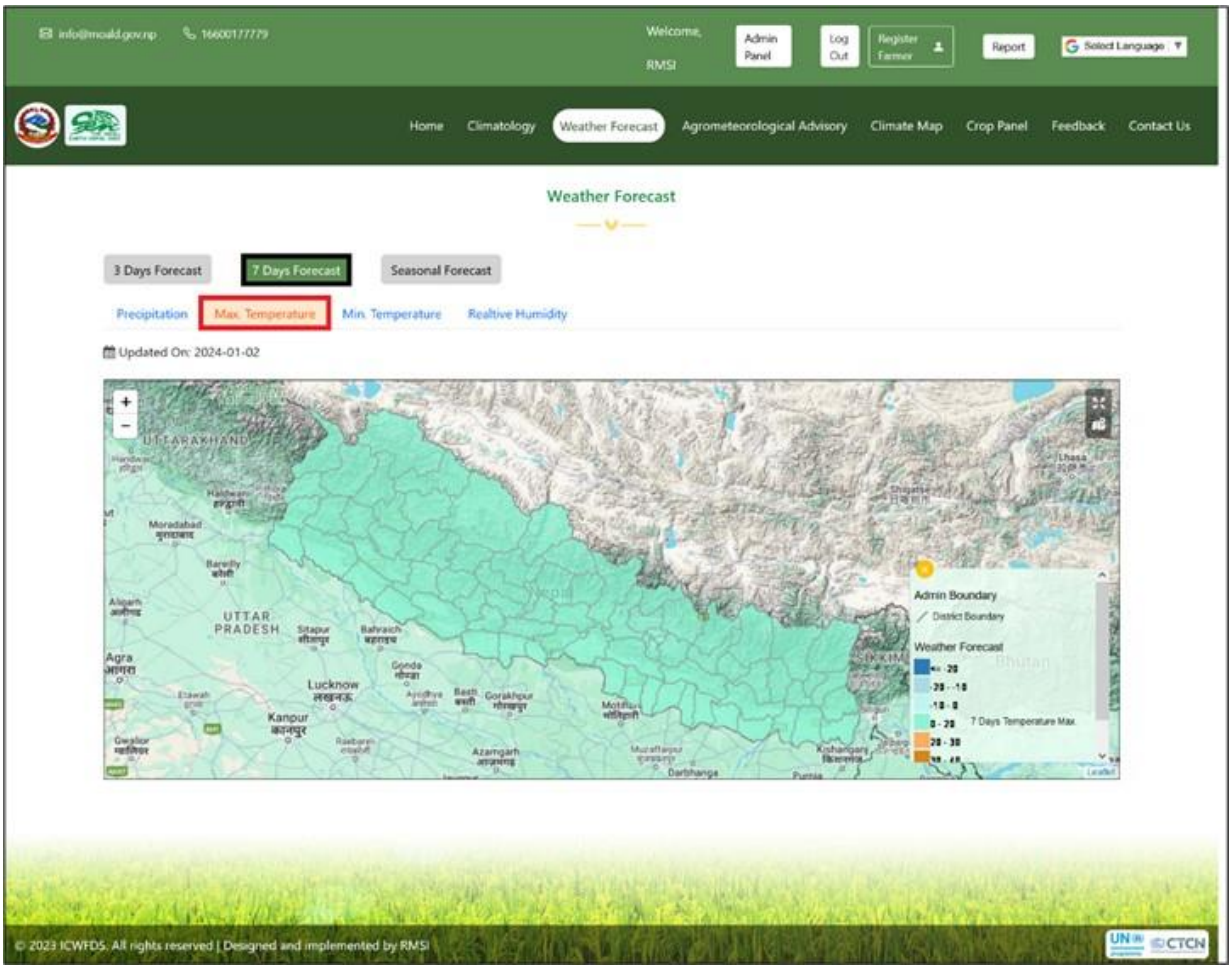


Figure 16: 7 Days Forecast Max Temperature screen

1.1.7.3 Seasonal Forecast

- There are following tabs under this module:
  - Precipitation;
  - Max Temperature;
  - Min Temperature; and
  - Drought Condition.
- In this case, we have selected Drought condition layer to show on the map viewer as shown in Figure 17. It should be noted that this drought map has been prepared based on WMO recommend index Standardized Precipitation Index (SPI).
- Click on + and – buttons at the top left corner of the map to Zoom-in and Zoom-out respectively.
- Similarly, user can change the tabs to view different layers.

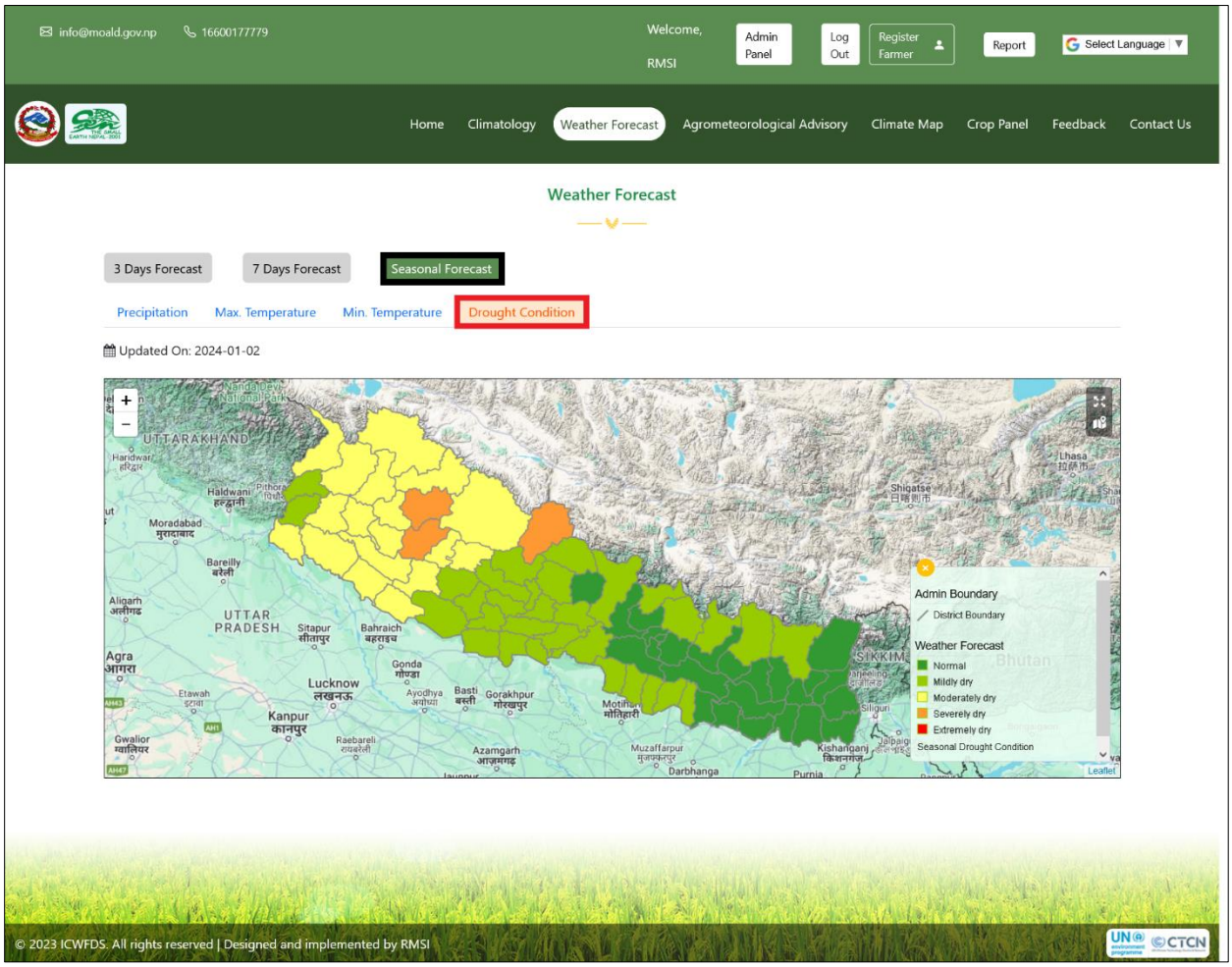


Figure 17: Seasonal Forecast Drought Condition screen

1.1.8 Agrometeorological Advisory

- Select Province and District and click on search button to view the weather advisory of the selected Province and District.
- It has two sub- sections:
    - Weather Advisory; and
    - Agrometeorological Advisory.

1.1.8.1 Weather Advisory

- In this section user can view 3 Days Weather Forecast, 7 Days Weather Forecast and Seasonal Weather Forecast in the pictorial form of the selected Province and District as shown in Figure 18.

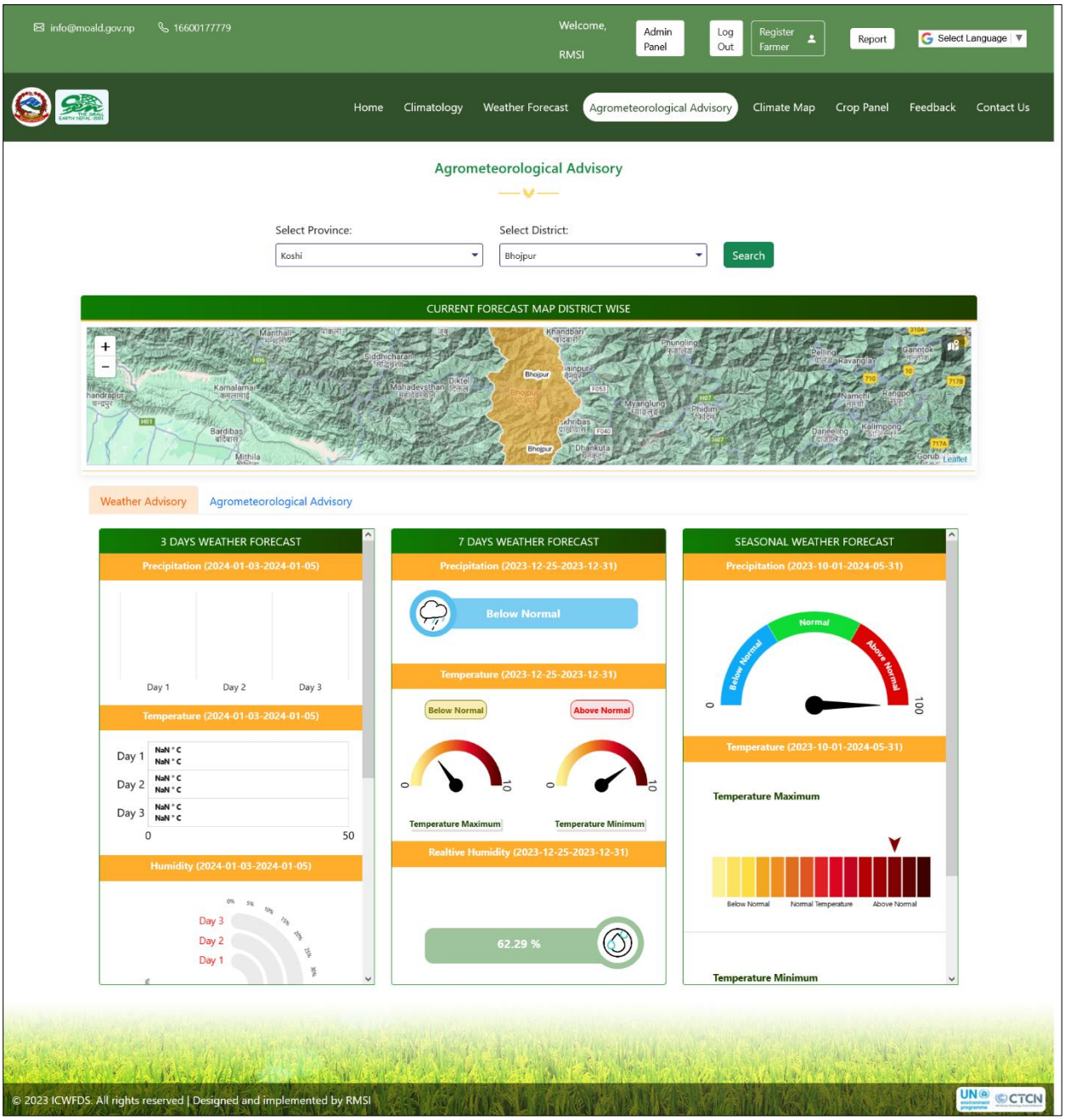


Figure 18: Weather Advisory screen

1.1.8.2 Agrometeorological Advisory

- In this section, user can view following advisories as shown in Figure 19:
  - Advisory for Crop type & Variety selection;
  - Advisory for Sowing Date;

- Advisory for Deficit / Excess Rainfall;
- Advisory for Fertilizer & Pesticide Application;
- Advisory for Pest & Disease Infestation;
- Advisory for Harvest Date; and
- Advisory for Post-Harvest Date.

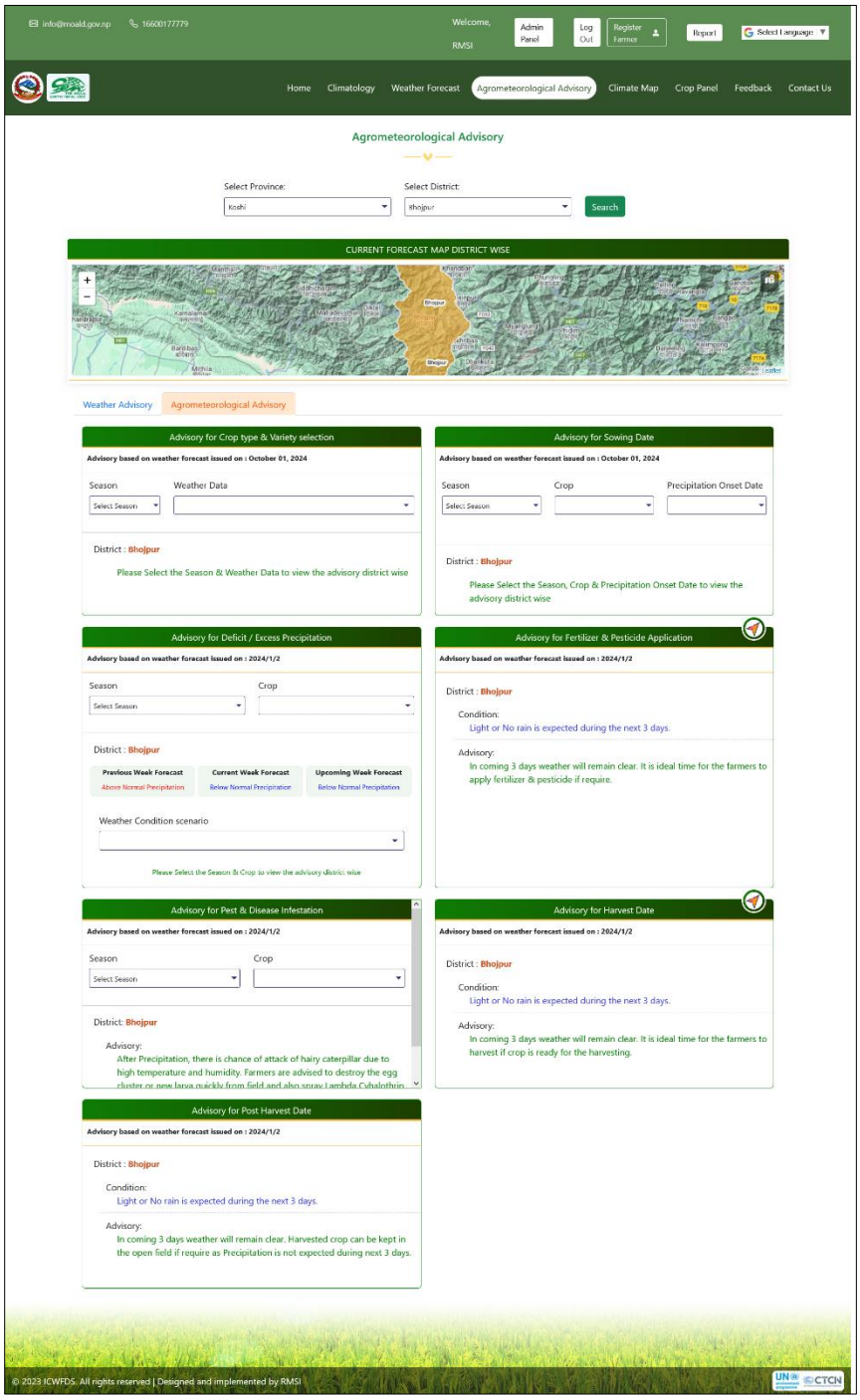


Figure 19: Agrometeorological Advisory screen

- User can also send Advisory for Fertilizer & Pesticide Application and Advisory for Harvest Date on the mail of selected user.
- Admin user click on the animated arrow mark and a pop of User list of selected district will appear, select the user and click on Send Mail button to send the advisory mail to the user as shown in Figure 20.

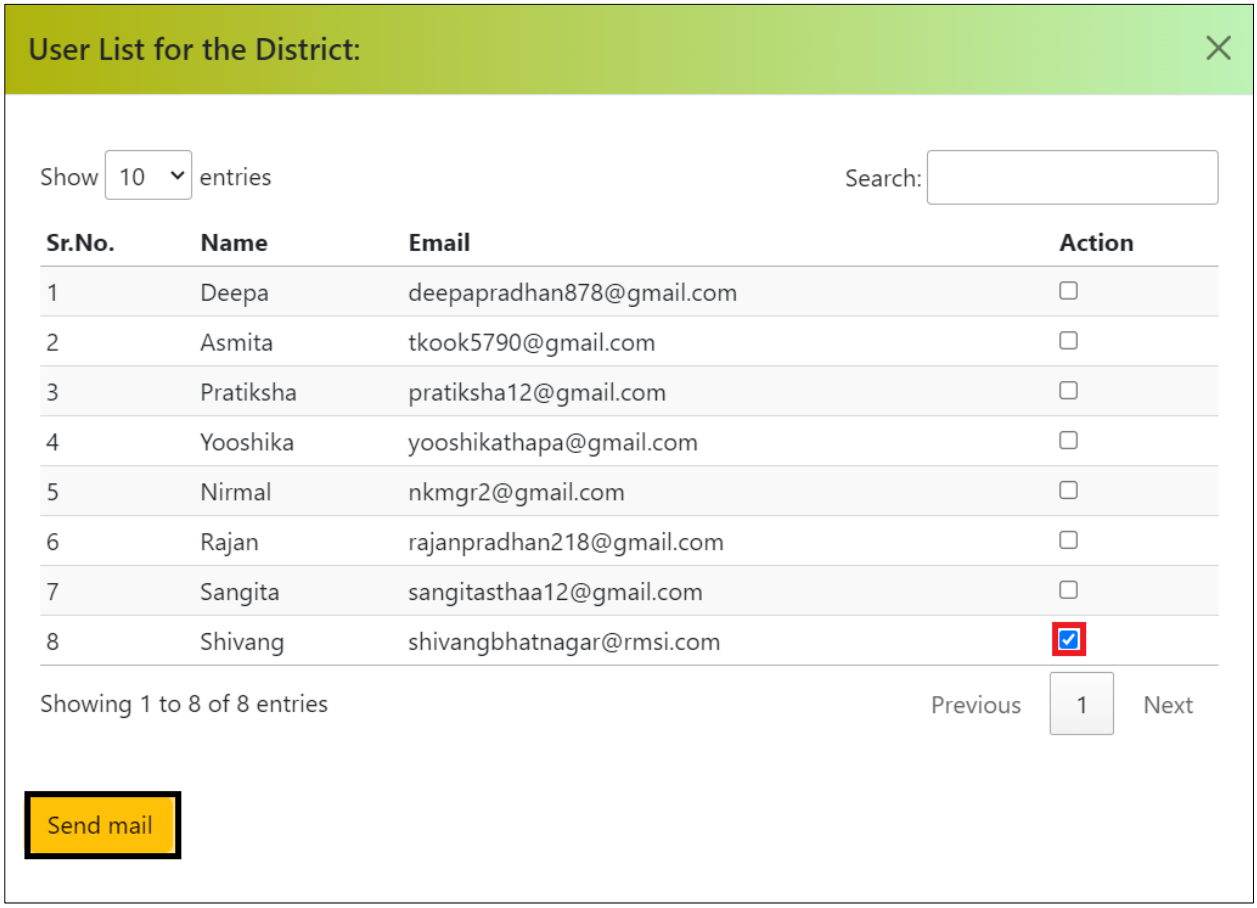


Figure 20: Agro Advisory User list screen

1.1.9 Climate Maps

- Click on the Climate Maps tab at the Homepage to view the following Climate maps as shown in Figure 21.
  - Normal Annual Rainfall
  - Normal Annual Max. Temperature
  - Normal Annual Min. Temperature
  - Normal JJASO Rainfall
  - Normal JJASO Max. Temperature
  - Normal JJASO Max. Temperature

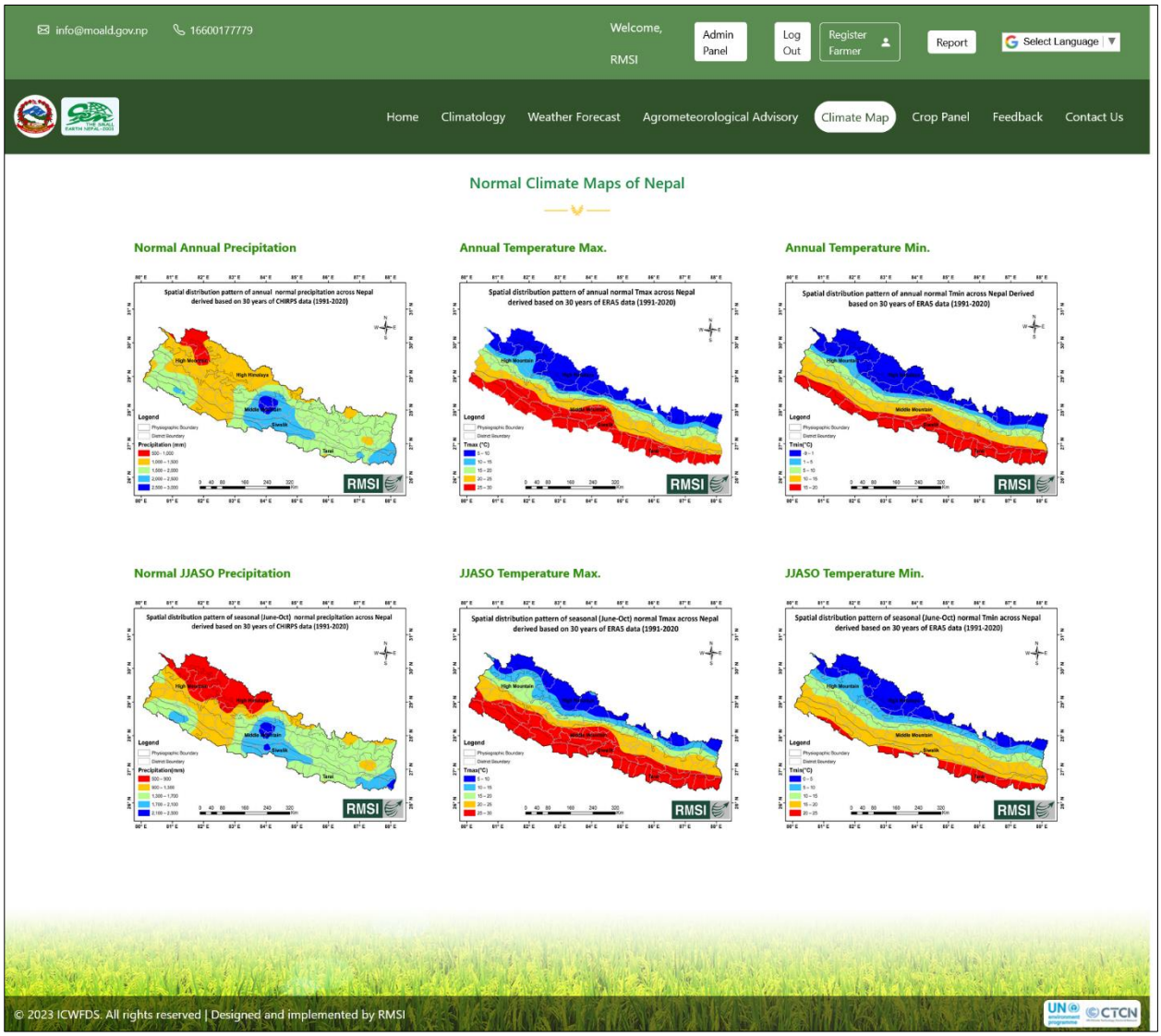


Figure 21: Climate Maps screen

1.1.10 Crop Panel

- Click on Crop Panel tab on the top panel of Homepage.
- Select Province, District, Session and Crop and click on Search button as shown in Figure 22.
- Plant Seedling, Plant Growing and Plant Harvesting with its legends is shown at the bottom of Graph.
- Legends on the graph show the stages as per the months.

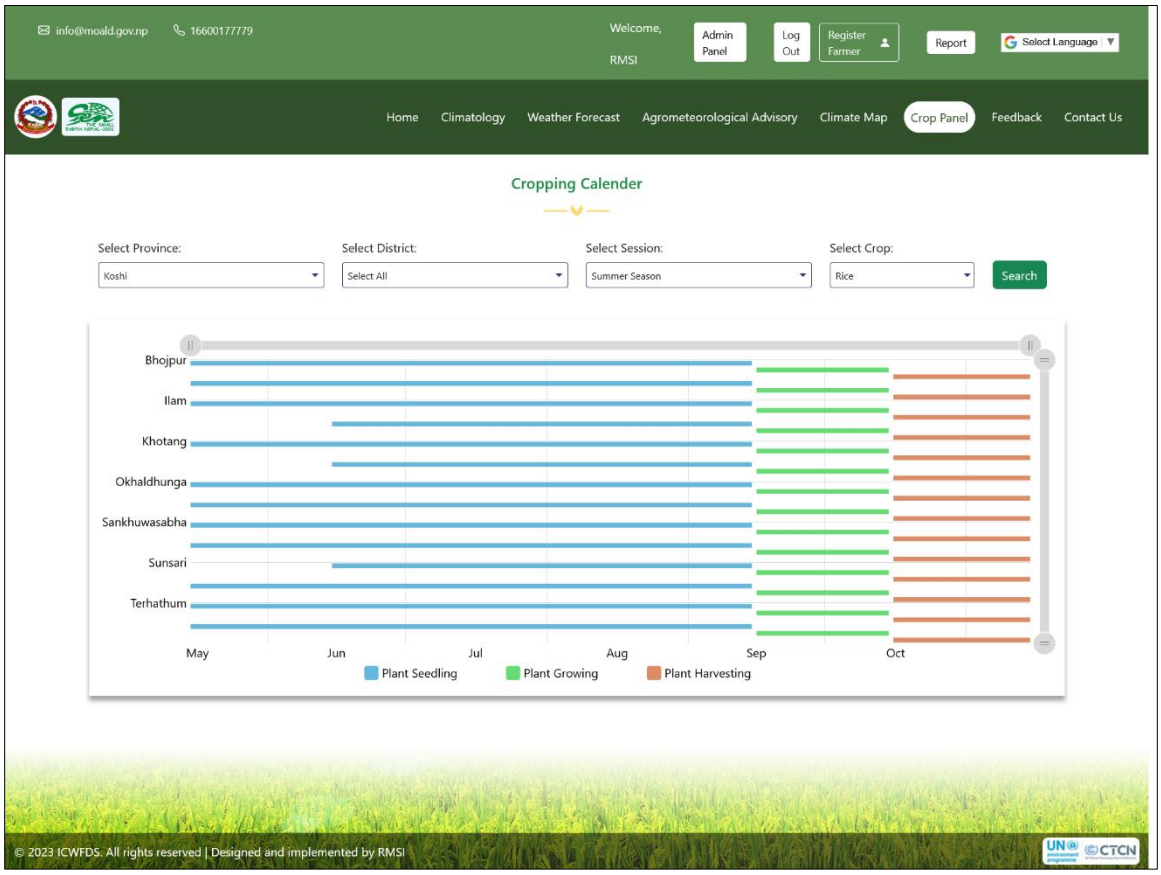


Figure 22: Cropping Calendar screen

1.1.11 Feedback

- Click on Feedback tab at top panel of Homepage.
- Feedback Form page opens up as shown in Figure 23; fill the following options to register feedback as shown in
  - Full Name;
  - Mobile Number;
  - Select Subject;
  - Email Address (this is an optional input);
  - Address; and
  - Message.
- Click on Submit Form button to register feedback.
- Search the feedbacks by selecting:
  - Name
  - Subject; and
  - Feedback.
- Feedback list with following details is showing in tabular form:

- S. No.;
- Name;
- Mobile;
- Subject;
- Feedback;
- Date;
- Status; and
- Response.

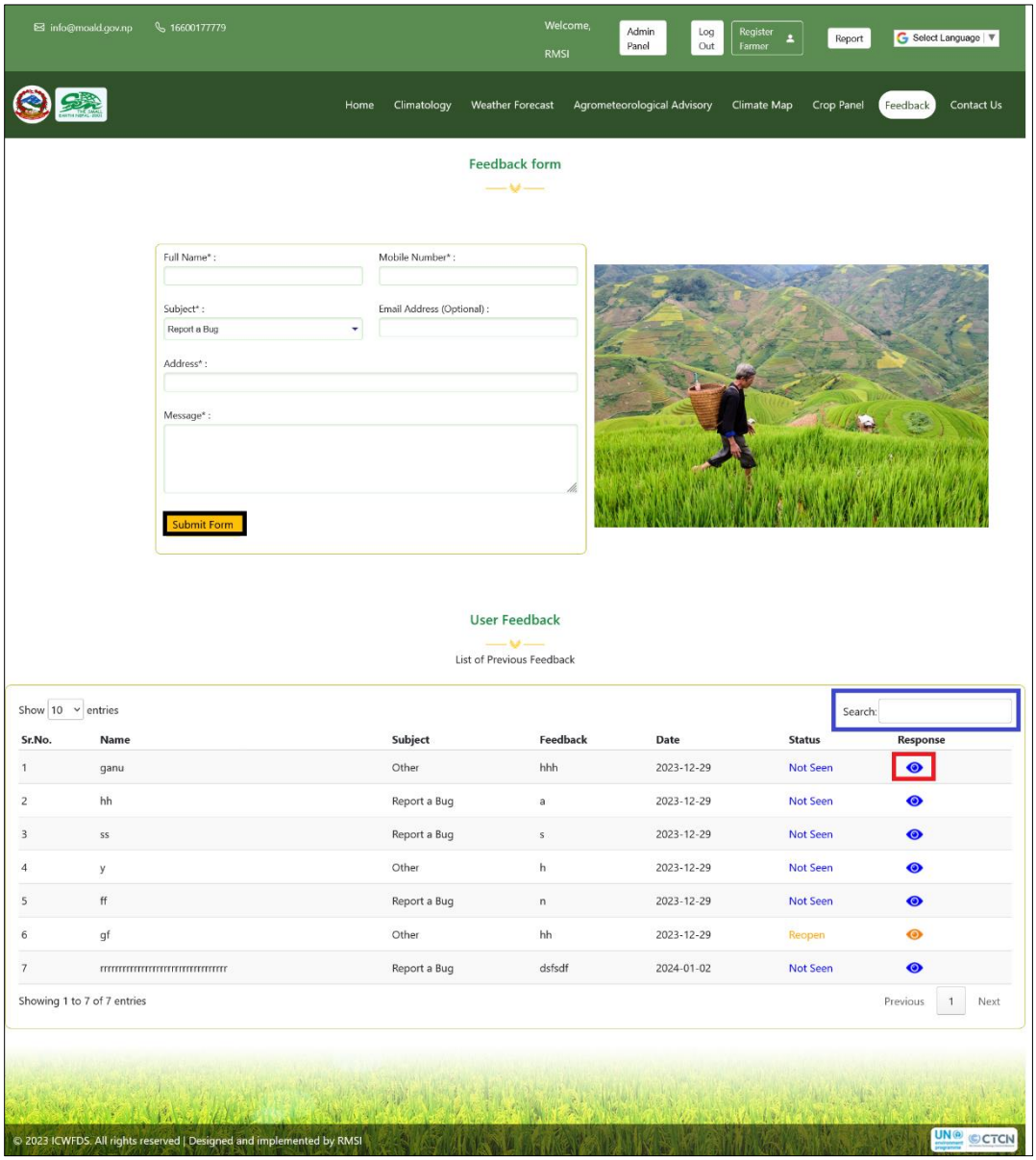


Figure 23: Feedback Form screen

- Click on eye icon to view the Response as shown in Figure 24.
- Click on eye icon, a pop-up screen appears with details of feedback.

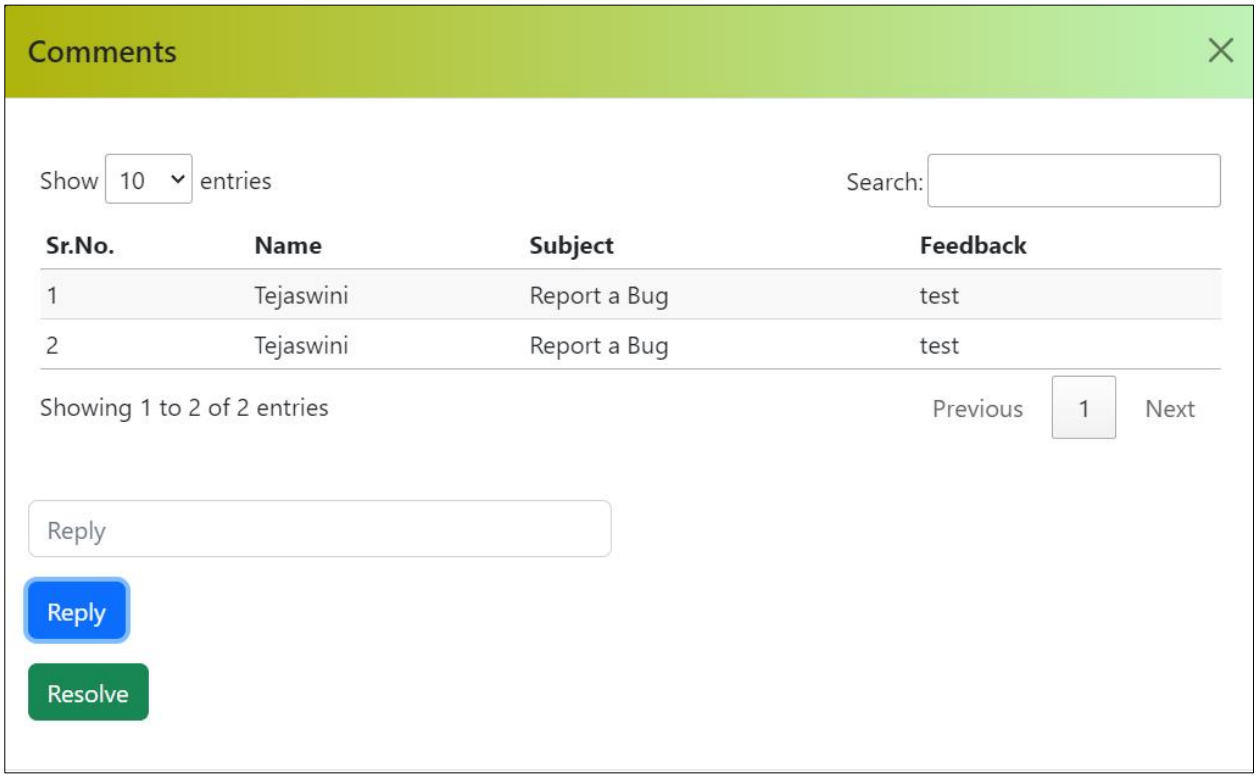


Figure 24: Feedback Response screen

- Type in the Reply text box and click on Reply or Resolve button to reply or resolve the issue.
- Resolved Feedback response can also be seen using same process as shown in Figure 25.

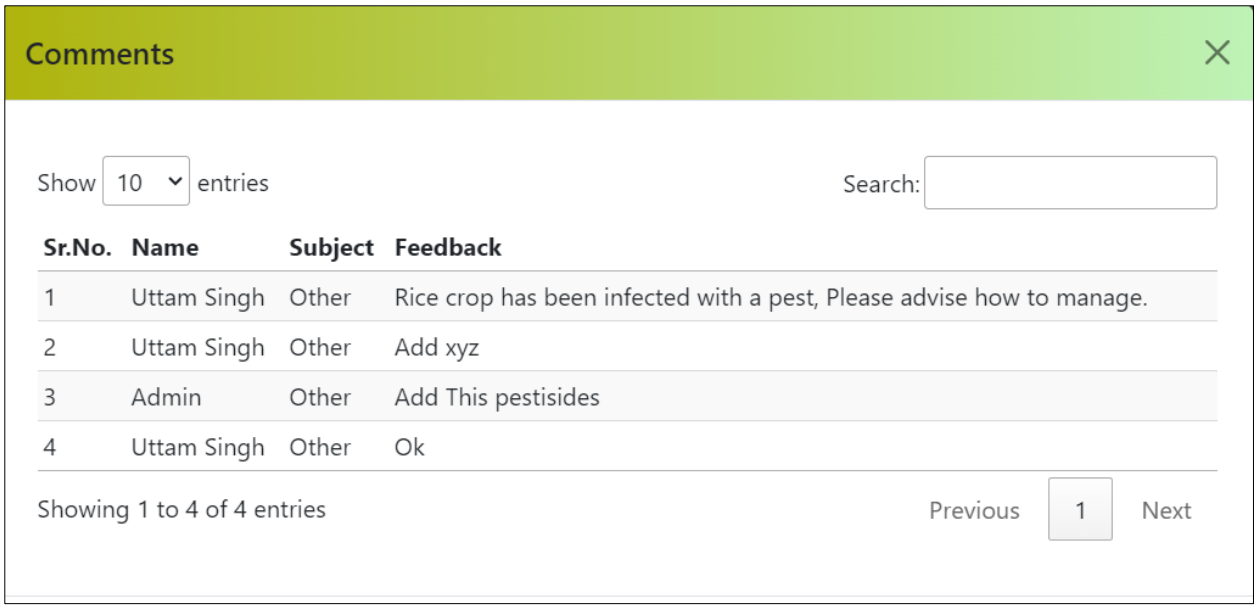


Figure 25: Resolved Feedback Response screen

1.1.12 Contact Us

- Click on Contact Us tab on the top panel of Home Page.
- Contact Us page opens up with the Address, Email Id and Mobile No. of the ICWFDS team as shown in Figure 26.

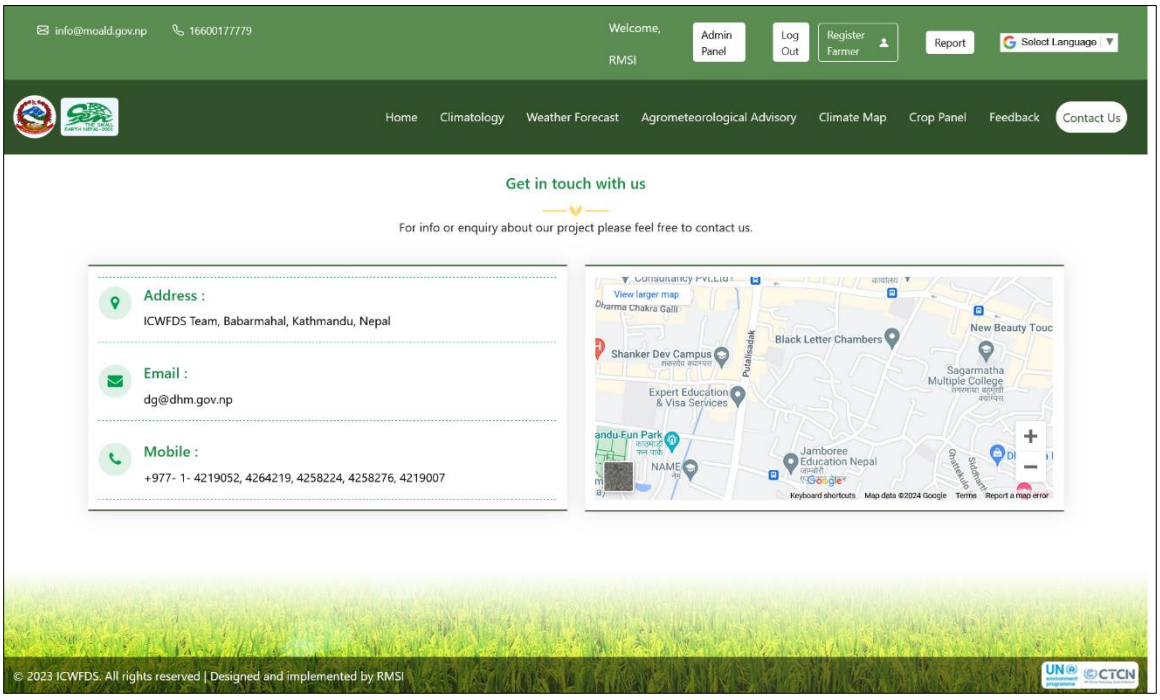


Figure 26: Contact Us screen

2 Process to install and host the API

2.1 Hardware Requirements

2.1.1 Server configuration required to install and host API

Following server configuration is required to install and host the API:

- **Processor**: Intel(R) Xeon(R) Gold 5215 CPU @ 2.50GHz 2.49 GHz (4 core processors)
- **RAM**: 32 GB
- **SSD**: 256 GB
- **Hard Disk**: 1TB
- **Server**: Windows Server 2019 or More
- **Internet Speed**: Min. 50 Mbps
- **Backup Server (disaster recovery):** Required with the same configuration as mentioned above.

2.2 PGAdmin Installation

2.2.1 Installation through exe.

- Download PGAdmin https://www.pgadmin.org/download/pgadmin-4-windows/ -- Windows Installer

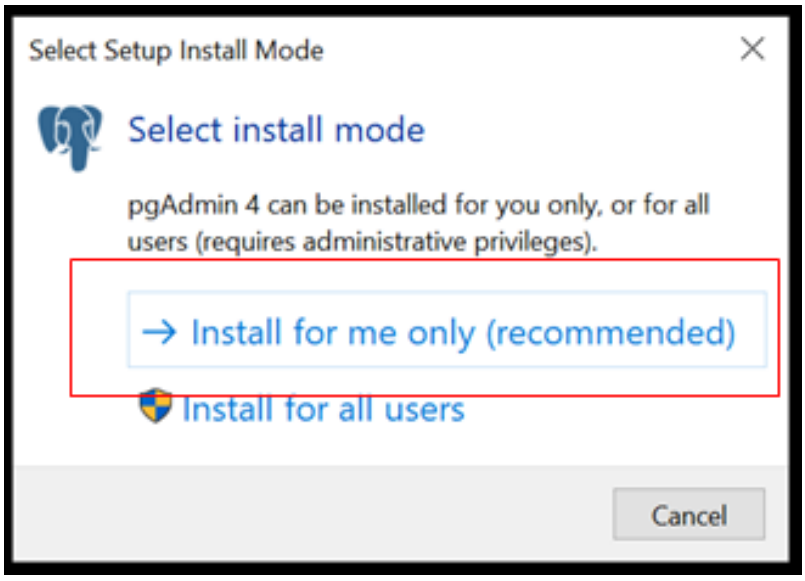


Figure 27: PGAdmin Installation screen

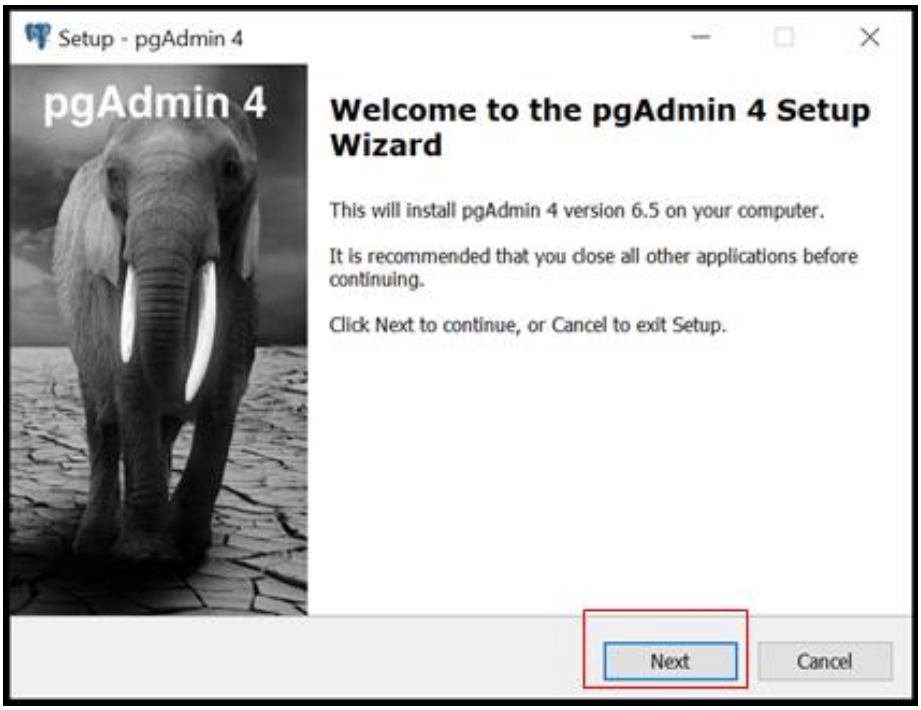


Figure 28: PGAdmin Setup screen

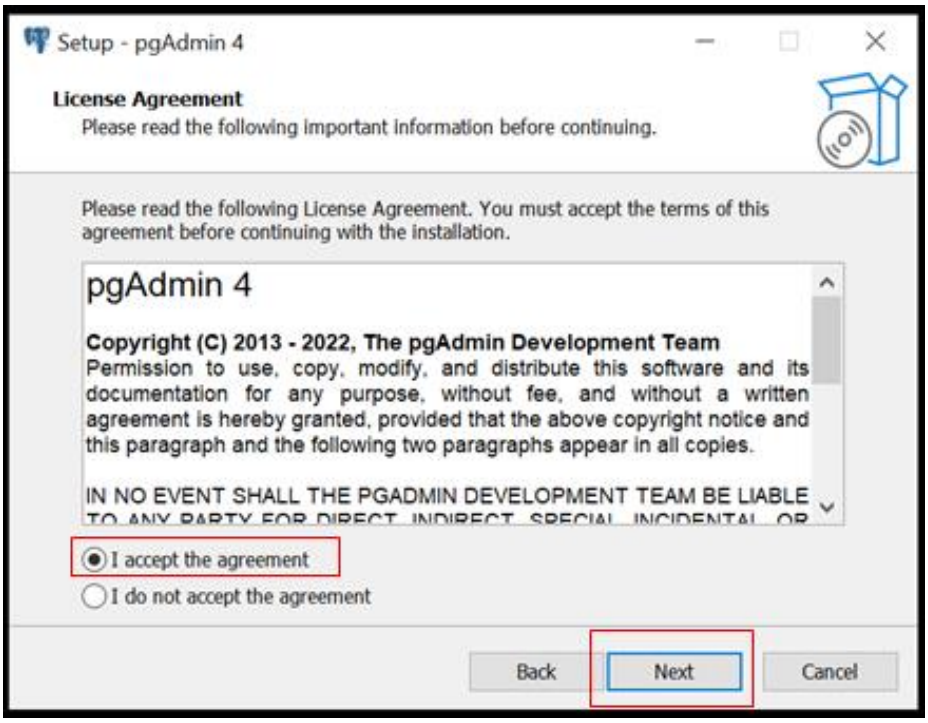


Figure 29: PGAdmin License Agreement screen

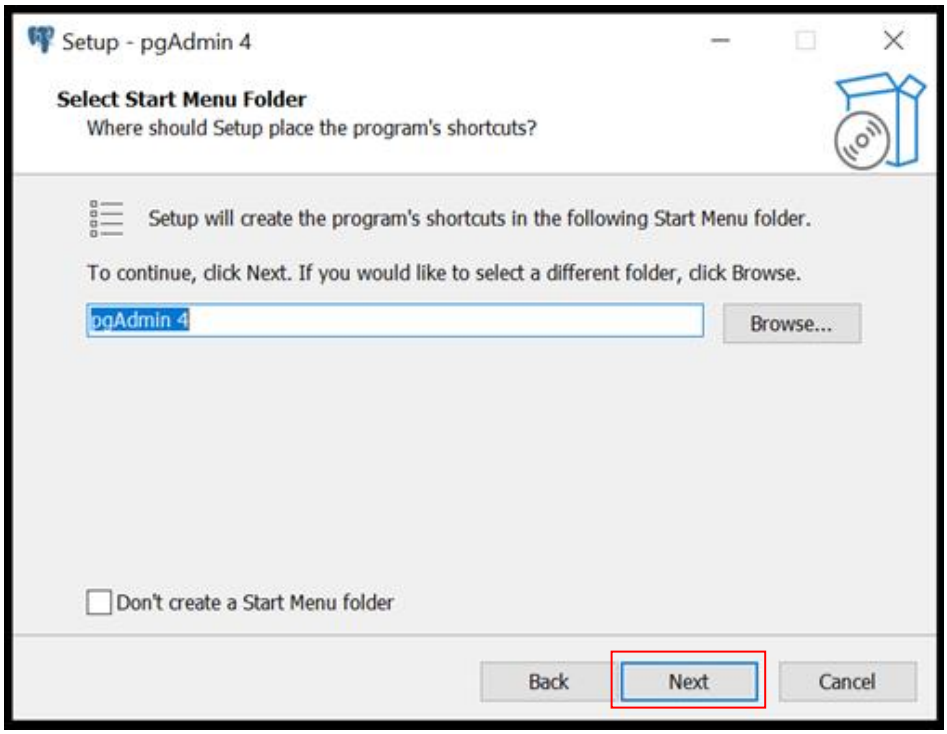


Figure 30: PGAdmin Start menu screen

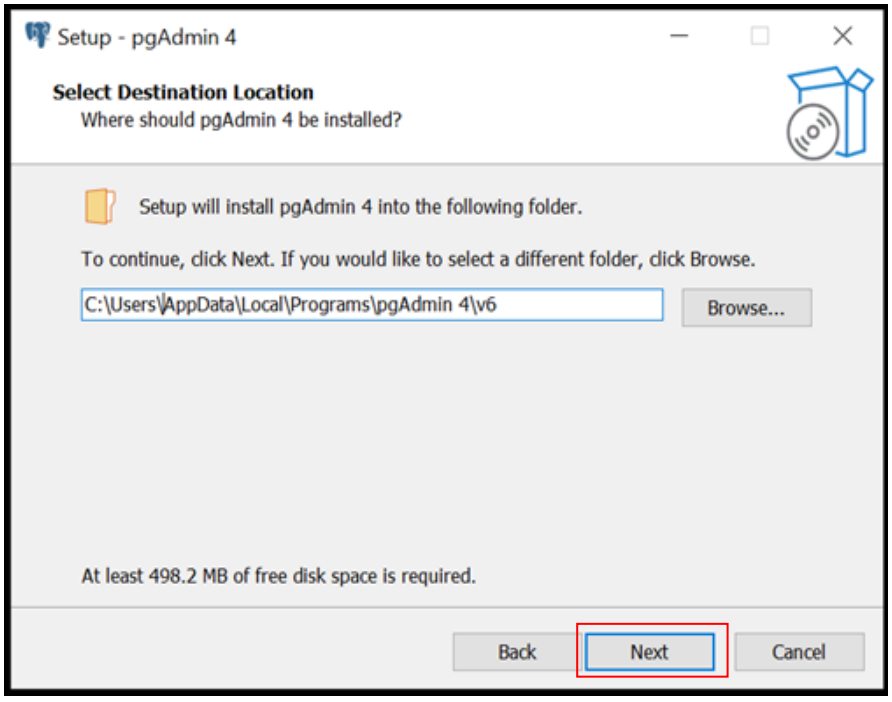


Figure 31: PGAdmin Select Destination Folder screen

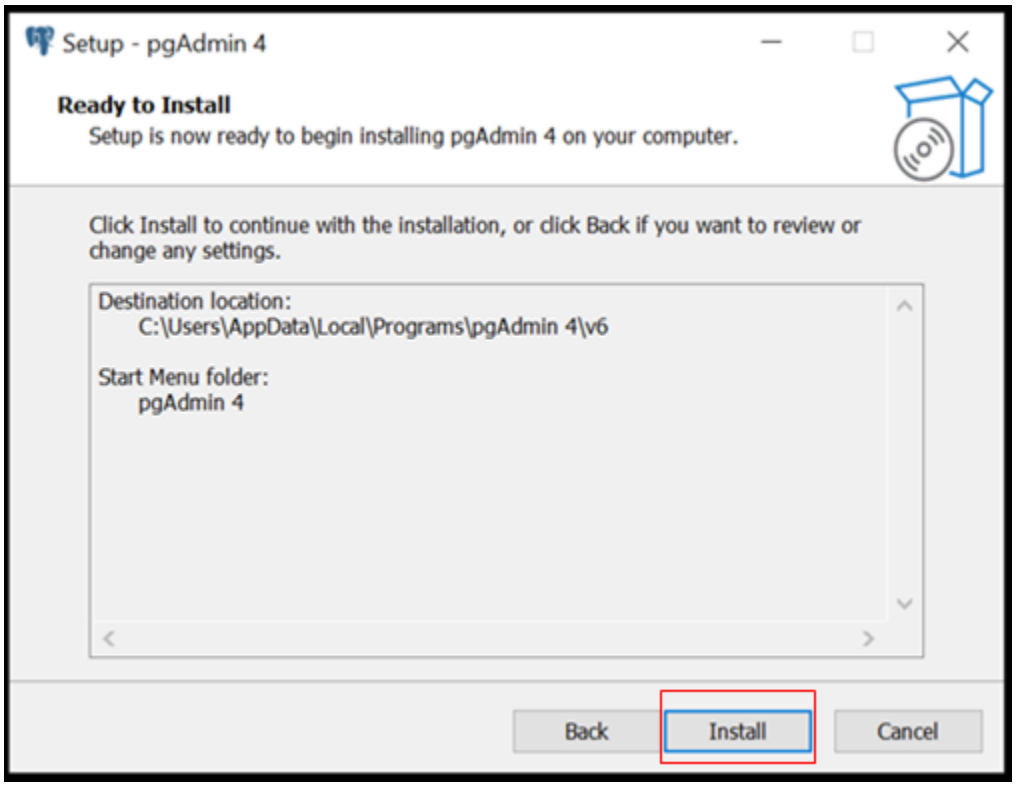


Figure 32: PGAdmin Ready to Install screen

2.3 PostgreSQL Installation

2.3.1 Installation through exe.

- Download PGAdmin https://www.enterprisedb.com/downloads/postgres-postgresql-downloads -- Windows Installer

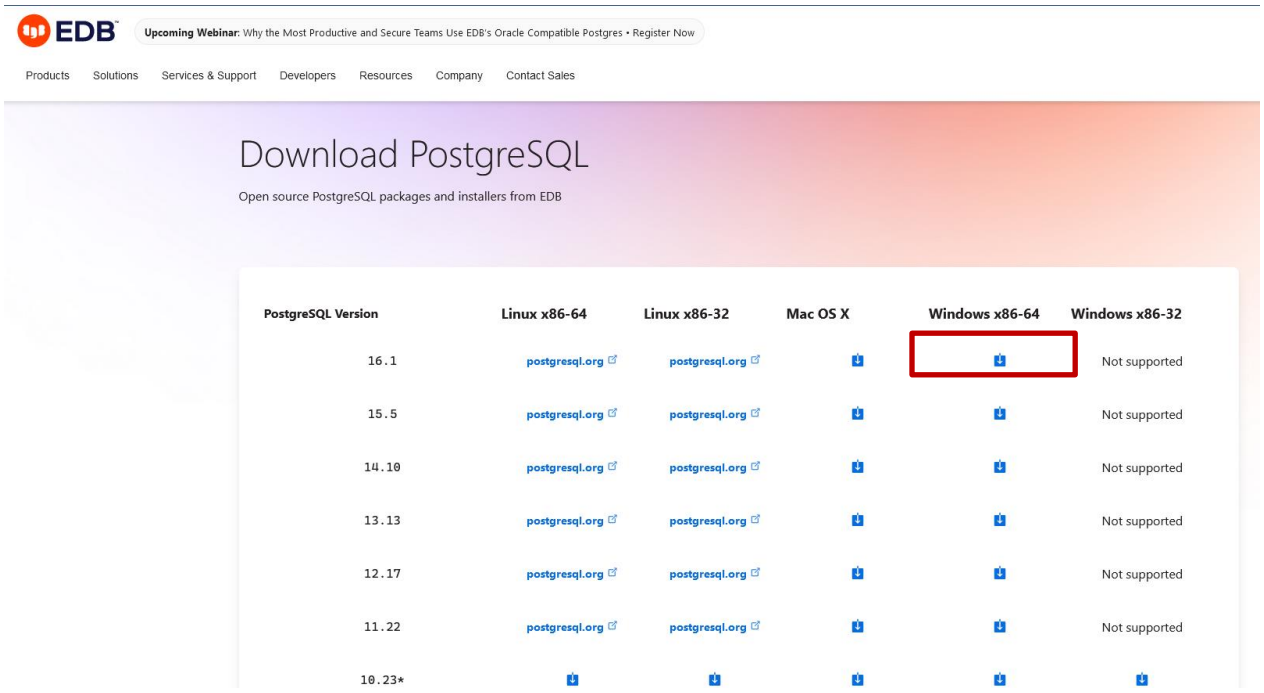


Figure 33: PGAdmin download screen

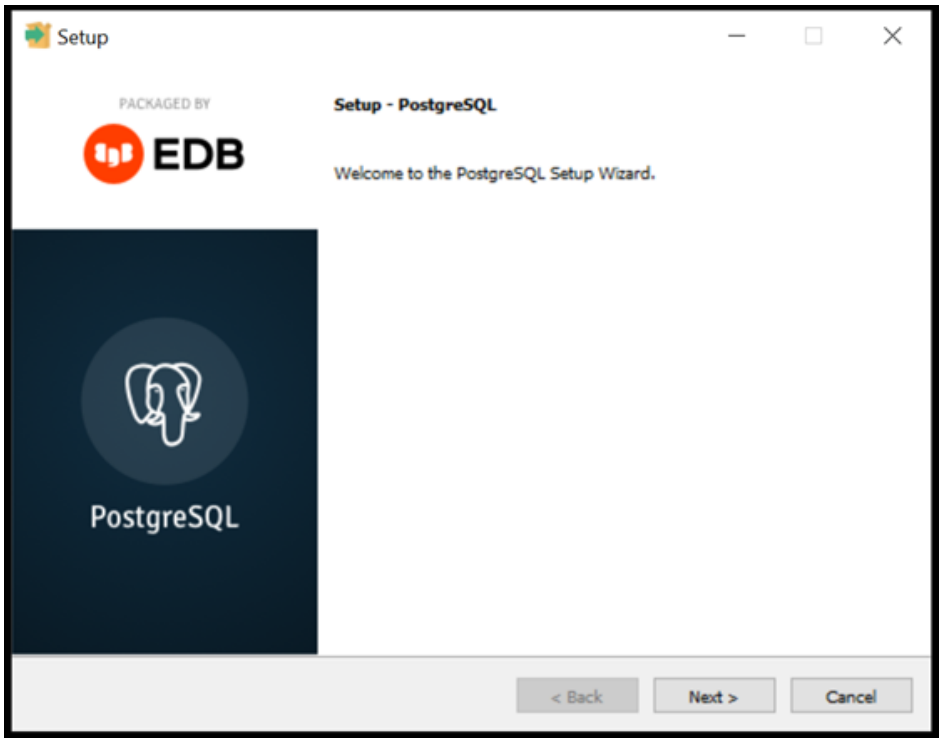


Figure 34: PostgreSQL setup screen

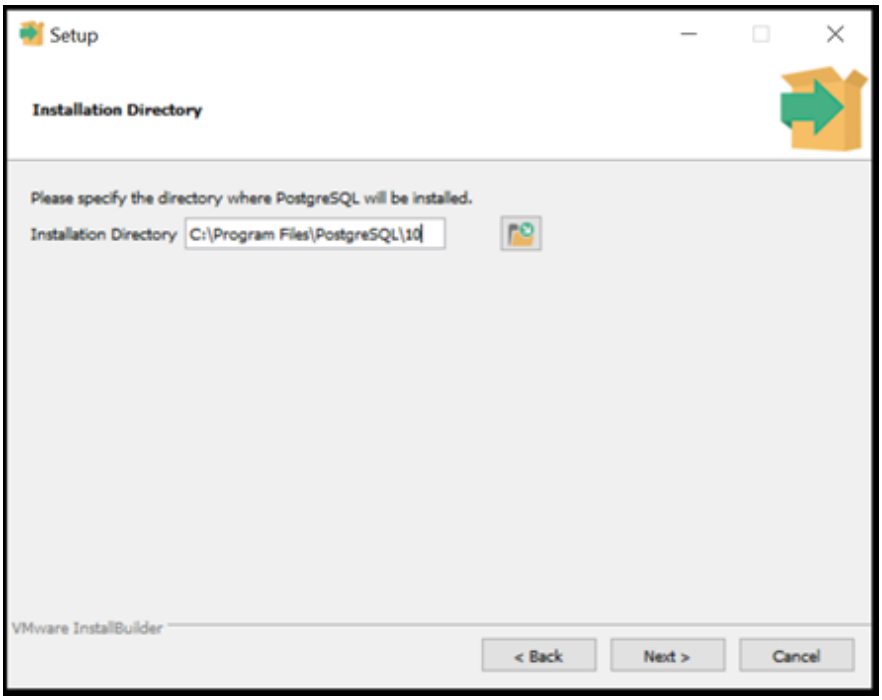


Figure 35: PostgreSQL Installation Directory screen

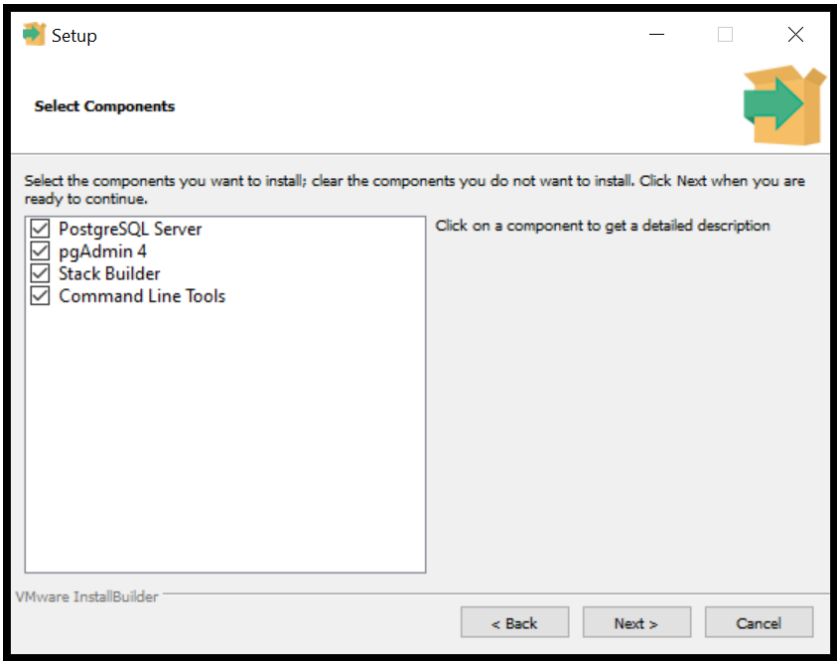


Figure 36: PostgreSQL Select Components screen

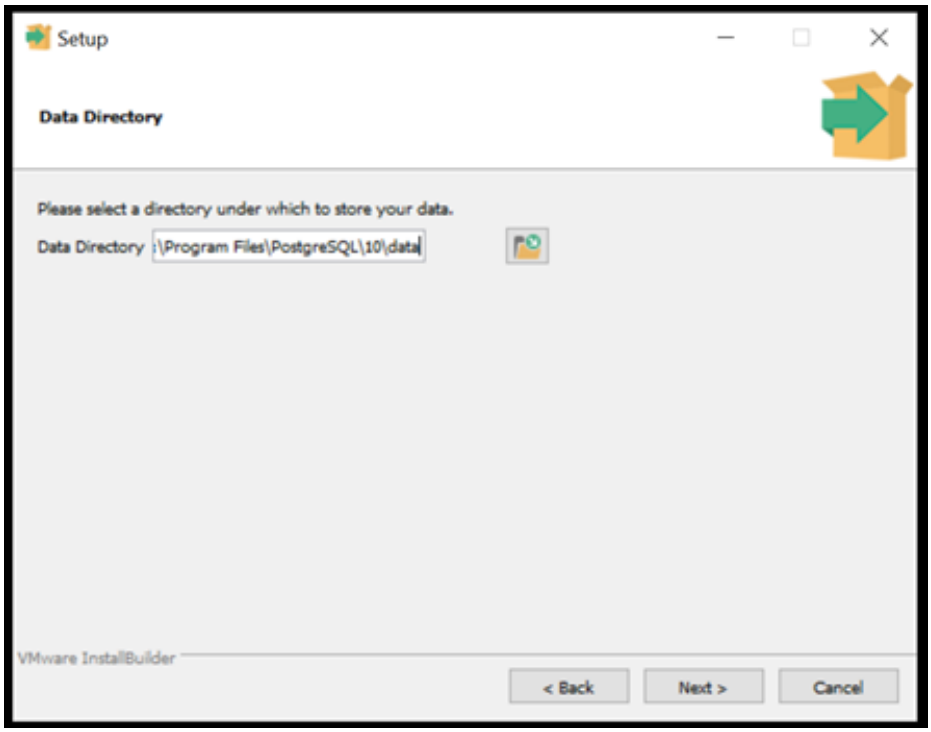


Figure 37: PostgreSQL Data Directory screen

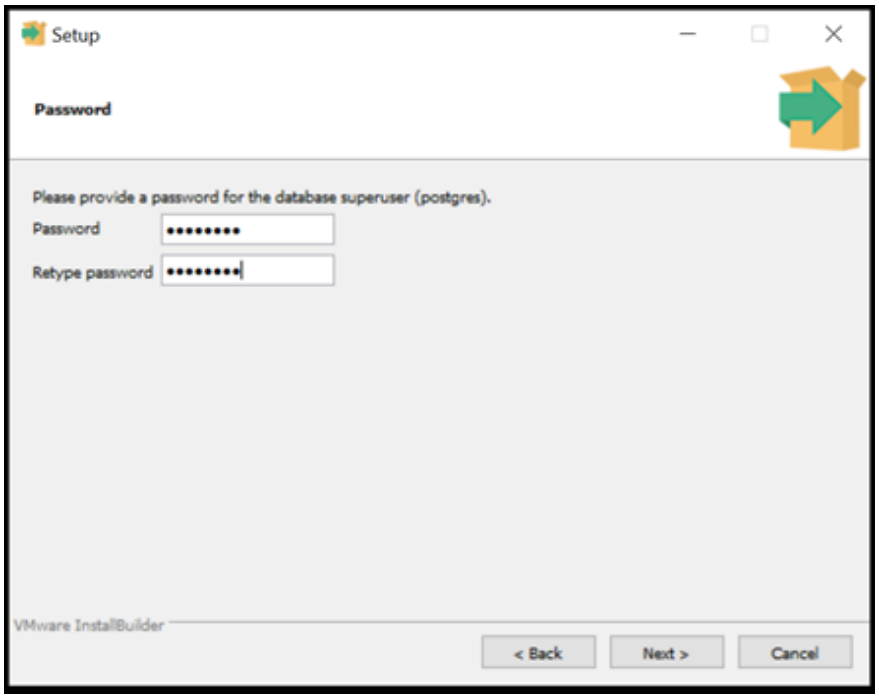


Figure 38: PostgreSQL Password screen

Add Password: **pass@123**

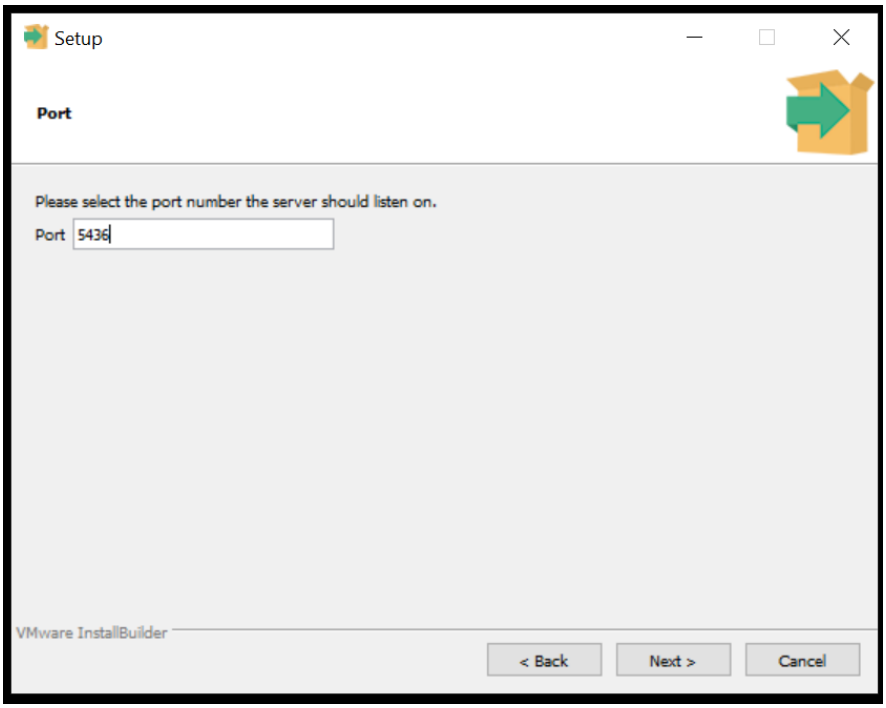


Figure 39: PostgreSQL Port setup screen

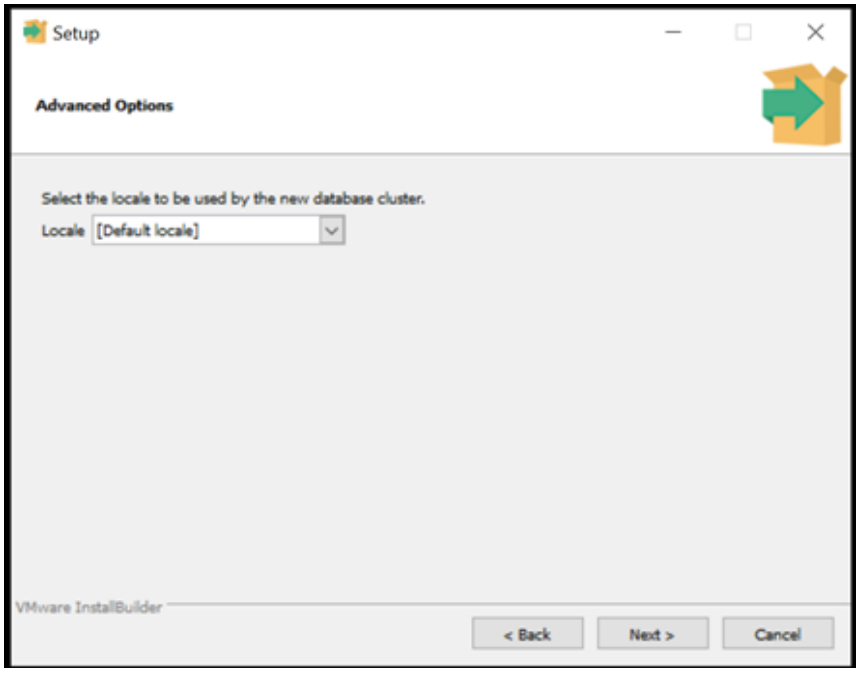


Figure 40: PostgreSQL Advanced Options screen

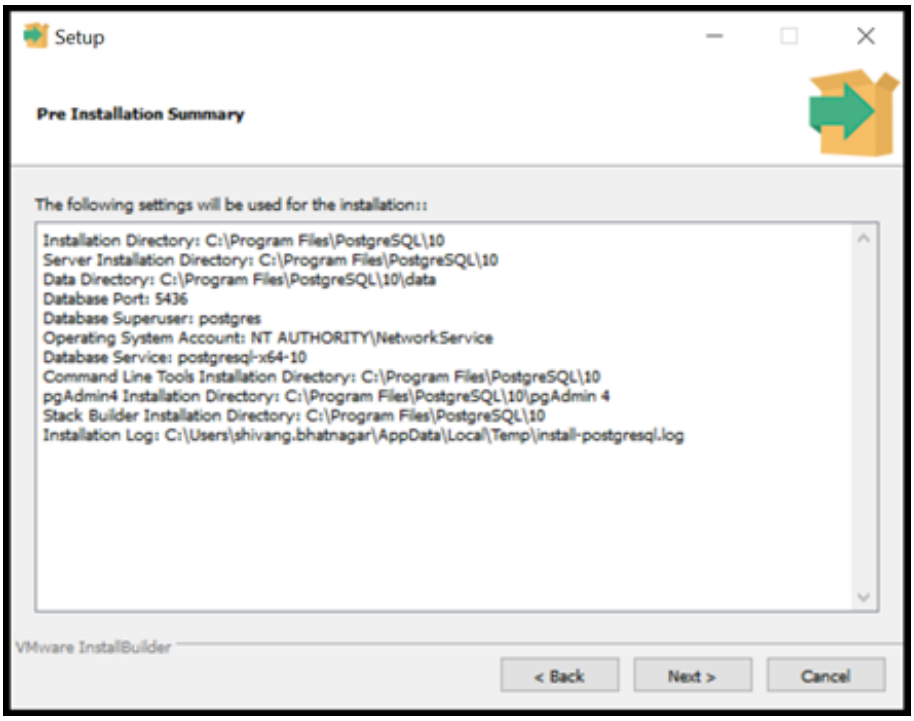


Figure 41: PostgreSQL Pre Installation Summary screen

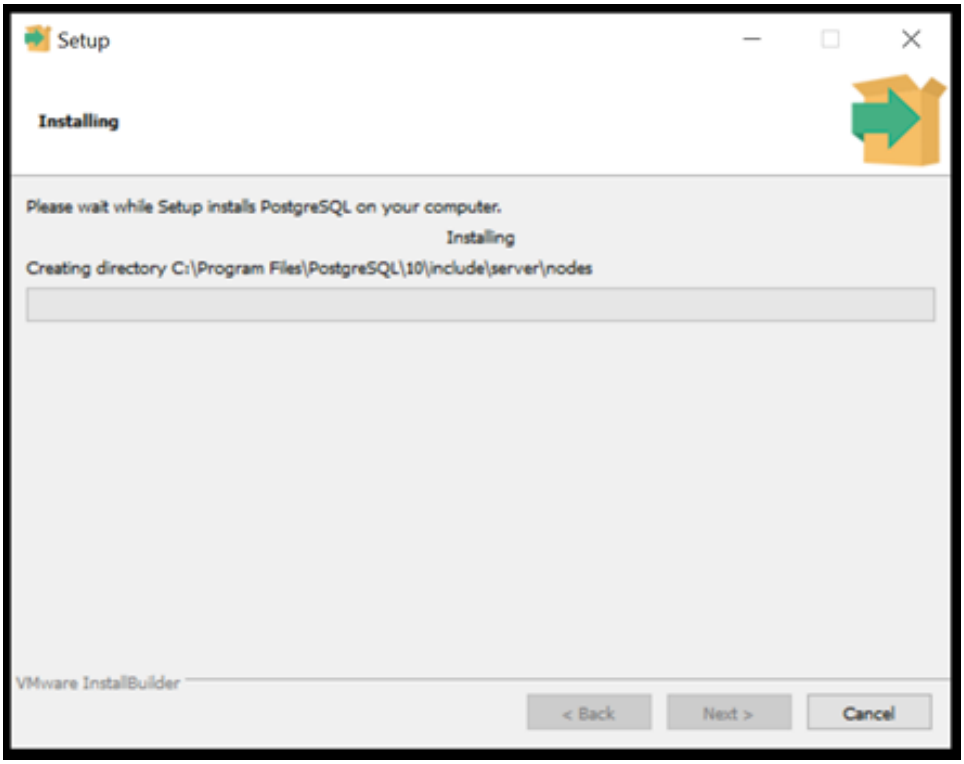


Figure 42: PostgreSQL Installation screen

2.4 Process to Install Microsoft .Net Framework 4.0

Steps to install .Net framework 4.0 user need to follow the below instructions.

1. Install IIS from add program in control panel.
2. At first, one needs to download Microsoft's .Net Framework 4.0, proceed to the Microsoft download page.

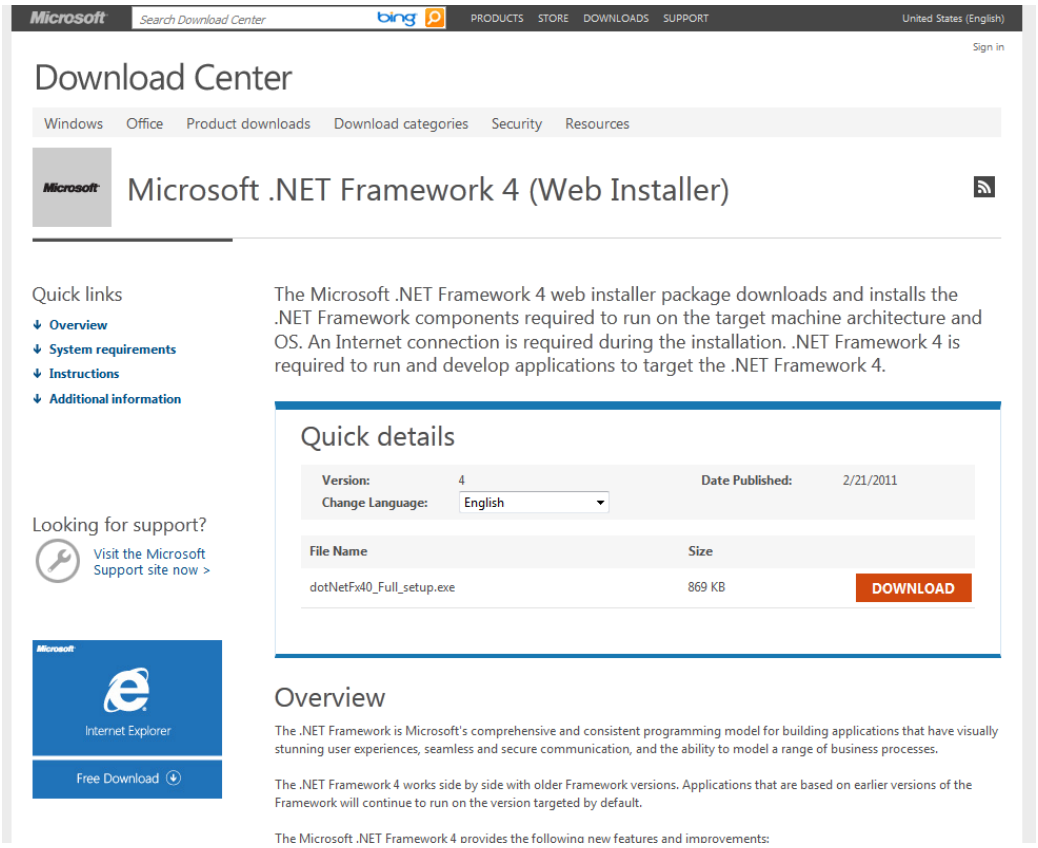


Figure 43: Microsoft.Net Framework Web Installer screen

3. Next execute the download file. You will be prompted with the .Net Framework 4.0 License Agreement. Click the checkbox "I have read and accept the license terms.", then click "Next".

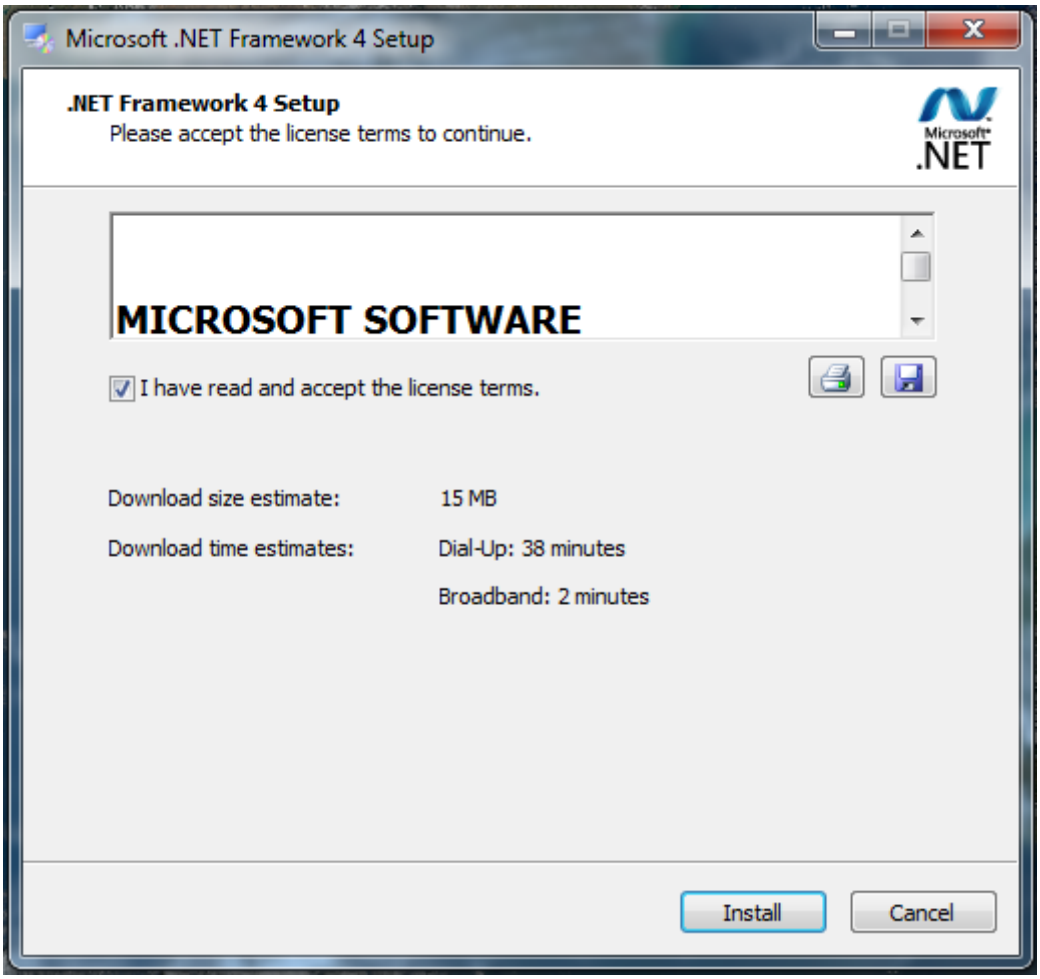


Figure 44: .Net Framework setup screen

4. The installer should begin downloading and installing .Net Framework 4.0.

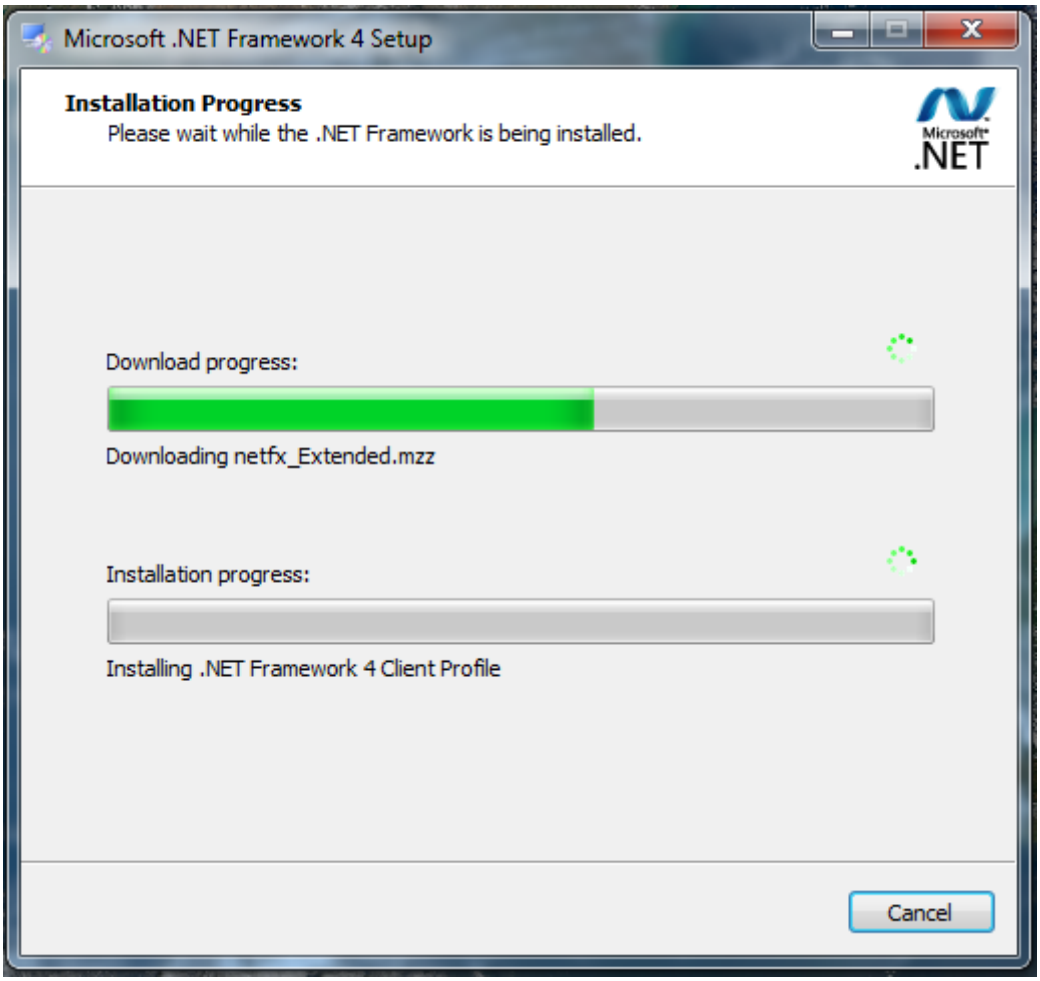


Figure 45: .Net Framework Installation screen

5. After a few minutes the download and install should be complete. You will be prompted with a window confirming that .Net Framework 4.0 has been installed. Click “Finish” to close the window.

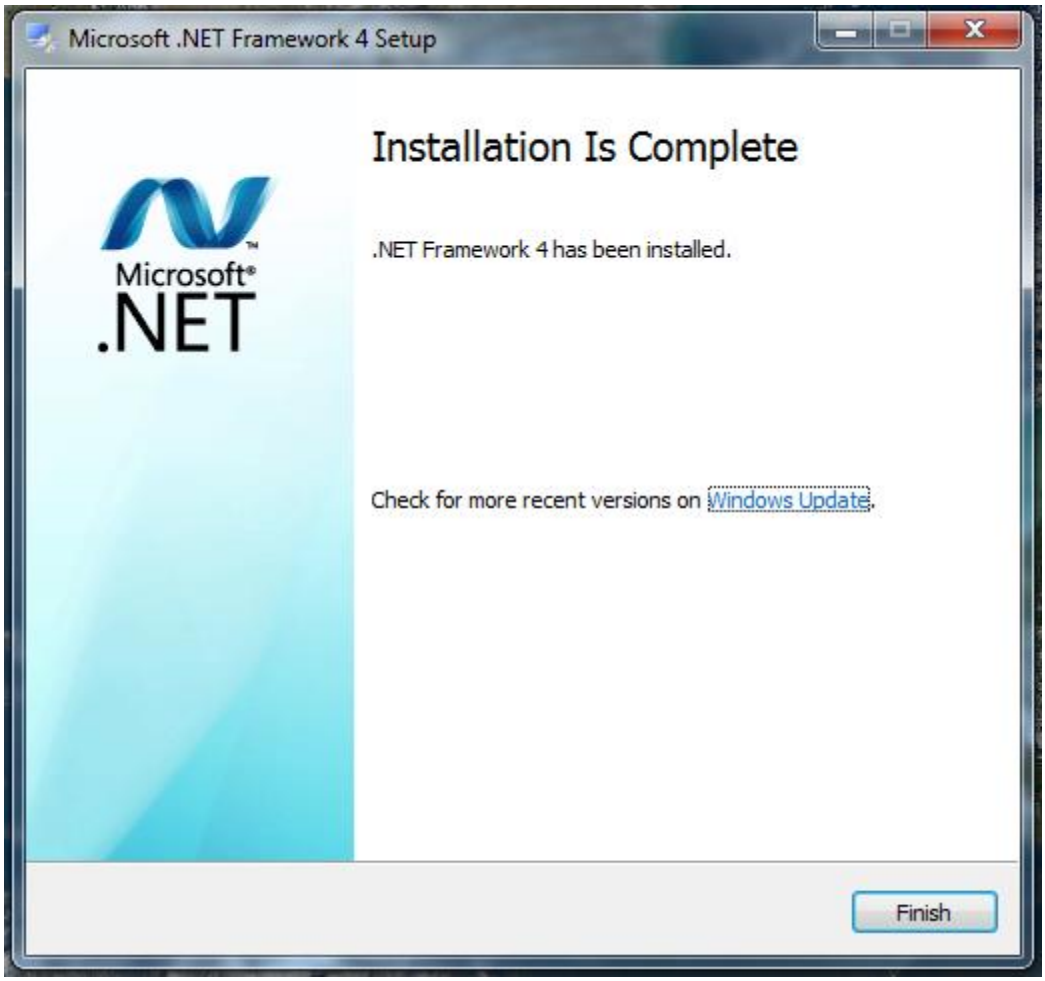


Figure 46: .Net Framework installation finished screen

2.5 Process to Install API named ICWFDS application

To install the API application, follow the below given steps below:

1. Open the setup folder in windows explorer
2. Go to setup >ICWFDS_Nepal folder.
3. Copy all the contents of this folder and paste in C:\inetpub\wwwroot\
4. Copy NepalAdvsioryService from setup folder to C:\inetpub\wwwroot\ ICWFDS_Nepal
5. Copy WeatherForecast from setup folder to any available drive
6. Launch IIS Manager and expand to “Default Web Site” as shown in Figure 47.

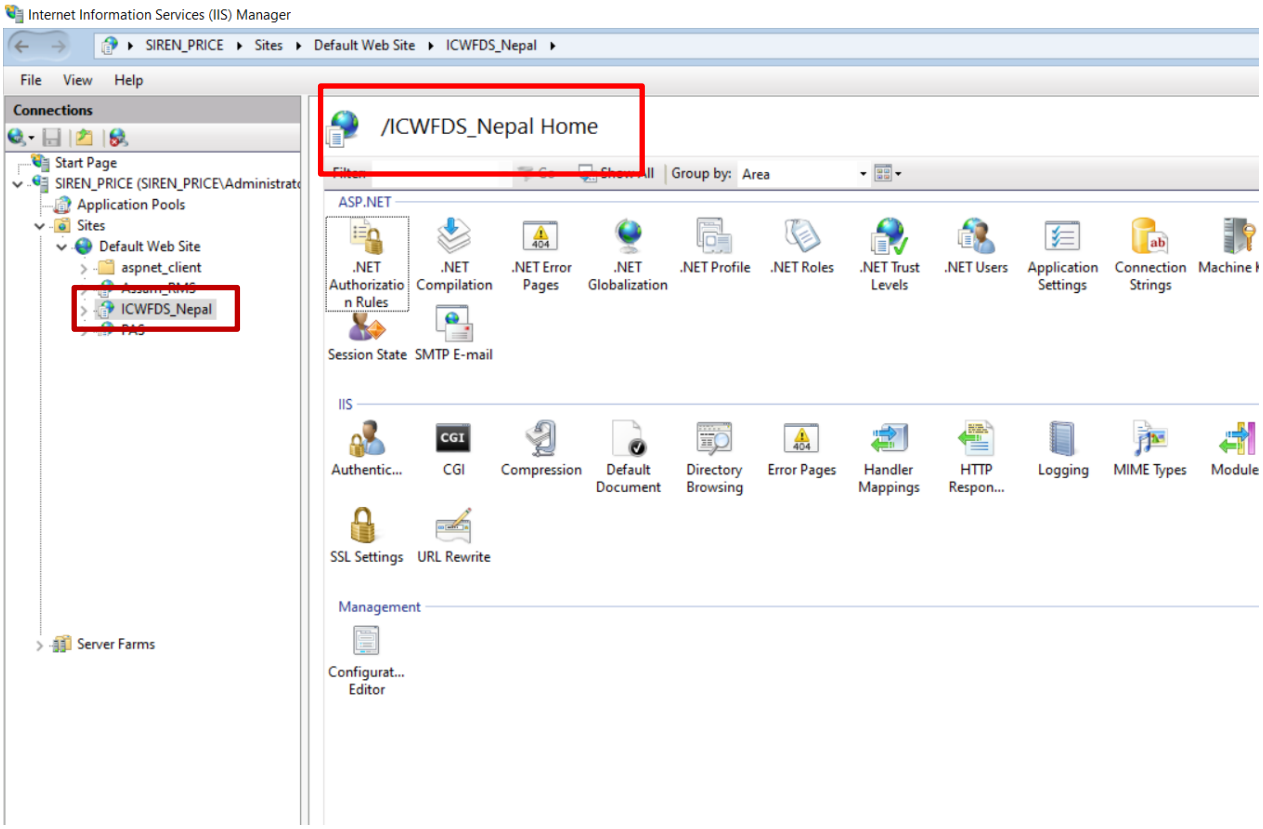


Figure 47: IIS Manager screen

Step 7) Right click on **ICWFDS folder** and select "Convert to Application" sub menu items. Press "OK" button in the dialog box.

2.6 GeoServer Installation

2.6.1 Installation through exe.

- Download GeoServer from the given URL http://geoserver.org/download/ -- Windows Installer
- Once downloaded, double click on the .exe file where GeoServer is downloaded.
- Make sure you have a Java Runtime Environment (JRE) installed on your system. GeoServer requires a **Java 11** or **Java 17** environment, as provided by Adoptium Windows installers.

  Note: For more information about Java and GeoServer, please see the section on Java Considerations.

- Navigate to the GeoServer Download page.
- Select the version of GeoServer that you wish to download. If you're not sure, select Stable release. This documentation covers GeoServer 2.25-SNAPSHOT which is under development and is available as a Nightly release.

Nightly releases are used to test out try out new features and test community modules and do not provide a windows installer. When GeoServer 2.25.0 is released, a windows installer will be provided.

- Click the link for the Windows Installer.

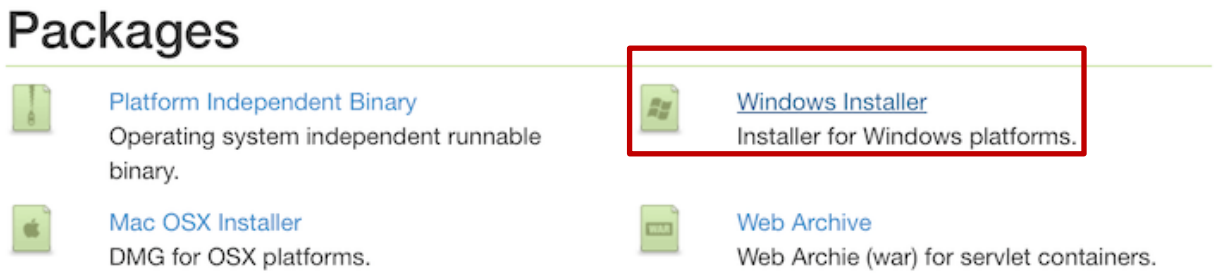


Figure 48: Windows Installer download screen

- After downloading, double-click the file to launch.
- At the Welcome screen, click Next.

Figure 49: Geoserver Welcome screen

- Read the License and click I Agree.

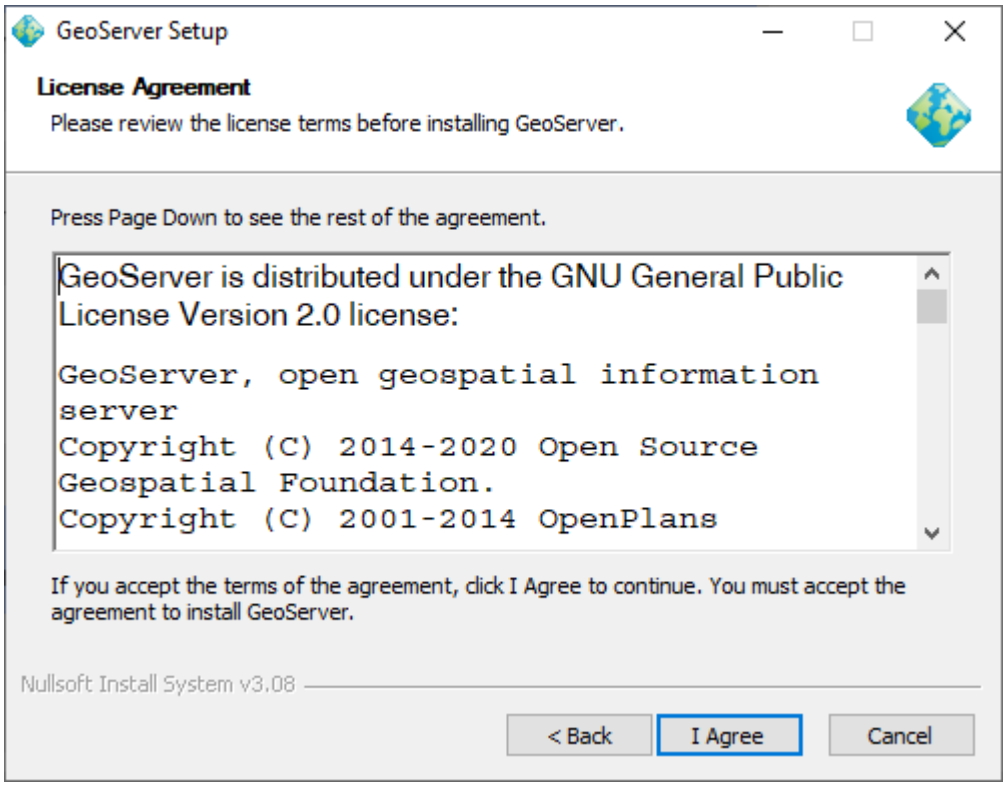


Figure 50: Geoserver License screen

- Select the directory of the installation, then click Next.

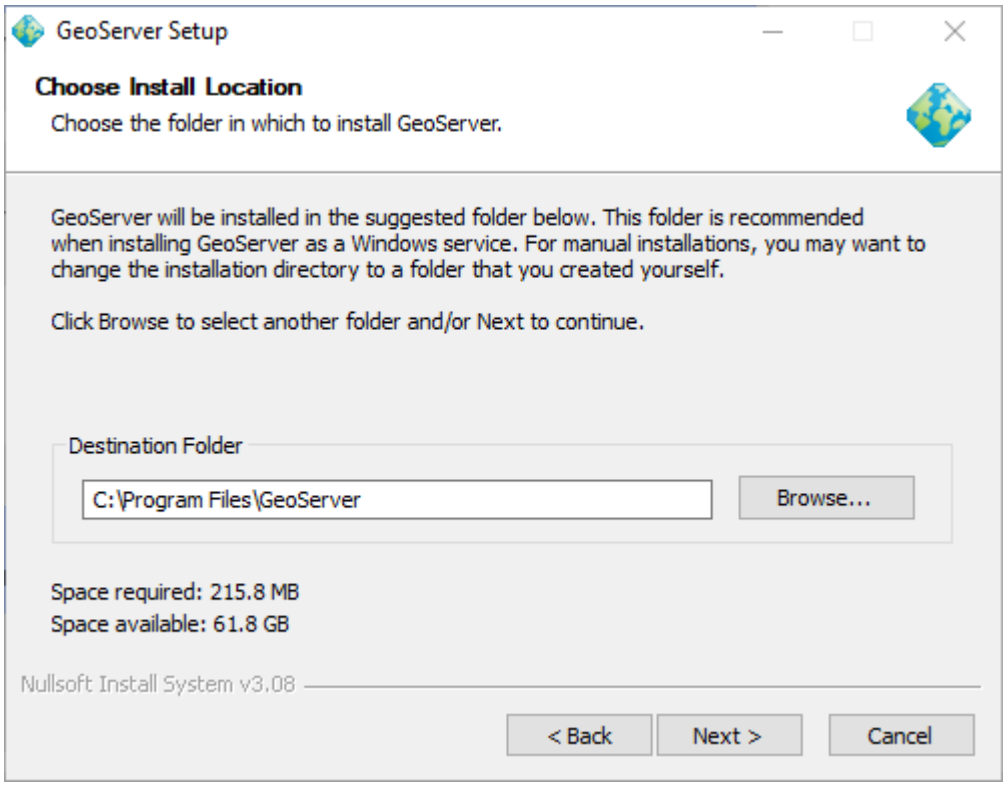


Figure 51: GeoServer install directory screen

- Select the Start Menu directory name and location, then click Next.

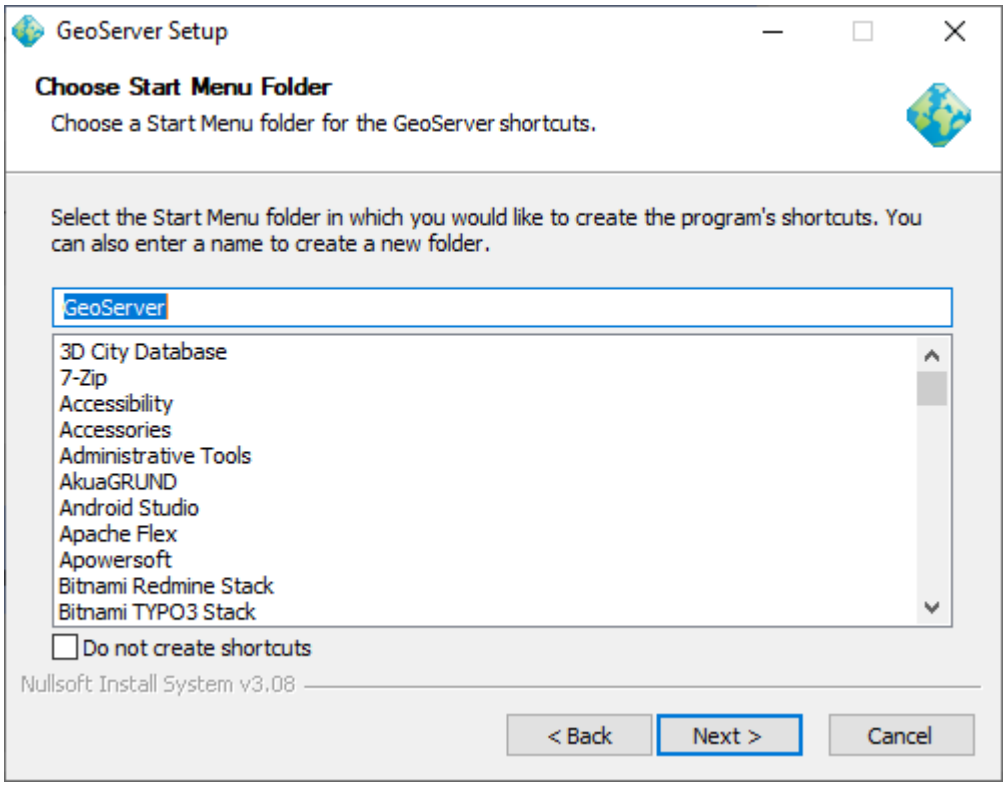


Figure 52: GeoServer Start menu location screen

- Enter the path to a **valid Java Runtime Environment (JRE)**. GeoServer requires a valid JRE in order to run, so this step is required. The installer will inspect your system and attempt to automatically populate this box with a JRE if it is found, but otherwise you will have to enter this path manually. When finished, click Next.

  Note: A typical path on Windows would be C:\Program Files\Java\jre8.
  Note: Don't include the \bin in the JRE path. So if java.exe is located at C:\Program Files (x86)\Java\jre8\bin\java.exe, set the path to be C:\Program Files (x86)\Java\jre8.
  Note: For more information about Java and GeoServer, please see the section on Java Considerations.

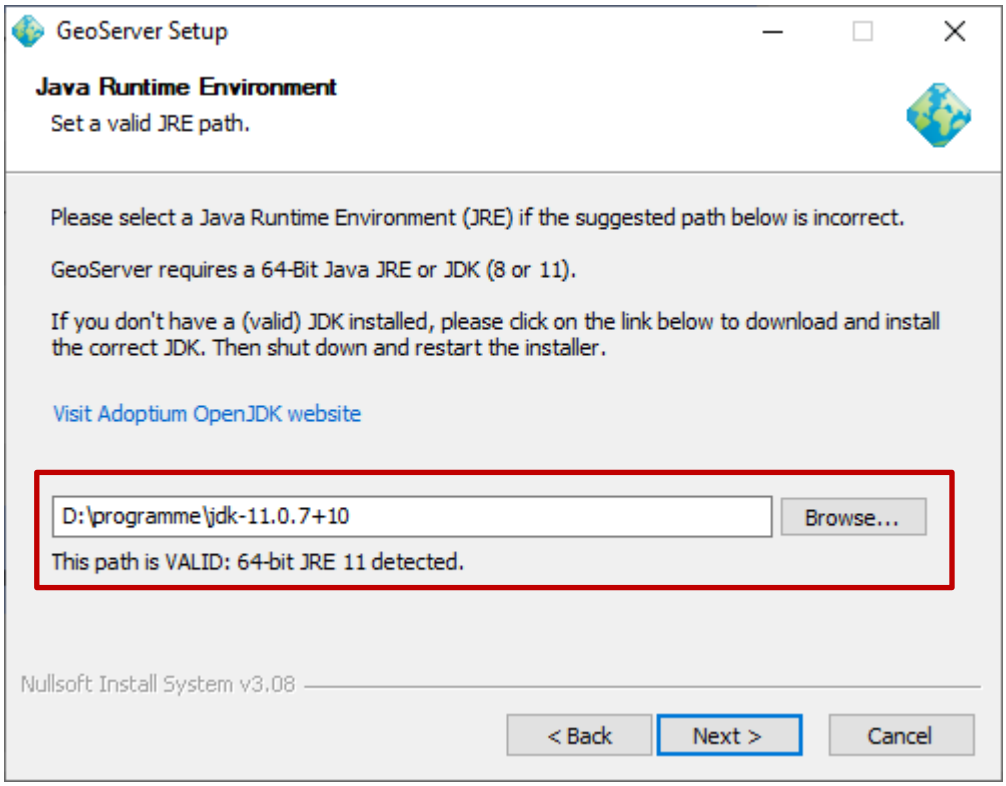


Figure 53: GeoServer selecting a valid JRE screen

- Enter the path to your GeoServer data directory or select the default. If this is your first time using GeoServer, select the Default data directory. When finished, click Next.

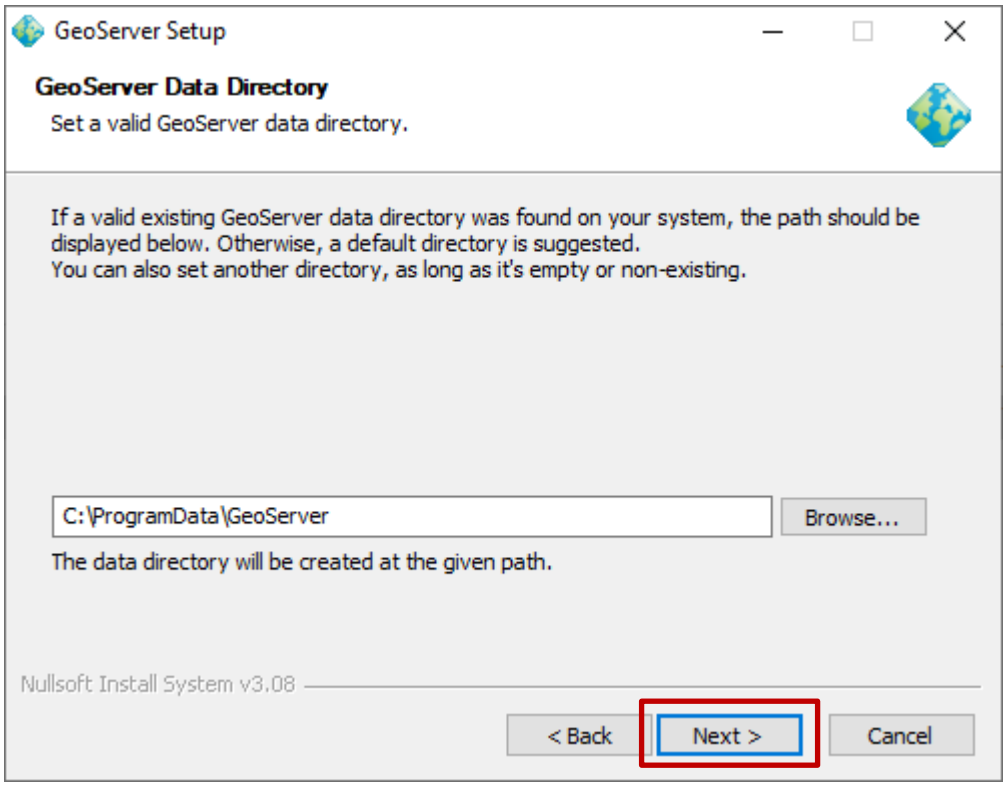


Figure 54: Setting a Geoserver data directory screen

- Enter the username and password for administration of GeoServer. GeoServer's Web administration interface requires authentication for management, and what is entered here will become those administrator credentials. The defaults are admin / geoserver. It is recommended to change these from the defaults. When finished, click Next.

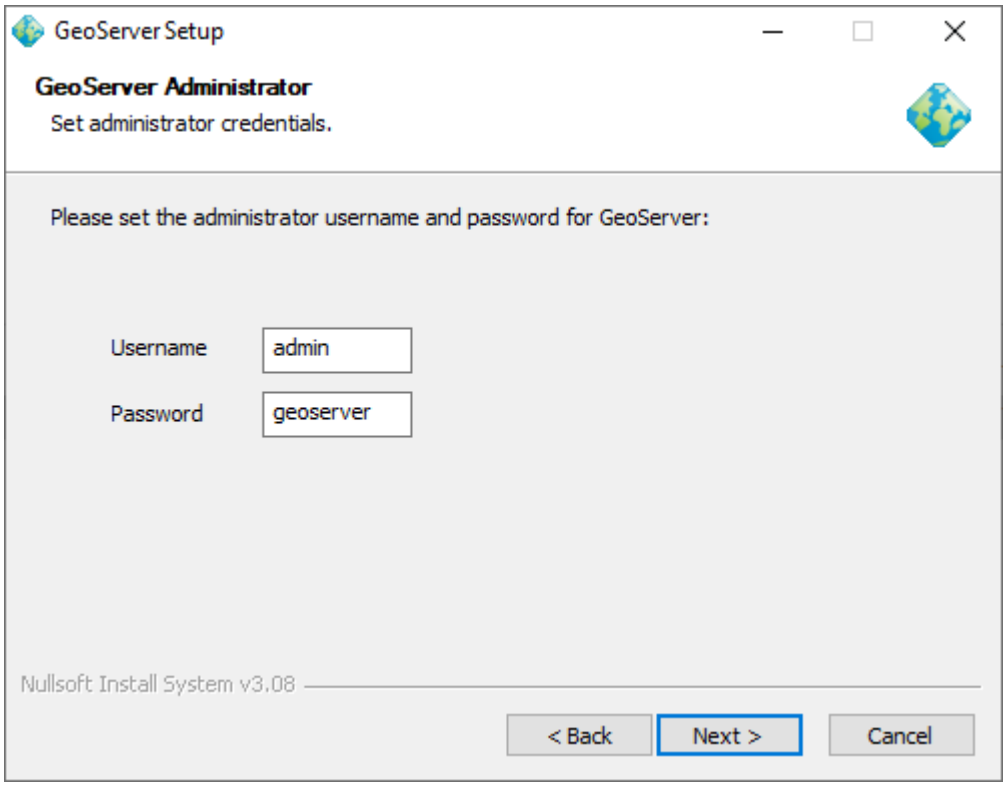


Figure 55: Setting the Username and Password for Geoserver administration screen

- Enter the port that GeoServer will respond on. This affects the location of the GeoServer Web administration interface, as well as the endpoints of the GeoServer services such as Web Map Service (WMS) and Web Feature Service (WFS). The default port is 8080, though any valid and unused port will work. When finished, click Next.

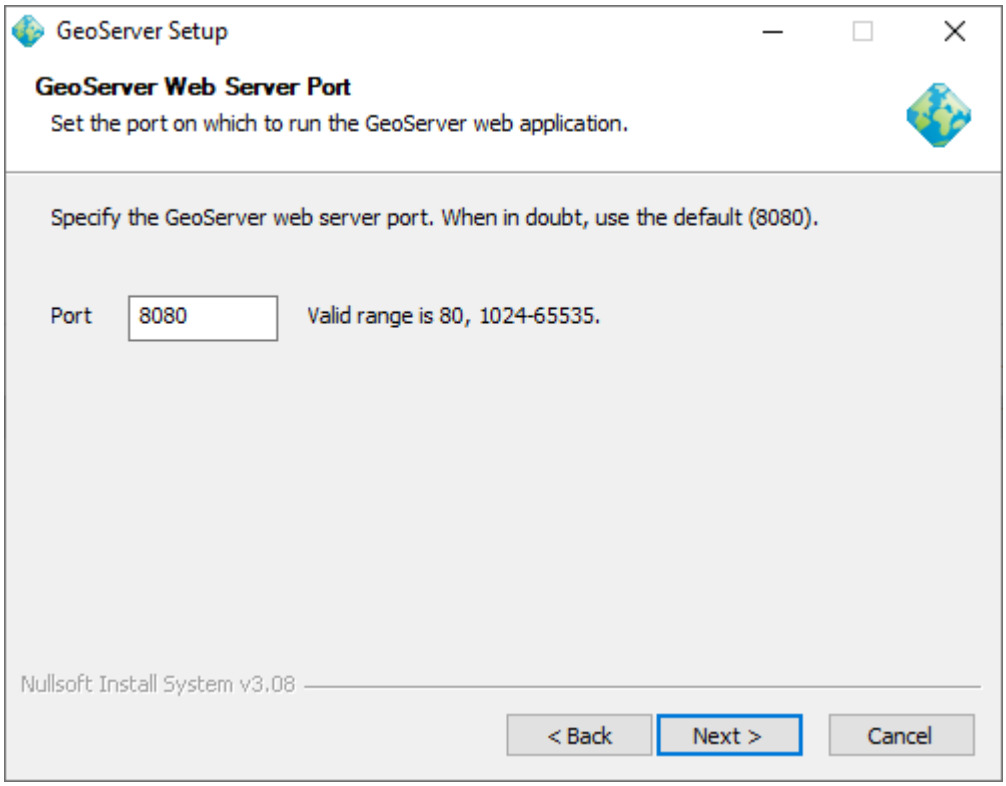


Figure 56: Setting the GeoServer port screen

- Select whether GeoServer should be run manually or installed as a service. When run manually, GeoServer is run like a standard application under the current user. When installed as a service, GeoServer is integrated into Windows Services, and thus is easier to administer. If running on a server, or to manage GeoServer as a service, select Install as a service. Otherwise, select Run manually. When finished, click Next.

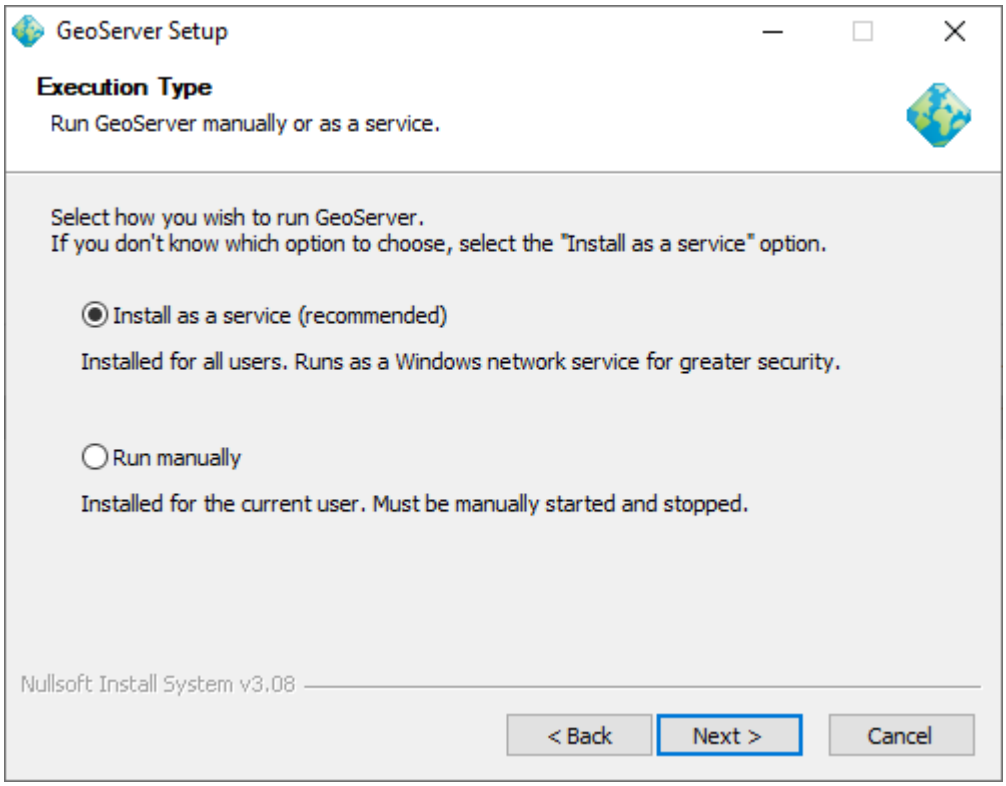


Figure 57: Installing GeoServer as a service screen

- Review your selections and click the Back button if any changes need to be made. Otherwise, click Install.

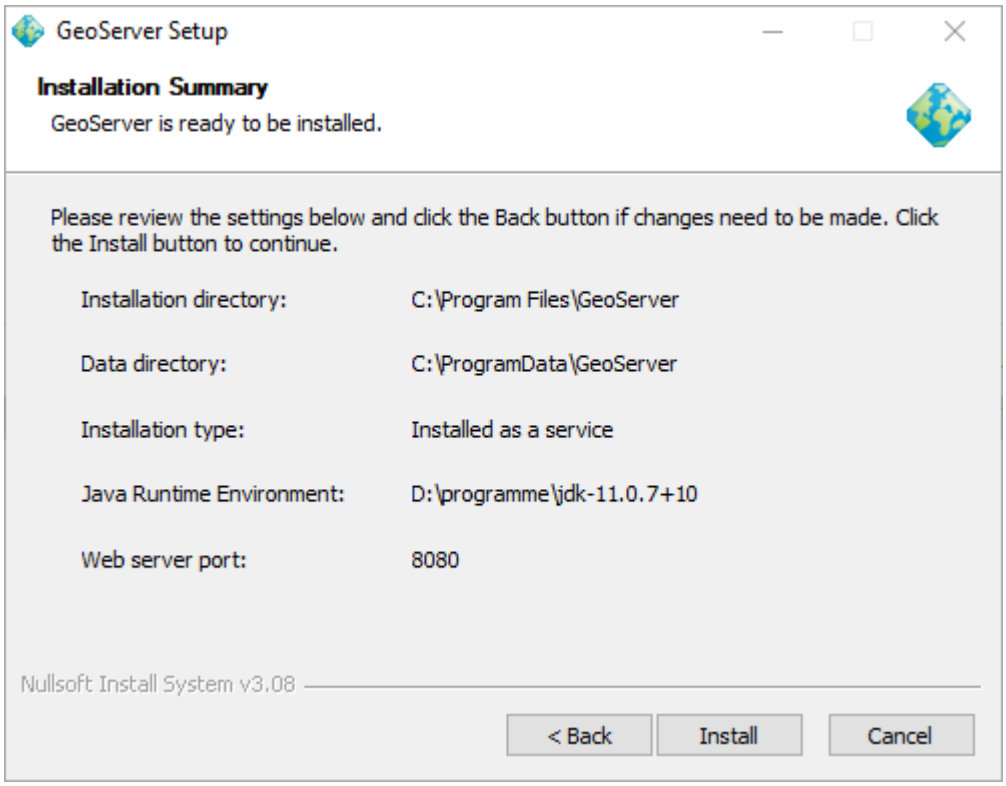


Figure 58: Verifying Settings of GeoServer screen

- GeoServer will install on your system.

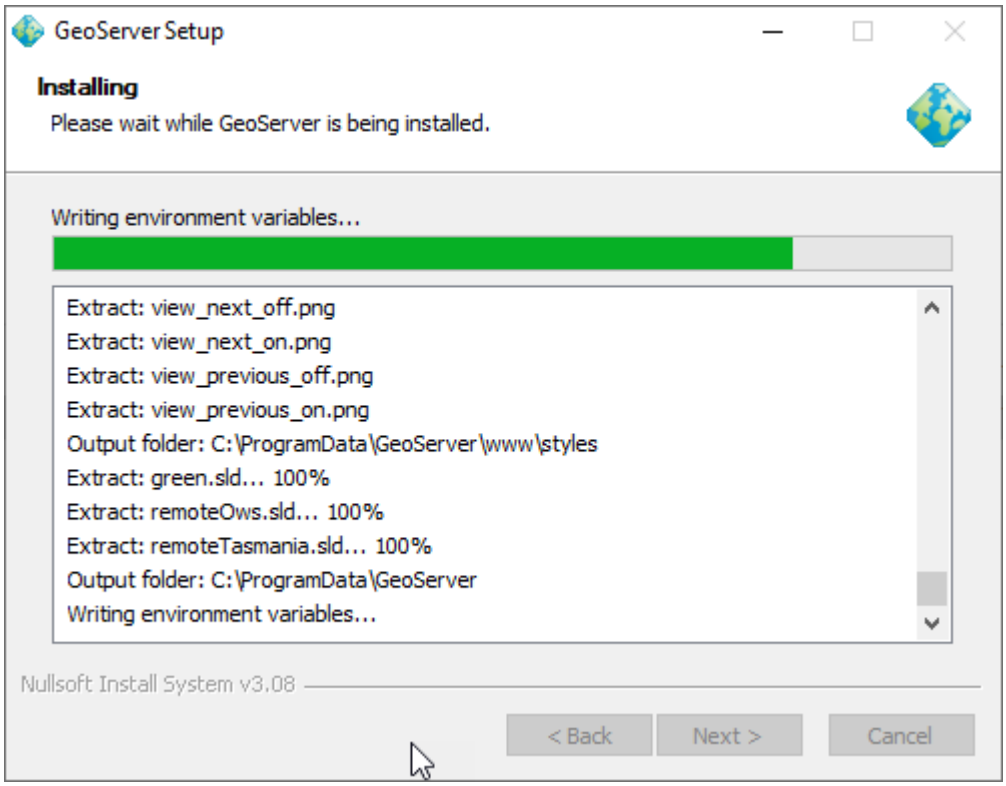


Figure 59: GeoServer Installation Progress screen

- When finished, click Finish to close the installer.

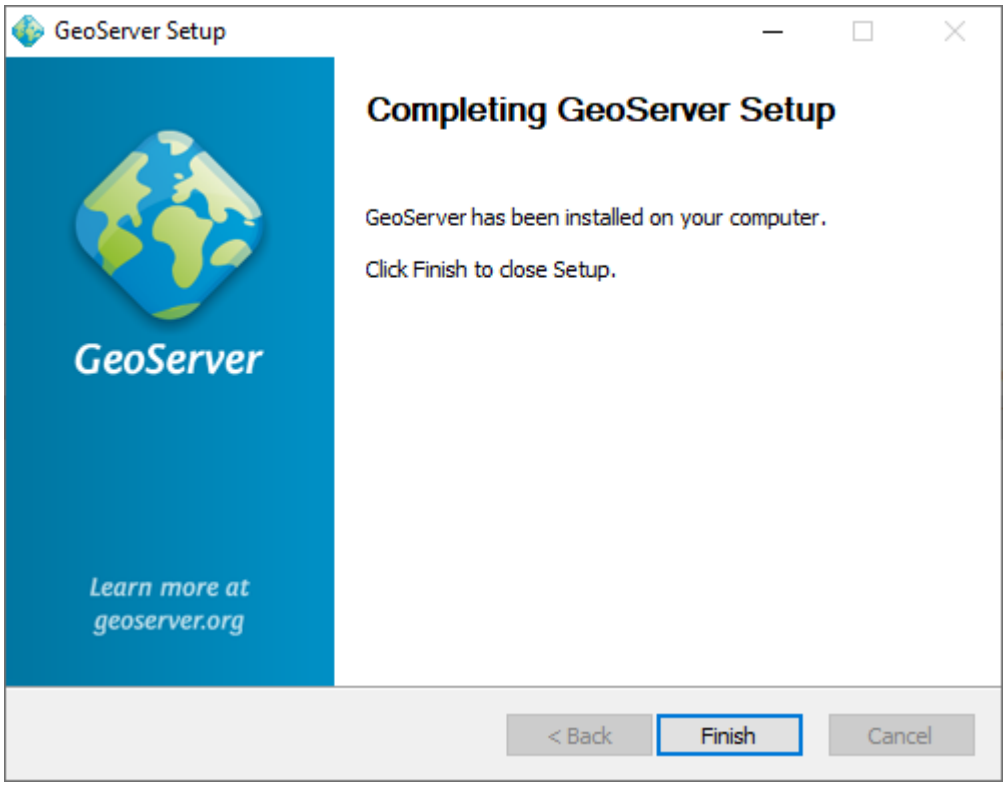


Figure 60: Completing GeoServer Setup screen

- If you installed GeoServer as a service, it is already running. Otherwise, you can start GeoServer by going to the Start Menu, and clicking Start GeoServer in the GeoServer folder.
- Navigate to http://localhost:8080/geoserver (or wherever you installed GeoServer) to access the GeoServer Web administration interface.

  If you see the GeoServer Welcome page, then GeoServer is successfully installed.

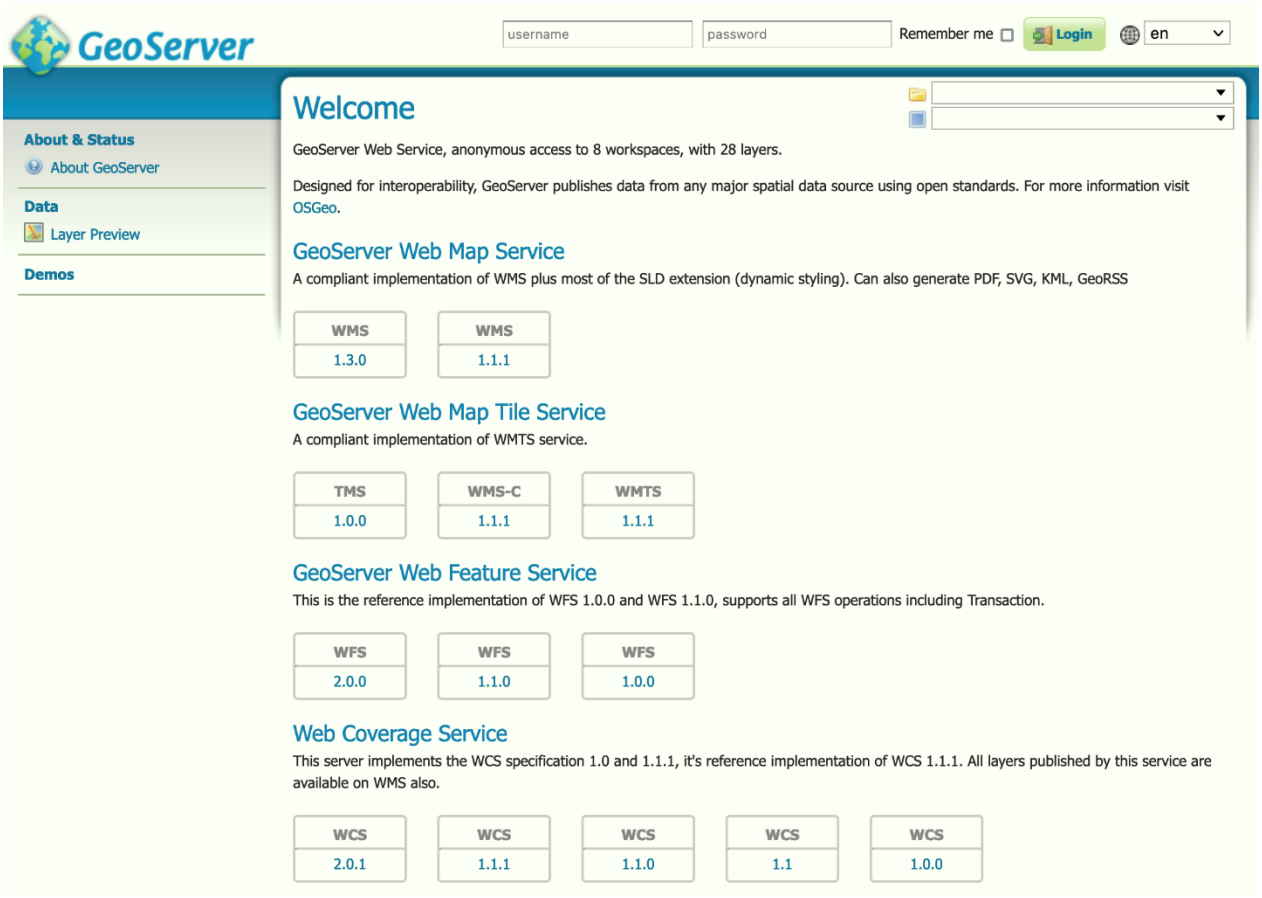


Figure 61: GeoServer Welcome Page screen

Installation of the required applications to run the API is finished!!!

3 Process to Manage and Maintain the API

3.1 Maintenance of Database and Map server

3.1.1 Database

This section presents the database structure of API by providing a high-level view of the application. It provides insight about the database backup, restoration, and maintenance.

3.1.1.1 Database Backup

Backups serve as a safety net in case of data loss or corruption. They allow you to restore your database to a previous state, minimizing downtime and potential data loss in case of system failures, accidental data deletion, or other issues.

Backups are crucial for disaster recovery scenarios, such as hardware failures, natural disasters, or cyberattacks. With a recent backup, you can quickly rebuild your database and resume operations as shown in Figure 62.

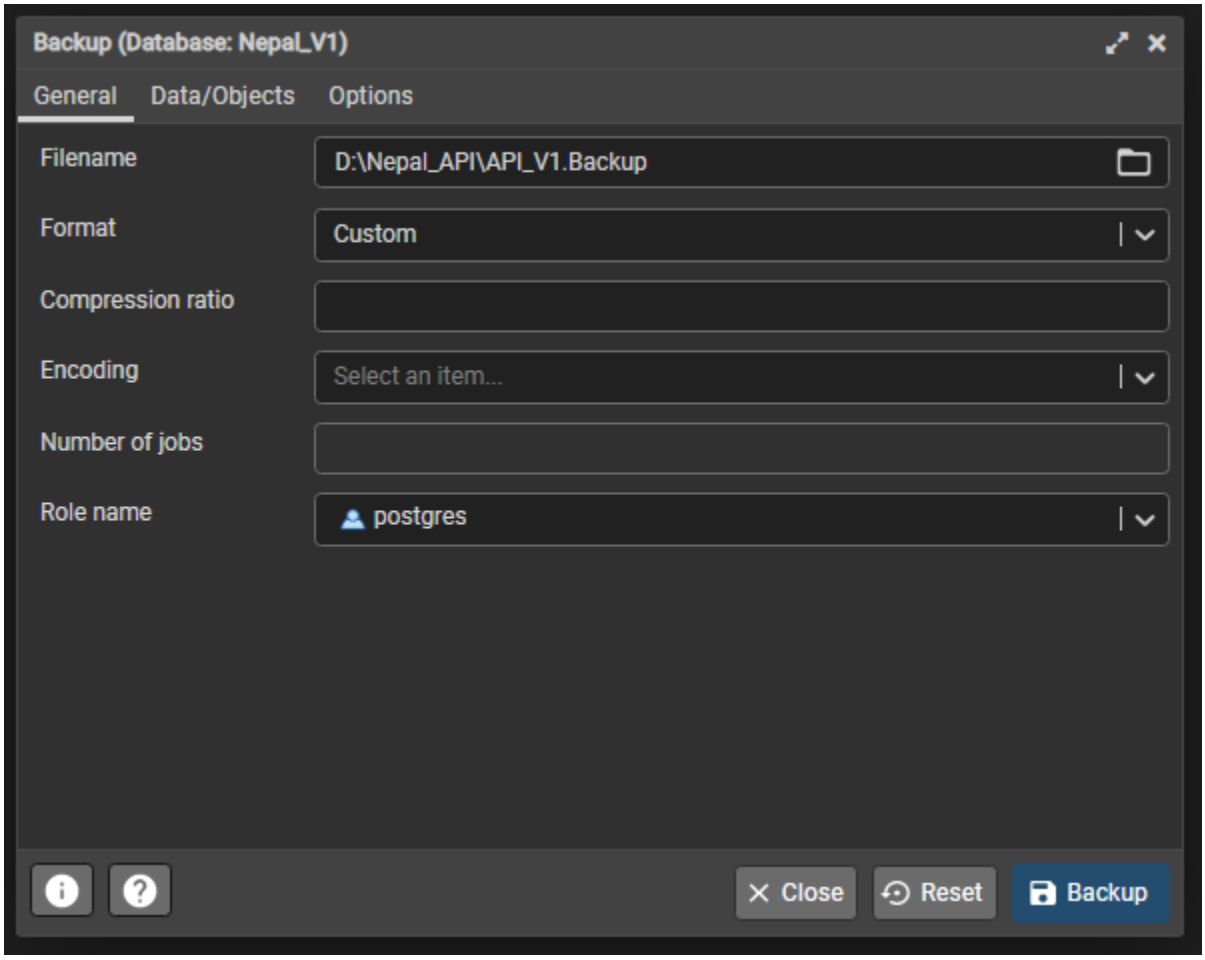


Figure 62:Database backup screen

3.1.1.2 Database Restoration

Restoring a database in PostgreSQL offers several benefits, which are closely related to the reasons for taking backups in the first place. Database restoration is the process of returning a database to a previous state using backup files, and the benefits include:

Data Recovery: The primary benefit of database restoration is the ability to recover your data in case of data loss, data corruption, or accidental deletion. It allows you to revert the database to a known good state, minimizing the impact of unexpected issues.

When migrating to a new server or upgrading PostgreSQL to a new version, database restoration simplifies the process. You can create a backup on the old system and then restore it on the new one, ensuring data continuity as shown in Figure 63.

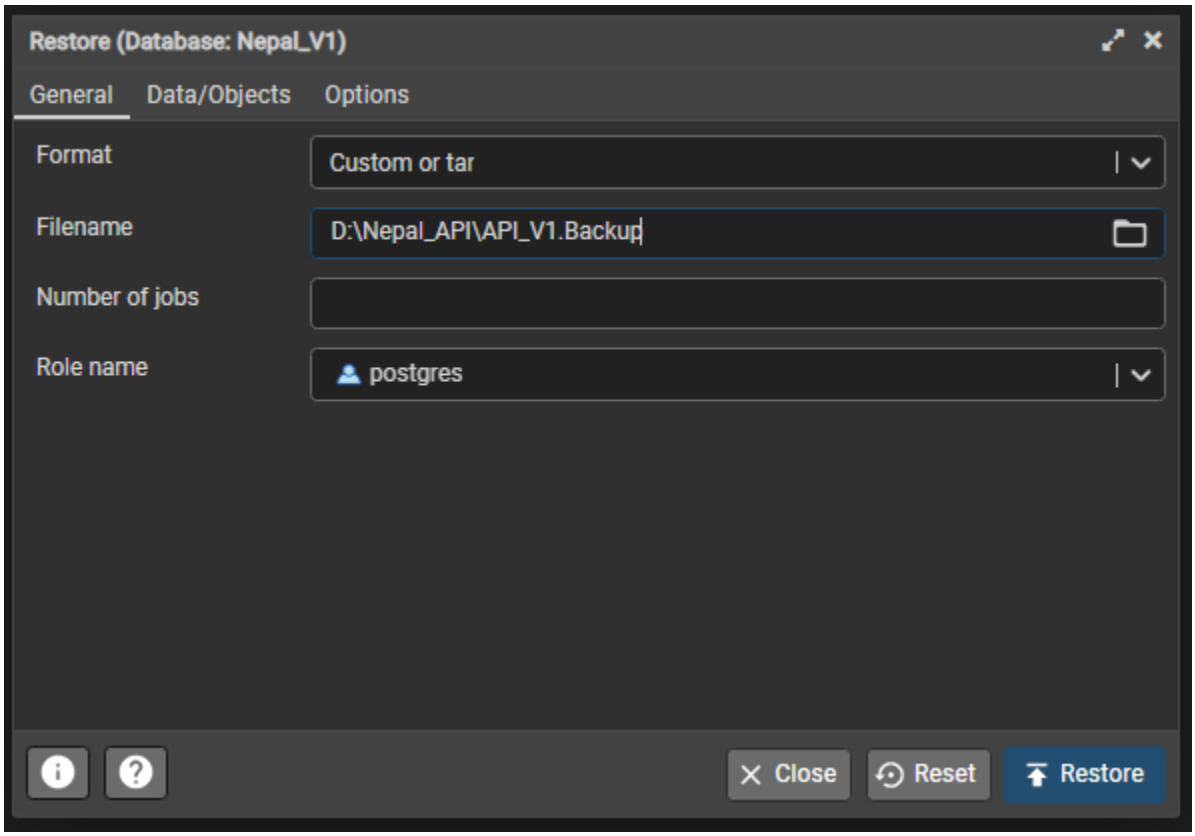


Figure 63:Restore Database screen

3.1.1.3 Database Maintenance

Database maintenance helps to optimize the performance of your PostgreSQL database. It includes tasks such as vacuuming, reindexing, and analyzing, which help to reclaim space, reduce bloat, and update statistics. As a result, your queries run faster, and your database operates more efficiently as shown in Figure 64.

Over time, database tables can accumulate dead or obsolete rows, leading to data bloat. Vacuuming and other maintenance tasks remove these unnecessary data, ensuring that your database remains compact and performs well.

Maintenance tasks like reindexing help optimize database indexes. Over time, indexes can become fragmented, affecting query performance. Reindexing reorganizes the indexes, making them more efficient.

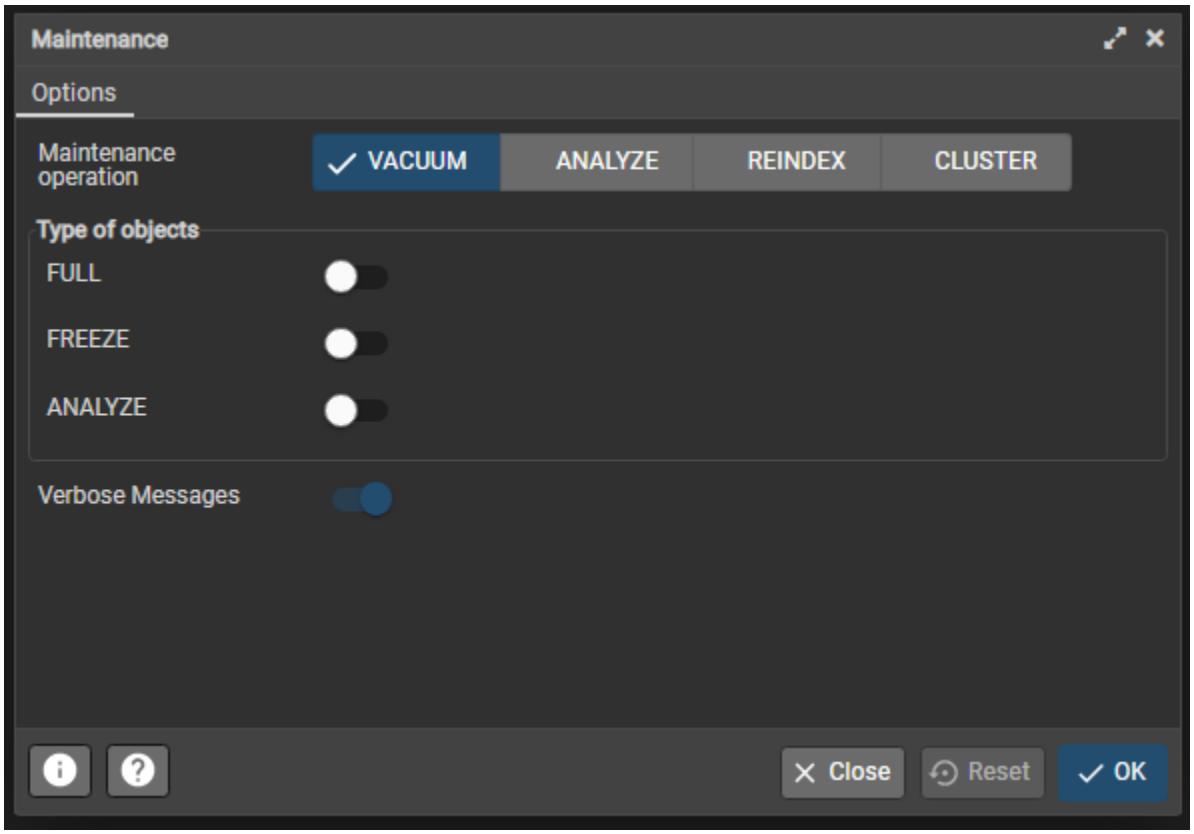


Figure 64: Database Maintenance screen

3.1.2 Map Server (Geo Server)

"Map server" typically refers to software used to serve maps and geographic data to clients. RMSI is using "GeoServer" as map server because it is a popular open-source server software specifically designed for serving geospatial data as shown in Figure 65. You can use GeoServer to publish and share your geospatial data through standard web services such as Web Map Service (WMS), Web Feature Service (WFS), and Web Coverage Service (WCS). Geoserver forms a core component of the Geospatial Web.

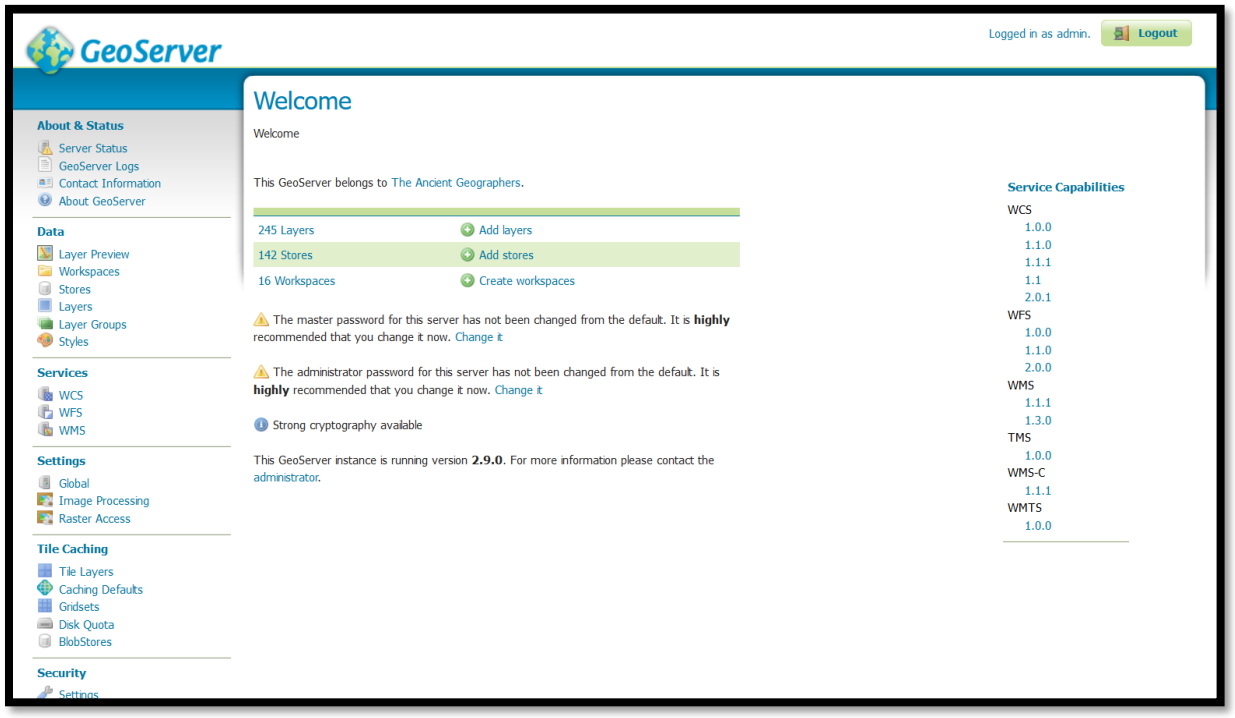


Figure 65: Geoserver screen

3.1.2.1 Map Server Layer Publication

Publishing a layer in GeoServer involves making your geospatial data available as a map layer through various Open Geospatial Consortium (OGC) web services like Web Map Service (WMS) and Web Feature Service (WFS) as shown in Figure 66.

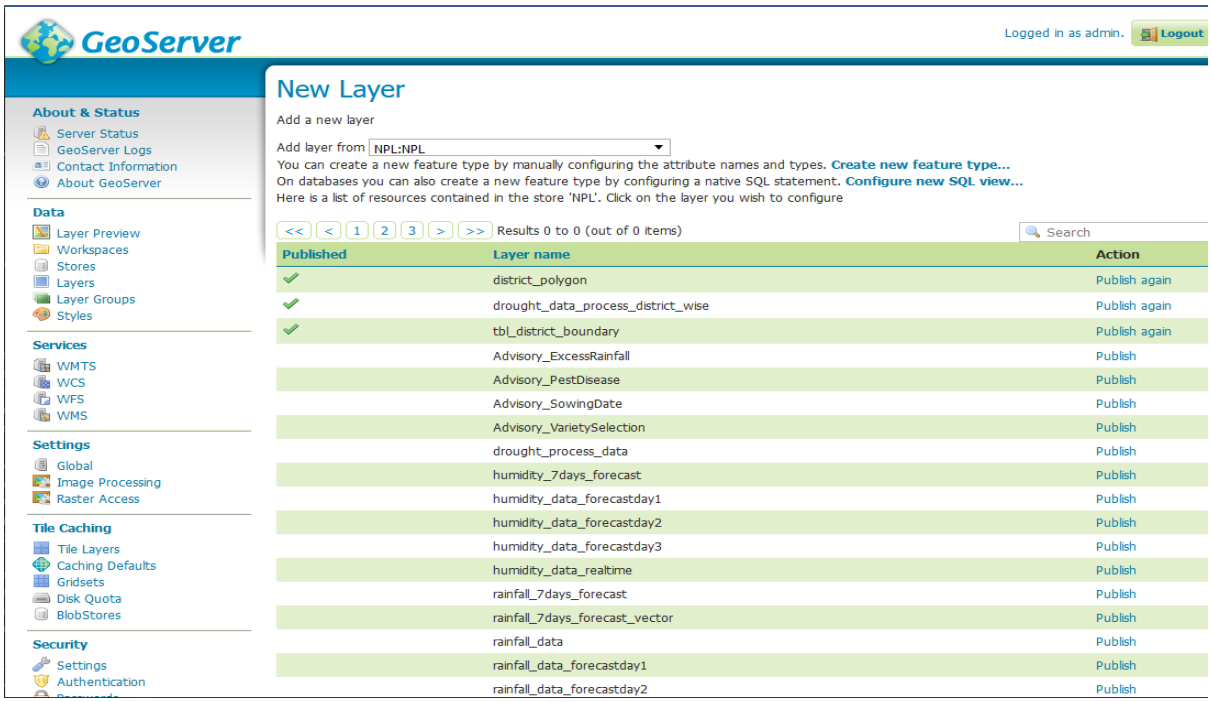


Figure 66: Layer Publication screen

3.2 Application User Flow

3.2.1 ICWFDS Dashboard

The dashboard consists of following details as shown in Figure 67.

- Home
- Climatology
- Weather Forecast
- Agrometeorological Advisory
- Climate Map
- Crop Panel
- Feedback
- Contact Us

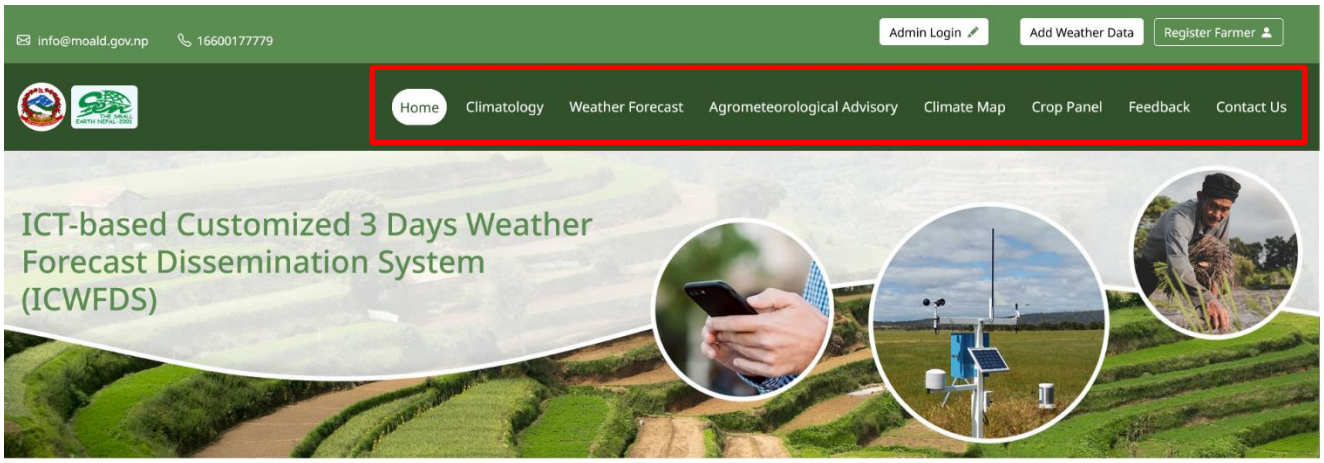


Figure 67: Application Dashboard screen

In this, the main component is Agrometeorological Advisory which has been described below.

3.2.1.1 Agrometeorological Advisory

In this section user can view the Weather Advisory and Agrometeorological advisory of the selected Province and District as shown in Figure 68.

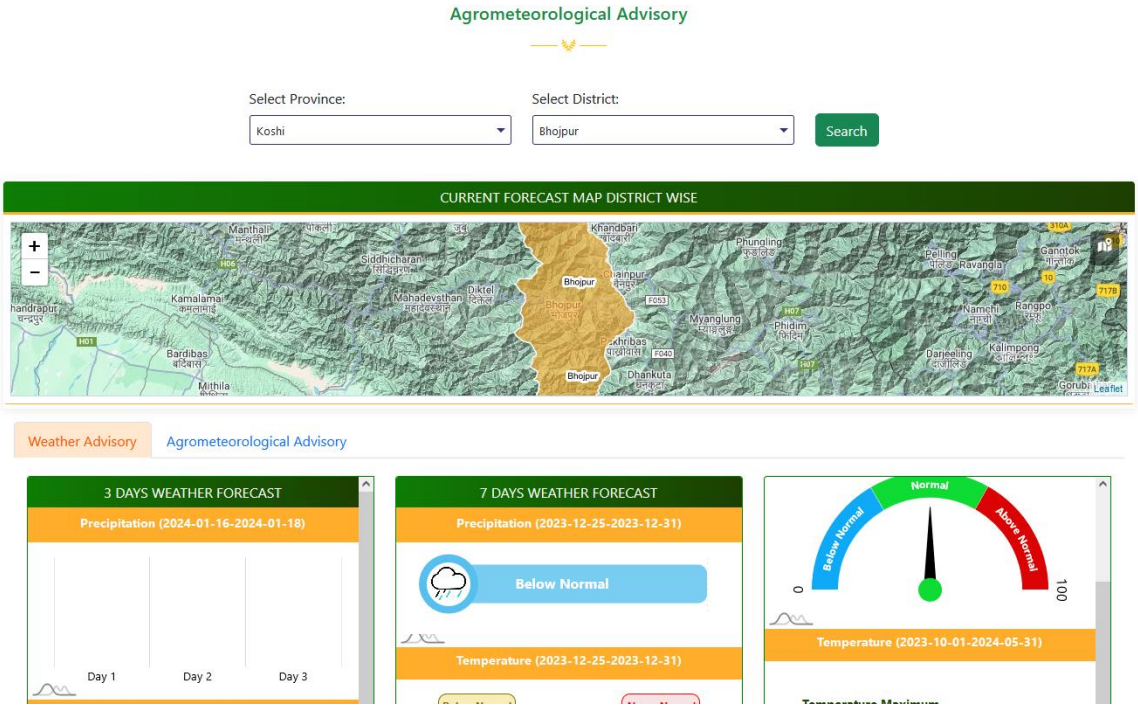


Figure 68: Agrometeorological Advisory screen

If data in the Agrometeorological Advisory is not displayed, then check for the list of tables given in Section 5.

3.3 List of Database Tables

tbl_weather_forecast_data_npl	Data for the 3 days weather forecast
tbl_weather_forecast_data_npl_seven_days	Data for the 7 days weather forecast
tbl_weather_forecast_data_npl_seasonal_days	Data for the Seasonal weather forecast
tbl_current_forecast_advisory	Showing the current Agrometrological advisory
tbl_province_boundary	Province Boundary
tbl_state_boundary	State Boundary
tbl_district_boundary	District Boundary
tbl_village_boundary	Village Boundary
tblCrop_MAJOR	Major Crops in Nepal
drought_process_data	Drought Data
tblFeedBackForm	Feedback Forms
tblCroppingseason	Cropping Seasons

3.4 Check List for the ICWFDS API

3.4.1 Check the Weather Forecast Data to application

If yes, then the next Three days, Seven Days & Seasonal forecasted Rainfall, Temperature, Windspeed, and Relative Humidity layers and data will be displayed in the application.

If No, then Check the data on the ADMIN Panel of the **Add Weather Data.**

3.4.2 Check the Advisory Data on the Website

If yes, then the next Three days, Seven Days and seasonal forecasted Rainfall, Temperature, Windspeed, Relative Humidity Agrometeorological Advisory and data will be displayed in the application.

If No, then Check the data on the ADMIN Panel of the **Add Weather Data.**

3.4.3 Check the Server for the application

If yes, then observe the server for the proper Planned Restart.

If No, then check for the Application using the link, and check the data.

3.5 Troubleshooting

3.5.1 Web Application

Troubleshooting an ASP.NET CORE web API involves identifying and resolving issues that affect the application's functionality, performance, or security. If we receive the **Not Found Error** after hit the URL of the application, then user should check the Web Server (IIS) as shown in Figure 67.

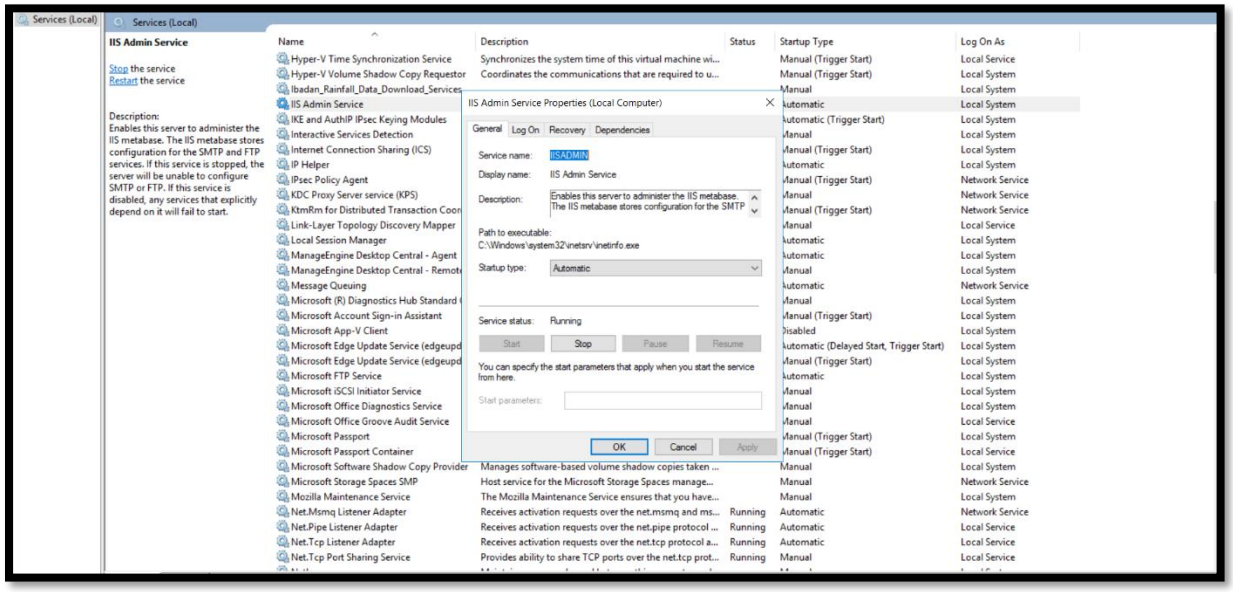


Figure 69: Web Server (IIS) screen

If in the image shows start button disable mean IIS is running and if start button is enable then just click on start button for starting the IIS service.

3.5.2 GeoServer

GeoServer is a powerful tool for serving geospatial data, but like any software, it can encounter issues. Troubleshooting GeoServer typically involves identifying and resolving problems related to configuration, data sources, services, and performance. If GeoServer is not accessible then firstly user should check the service status of the GeoServer as shown in the Figure 70.

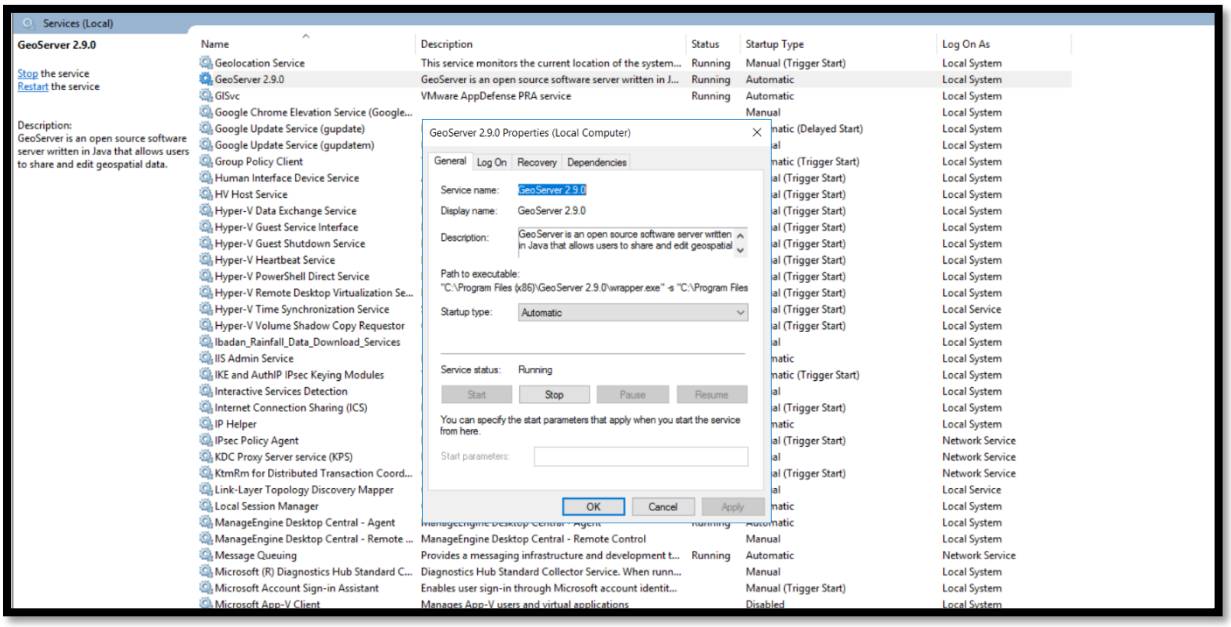


Figure 70: GeoServer Services screen

3.5.3 Database

Troubleshooting a PostgreSQL database involves identifying and resolving issues related to data integrity, performance, configuration, security, and more. For the resolving firstly check the Database service in the windows service as shown in Figure 71.

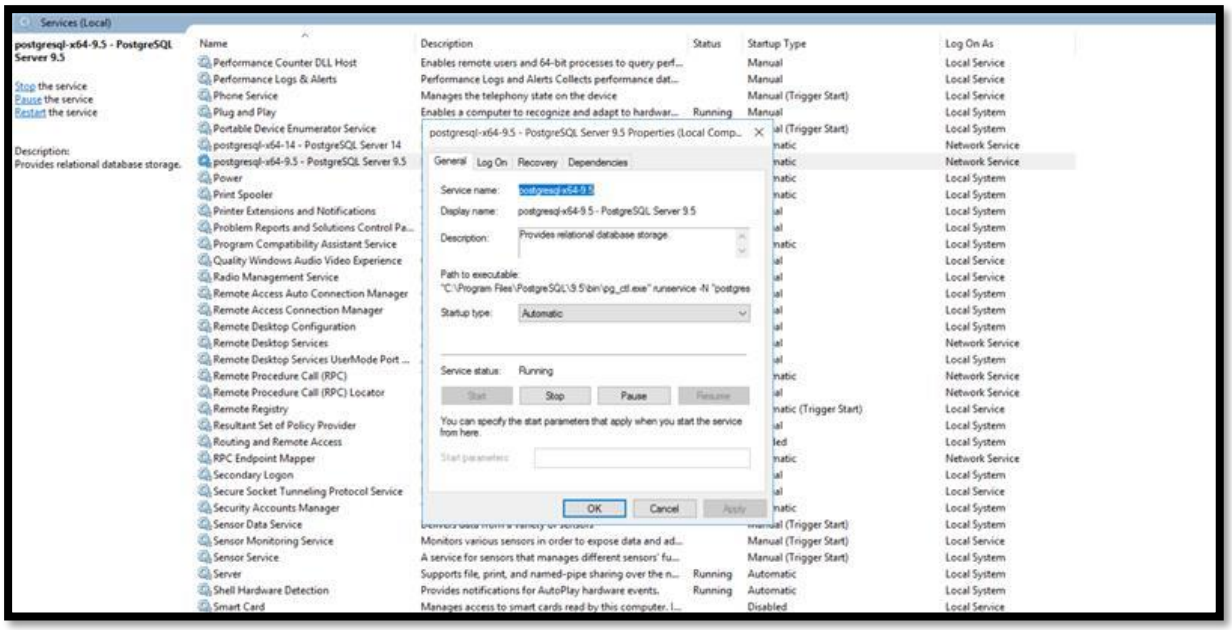
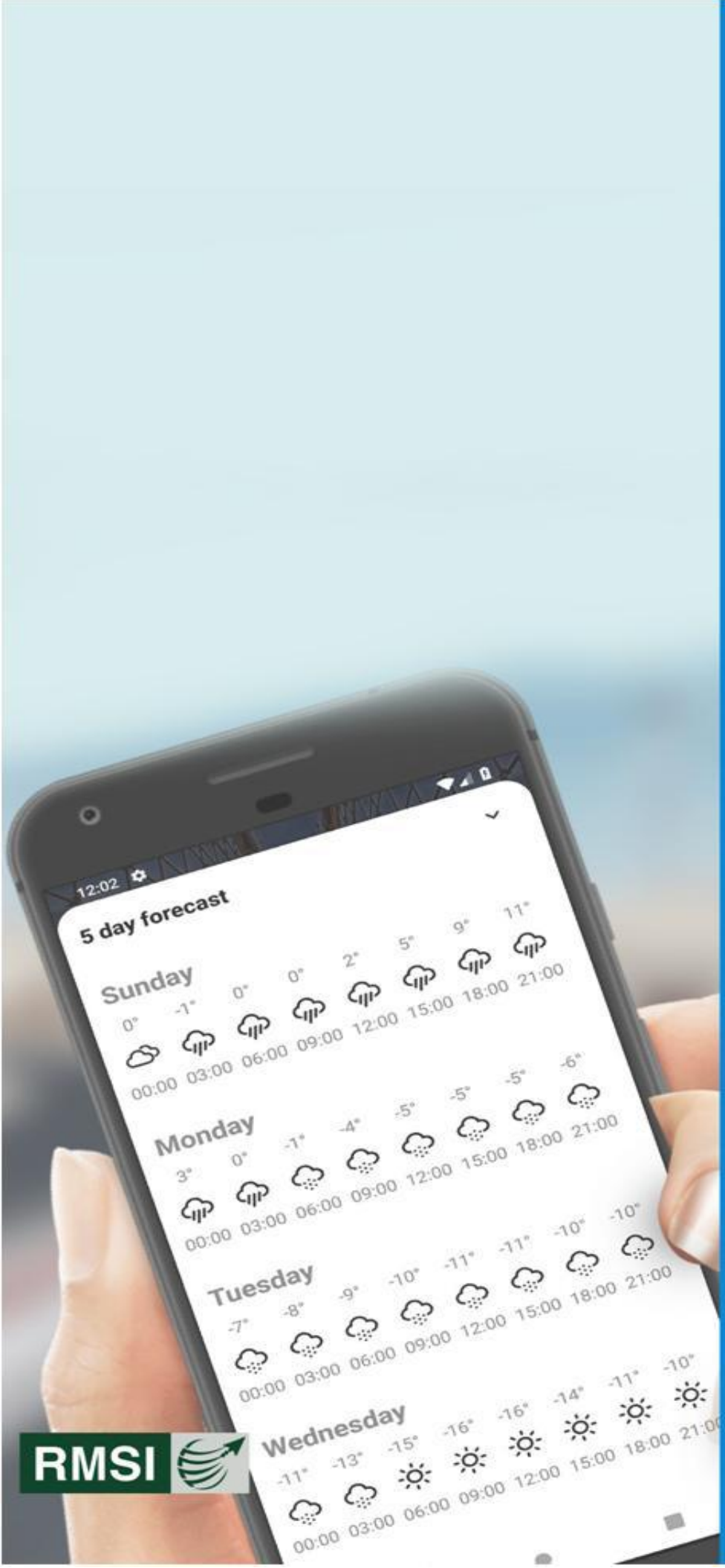


Figure 71: Database Services screen



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