Agro-Climatic Advisory Portal (ACAP)-Bicol User Manual

ACAP Admin Pages

ACAP's Admin pages consist of several admin-level tools for updating its seasonal outlook, cyclone weather, and 10-day weather forecast settings in its ACAP Settings module. These pages allow admins to manually update several parts of weather forecast information displayed on the public pages or data rendered on the PDF bulletins. Data updating is available thru manual user input, excel file uploads, or by instructing the system to conduct instant PAGASA data syncing (done automatically at scheduled time intervals) with the press of a button.
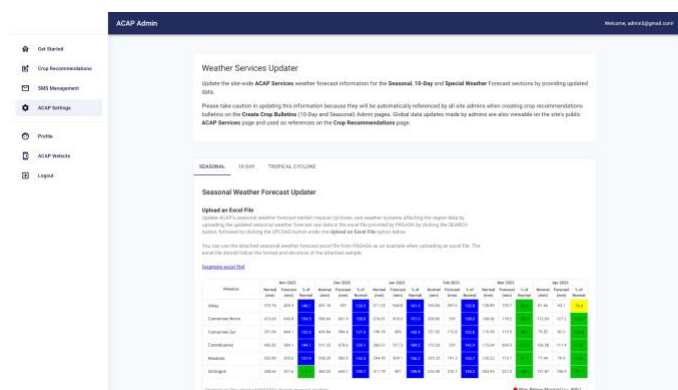

Figure 1.0 ACAP Settings

The Admin Crop Recommendations modules allow admins to generate, preview, create and upload seasonal, 10-day outlook, and special weather PDF bulletins with weather forecast data referenced from each respective ACAP weather forecast data, cropping calendar, and pre-processed crop recommendations data by crop experts.
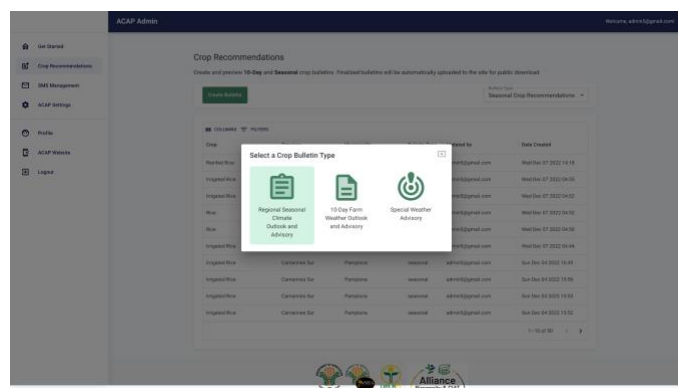

Figure 2.0 Crop Recommendations - Create bulletin prompt

The Admin SMS Management module allows admins to send an SMS text to their ACAP Phonebook contacts about a specific seasonal, the 10-day outlook, or the cyclone weather bulletin PDF.
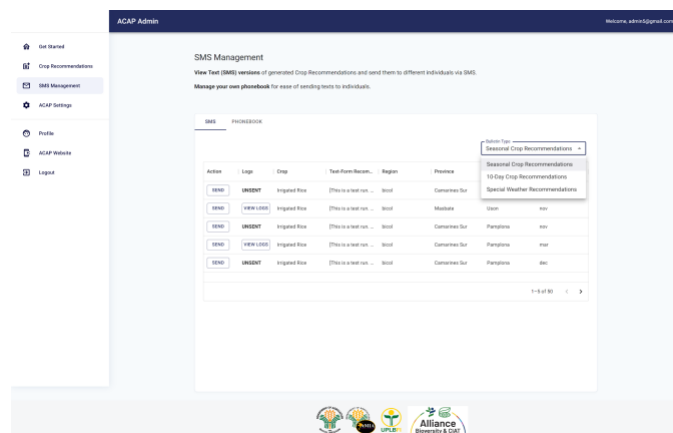

Figure 3.0 SMS Management

ACAP's admin pages require user authentication and login. A sole super admin account creates admin user accounts by request. Creating user accounts will be discussed in more detail in the following sections.

Updating the ACAP Services (Forecasts)

The ACAP Settings module contains a user interface (UI) for updating the (3) three weather forecast data sources used by ACAP as a reference, namely the Seasonal, 10-Day, and Tropical Cyclone weather forecasts.

An admin must first sign in to his account to access the private ACAP Admin pages to access these settings, after which they can update each weather forecast data as described in the following sections.

Admin Sign-In

1. First, request for an ACAP admin account from an ACAP superadmin. An ACAP superadmin is someone who has granted permissions to create ACAP admin accounts from the ACAP super admin dashboard, accessible on https://amia-cis.github.io/superadmin
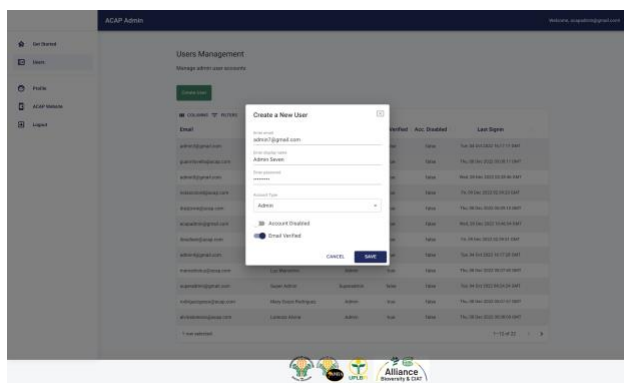
Figure 4.0 ACAP super admin dashboard

2. Signin to the ACAP Admin pages on https://amia-cis.github.io/admin/login/ using the login credentials provided by the ACAP superadmin.
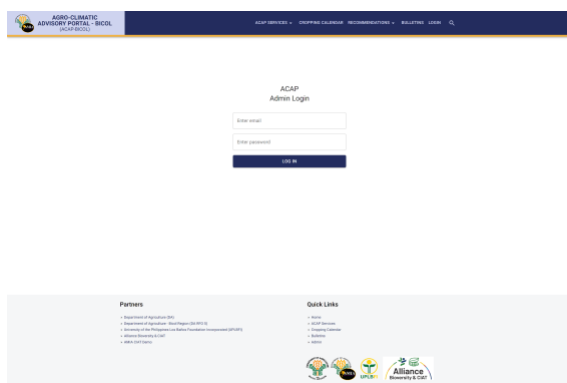

Figure 5.0 ACAP Admin login page

A successful sign-in will take the signed-in user to the admin welcome page shown below.
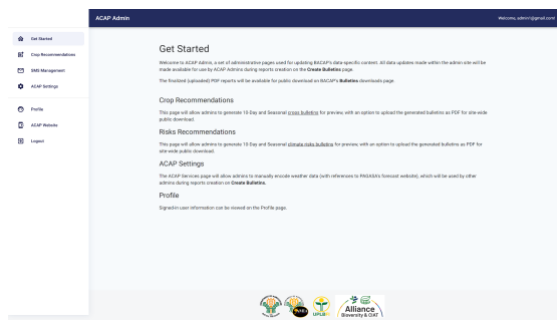

Figure 5.1 ACAP Admin welcome/home page

3. Press the ACAP Settings side tab to navigate to the ACAP Settings pages. The Seasonal weather forecast settings tab will show on the first tab.
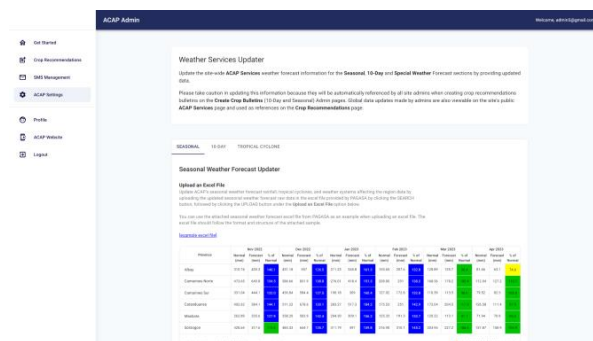

Figure 5.2 ACAP Settings page
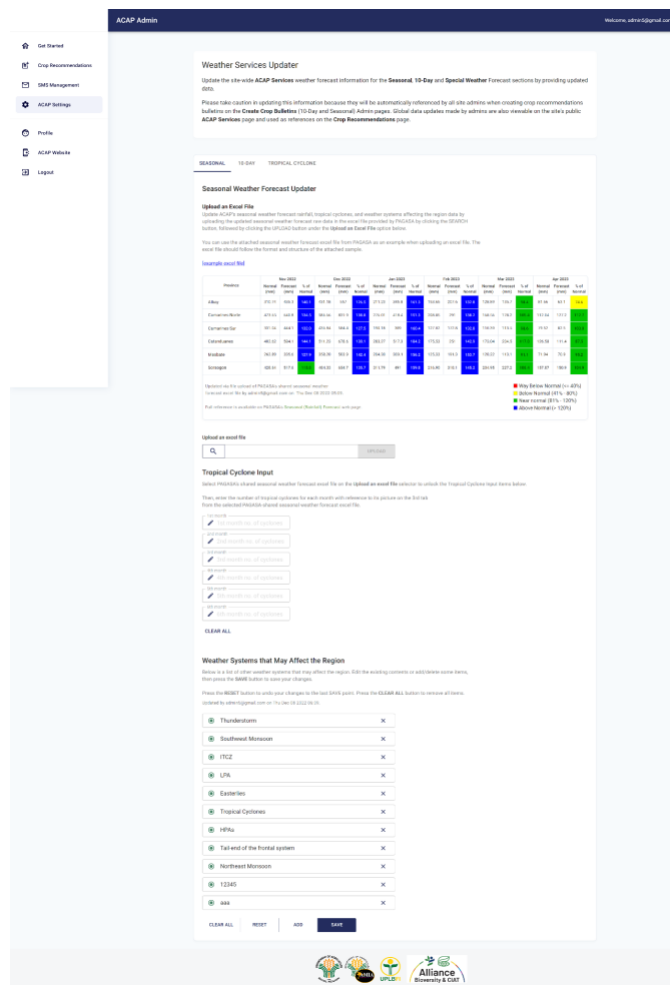
I. Seasonal Weather Forecast

Figure 6.0 ACAP Settings - Seasonal tab full page

Introduction

ACAP uses seasonal weather forecast data from PAGASA for monthly rainfall condition reference on its public Seasonal Recommendations page, ACAP Services - Seasonal Forecast page, and Regional Seasonal Climate Outlook and Advisory Crop Recommendations PDF Bulletin. Most data are publicly available as image (picture) files on PAGASA's Seasonal Rainfall Forecast web page https://www.pagasa.dost.gov.ph/climate/climate-prediction/seasonal-forecast.

ACAP uses raw text data extracted from a standard excel file shared by PAGASA every month, containing the requested latest 6-months seasonal weather forecast raw data.

The seasonal weather forecast data of interest are:

  a. Seasonal Rainfall Forecast
  b. Tropical Cyclones Forecast
  c. Weather systems that may affect the region
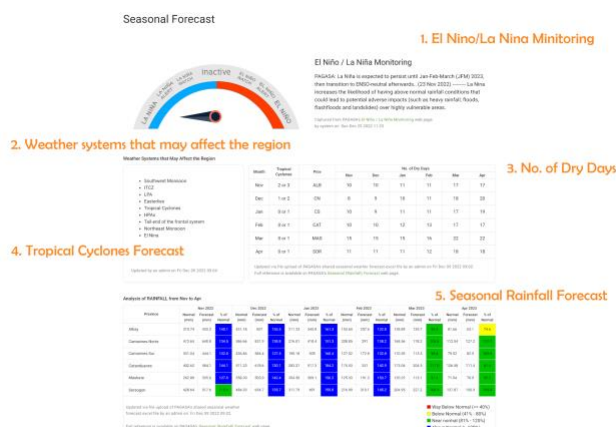 d. No. of Dry Days
  e. El Nino/La Nina Monitoring

Figure 6.1 Seasonal weather forecast data on the public ACAP Services Seasonal Forecast page
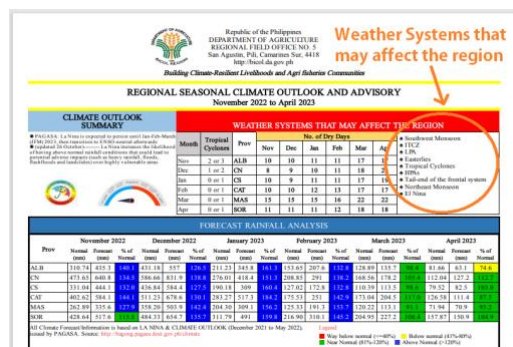

Figure 6.2 Seasonal weather forecast data on the Regional Seasonal Climate Outlook and Advisory Crop Recommendations Bulletin PDF

Updating the Seasonal Weather Forecast Data

1. Obtain the latest seasonal rainfall forecast excel file from PAGASA. The excel file should follow the latest excel file format, structure, naming conventions, and placement of text and numeric values on cells and columns as shared by PAGASA for the Nov 2022 - April 2023 seasonal forecast. An example excel file is available on https://firebasestorage.googleapis.com/v0/b/climate-webservices.appspot.com/o/files%2Fseasonal_forecast_example_v2.xlsx?alt=media&token=4835bc36-3e63-4200-b83b-a00616c14cda for reference.

2. After signing in, navigate to ACAP Settings, then Press the Seasonal tab. This tab contains a user interface (UI) for updating ACAP's seasonal weather forecast data.
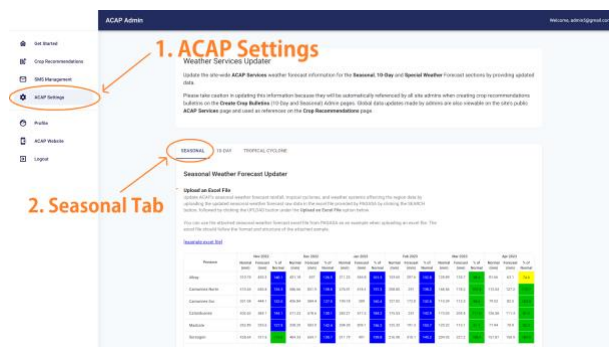

Figure 6.3 Navigation to the ACAP Setting Seasonal tab

3. Update the Seasonal Rainfall Forecast and Tropical Cyclones Forecast data.

    a. Scroll down and press the SEARCH button. Then look for and select PAGASA's shared excel file. Selecting an excel file will enable the input boxes on the proceeding Tropical Cyclone Input list UI.

Figure 6.3 PAGASA seasonal rainfall forecast excel file upload

    b. Open the excel file and use the tropical cyclones picture (image) on its 3rd tab (Forecast_TC) as a reference for encoding the respective no. of cyclones for each of the (6) seasonal months under the Tropical Cyclone Input list. Tropical cyclones require manual input because raw numeric and other text are not extractable from the provided picture references.
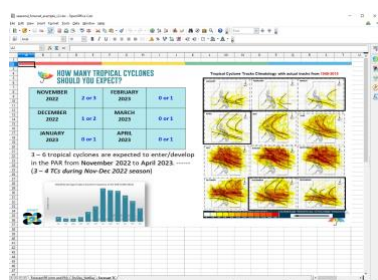
Figure 6.4 Tropical cyclone manual input

Figure 6.5 Tropical cyclone picture reference on PAGASA's share excel file (3rd tab)

c. Press the UPLOAD button beside the selected excel file input.
d. Wait for the excel file to finish uploading. A notification will appear after a successful (or failed) excel file upload and no. of tropical cyclones update.

Figure 6.5 Seasonal excel file upload success notification

4. Update the Weather systems that may affect the region data.
   a. Scroll down to the Weather Systems that May Affect the Region section.

Figure 6.5 Weather Systems that may affect the region

b. Edit the existing contents or add/delete some items.
c. Press the SAVE button to save your changes.
d. Press the RESET button to undo your changes to the last SAVE point.
e. Press the CLEAR ALL button to remove all items.w

5. El Nino/La Nina Monitoring data currently does not have manual means of updating. The system automatically updates these data every Sunday from around 11:05 AM to 2:05 PM PH Time.

Troubleshooting

1. Admins may encounter an excel file upload error similar to the Seasonal weather forecast excel file upload error below should the excel file they are trying to upload deviate from the recommended seasonal weather forecast excel file format. PAGASA's shared Nov 2022 - April 2023 seasonal forecast excel file is used as the base reference.

   Follow the sample excel file on https://firebasestorage.googleapis.com/v0/b/climate-webservices.appspot.com/o/files%2Fseasonal_forecast_example_v2.xlsx?alt=media&token=4835bc36-3e63-4200-b83b-a00616c14cda as a template to avoid upload issues.

Figure 6.6 Seasonal weather forecast excel file upload sample error

II. 10-Day Weather Forecast
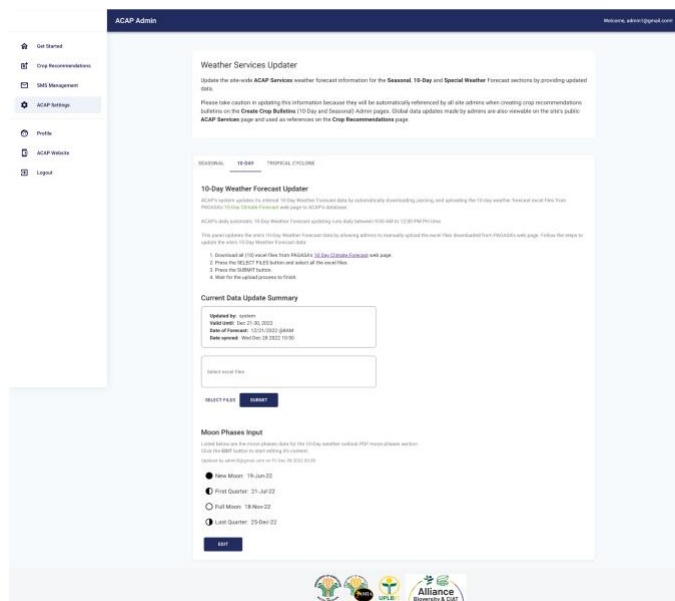
Figure 7.0 ACAP Settings - 10-Day Weather Forecast Update UI full page

Figure 7.1 ACAP Services - 10-day weather forecast page

Figure 7.2 Moon phases section on the 10-Day Farm Weather Outlook and Advisory Bulletin PDF

Introduction

ACAP uses PAGASA's 10-Day weather forecast data extracted from their 10-Day excel files uploaded on their 10-Day Climate Forecast web page (https://www.pagasa.dost.gov.ph/climate/climate-prediction/10-day-climate-forecast) to display relevant 10-day weather forecast data on the ACAP Services - 10-Day Weather Forecast page and Home page.

ACAP also uses this data as a reference along with the cropping calendar for detecting farm operations in a 10-day date range on the public 10-Day Farm Weather Outlook and Advisory Recommendations page and bulletins PDF and for detecting crop stages for the Special Weather Forecast bulletin PDF.

The 10-day weather forecast data of interest (by the municipality) for each day are:

    a.   Rainfall intensity
    b.   Cloud cover
    c.   Average temperature
    d.   Wind speed
    e.   10-Day date range validity period
    f.   Moon Phases

ACAP updates its internal 10-Day Weather Forecast data by automatically downloading, parsing, and uploading the 10-day weather forecast excel files from PAGASA's 10-Day Climate Forecast web page to ACAP's database daily between 9:00 AM to 12:00 PM PH time.

However, there are cases where admins may want to use the latest 10-Day weather forecast data should they notice that PAGASA's excel files are already updated earlier than 9:00 AM with ACAP's automatic updates yet to run. There are also cases where the automatic update fails due to network errors caused by external factors when trying to download PAGASA's excel files from their website.

This panel allows admins to update the site's 10-Day Weather Forecast data by letting admins manually upload the 10-Day weather forecast excel files downloaded from PAGASA's web page. Follow the steps below to MANUALLY update the site's 10-Day Weather Forecast data thru an excel file upload of PAGASA's 10-day weather forecast excel files.

Updating the 10-Day Weather Forecast Data

1.   After signing in, navigate to ACAP Settings, then Press the 10-Day tab. This tab contains a user interface (UI) for updating ACAP's 10-Day weather forecast data. The latest successful 10-day automatic (or admin-initiated) excel files update log is shown in the Current Data Update Summary section, along with a file explorer for selecting new excel files.

10-Day Weather Forecast Updater

ACAP's system updates its internal 10-Day Weather Forecast data by automatically downloading, parsing, and uploading the 10-day weather forecast files from PAGASA's 10-Day Climate Forecast web page to ACAP's database.

ACAP's daily automatic 10-Day Weather Forecast updating runs daily between 9:00 AM to 12:00 PM PH time.

This panel updates the site's 10-Day Weather Forecast data by allowing admins to manually upload the excel files downloaded from PAGASA's web page. Follow the steps to update the site's 10-Day Weather Forecast data:

1. Download all (10) excel files from PAGASA's 10 Day Climate Forecast web page.
2. Press the SELECT FILES button and select all the excel files.
3. Press the SUBMIT button.
4. Wait for the upload process to finish.

Current Data Update Summary

Updated by: system
Valid Until: Dec 21-30, 2022
Date of Forecast: 12/21/2022 @8AM
Date synced: Wed Dec 28 2022 10:50

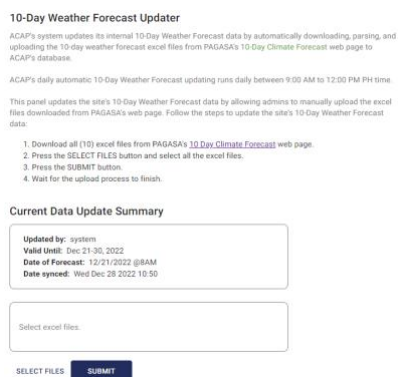Select excel files.

SELECT FILES   SUBMIT

Figure 7.2 10-Day Weather Forecast Updater summary and UI

2. Download all (10) excel files from PAGASA's 10 Day Climate Forecast web page.
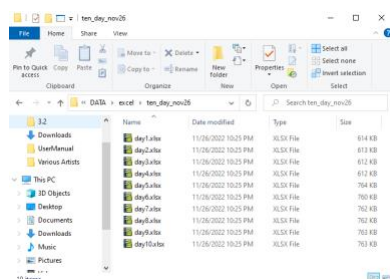

Figure 7.3 PAGASA 10-Day weather forecast excel files

3. Press the SELECT FILES button and select all the downloaded excel files. The excel files should follow the day1.xlsx, day2.xlsx,... day10.xlsx naming convention, and each file should follow the text labels, placement of text, and numerical values on specific cells and columns of PAGASA's 10-Day weather excel files as of December 2022.
4. Press the SUBMIT button.
5. Wait for the upload process to finish. A notification will appear after a successful (or failed) excel file upload.

Current Data Update Summary

Updated by: admin5@gmail.com
Valid Until: November 23- December 02, 2022
Date of Forecast: 11/23/2022 @8AM
Date synced: Wed Dec 28 2022 22:43

day1.xlsx   day2.xlsx   day3.xlsx   day4.xlsx   day5.xlsx   day6.xlsx
day7.xlsx   day8.xlsx   day9.xlsx   day10.xlsx

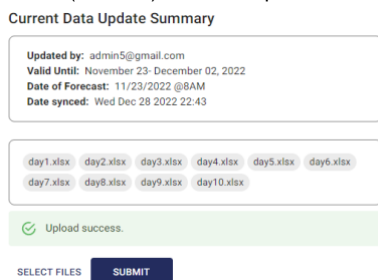✓ Upload success.

SELECT FILES   SUBMIT

Figure 7.4 10-Day Weather Forecast excel files upload success

6. Update the moon phases data. These also need manual user input since they are not included in the 10-day weather forecast excel files.
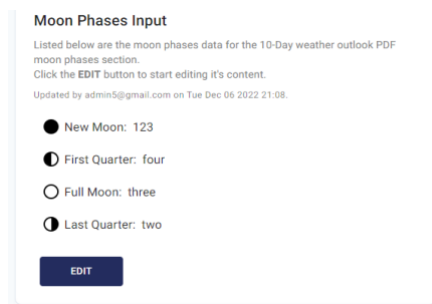   a. Scroll down until you reach the Moon Phases Input section.

Moon Phases Input

Listed below are the moon phases data for the 10-Day weather outlook PDF moon phases section.
Click the EDIT button to start editing it's content.
Updated by admin5@gmail.com on Tue Dec 06 2022 21:08.

● New Moon: 123
◐ First Quarter: four
○ Full Moon: three
◑ Last Quarter: two

EDIT

Figure 7.5 Moon Phases Input section

b. Press the EDIT button. Type the appropriate values for each moon phase and press the SAVE button.

Moon Phases Input

Listed below are the moon phases data for the 10-Day weather outlook PDF moon phases section.
Click the EDIT button to start editing it's content.
Updated by admin5@gmail.com on Fri Dec 09 2022 03:59.

New Moon
◉ 19-Jun-22

First Quarter
◉ 21-Jul-22

Full Moon
✎ Full Moon date i.e., 29-Jun-22
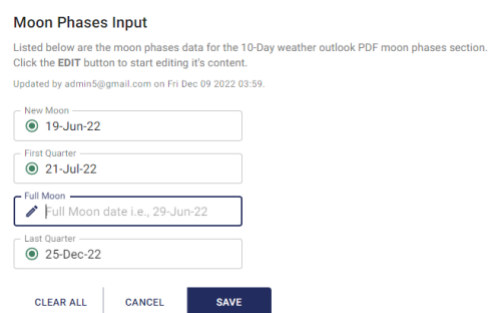
Last Quarter
◉ 25-Dec-22

CLEAR ALL   CANCEL   SAVE

Figure 7.6 Moon Phases EDIT mode

c. Wait for the update process to finish. A notification will appear after a successful (or failed) data update.

✓ Successfully saved changes   ✕

Figure 7.7 Moon phases data update success

Troubleshooting

1. Admins may also encounter an excel file upload error similar to the Seasonal weather forecast excel file upload error should the excel file they are trying to upload deviate from the recommended 10-day weather excel file format. PAGASA's 10-day weather forecast excel files as of December 2022 are used as a base reference.

   Follow the sample 10-day weather excel file on https://firebasestorage.googleapis.com/v0/b/climate-webservices.appspot.com/o/files%2Fday1.xlsx?alt=media&token=6d10c8a8-4fc7-4945-9631-0143a6c17e0d as a template to upload files successfully.
   .
   Other excel file data validation errors, if any will be displayed accordingly during upload.

Figure 7.8 10-Day Weather Forecast excel files upload error

2. ACAP's automatic 10-day weather forecast updater (web scraper) may also fail with a similar error if it detects a new excel file format and structure different from its known reference format as of <u>December 2022</u>.

Admins may manually download the 10-day weather forecast excel files and update their content and formatting to match those from the December 2022 reference files before uploading. They can also request updates to ACAP's automatic updater scripts to accommodate the newest 10-day weather forecast excel file formatting and structure.

III. Tropical Cyclone Forecast

Figure 8.0 ACAP Settings - Tropical Cyclone tab full page

Introduction

ACAP displays relevant tropical cyclone information from PAGASA's Tropical Cyclone Bulletin web page (accessible at https://www.pagasa.dost.gov.ph/tropical-cyclone/severe-weather-bulletin) in its ACAP Services - Special Weather Forecast page.

The special weather bulletin PDF also shows the special weather forecast data, along with the standard 10-day weather forecast, cropping calendar, and crop stages for the month half where the current special weather forecast date falls into for the affected (admin-encoded) municipality.

Admin-encoded Bicol municipalities affected by cyclone(s) are available for selection when creating Special Weather Forecast bulletin PDFs.

The special weather forecast data of interest are:

a. Tropical cyclone bulletin Number
b. Date and time of issue
c. Tropical cyclone name
d. Location of eye/center
e. Movement
f. Strength
g. Forecast Position
h. Tropical cyclone track and intensity picture
i. Tropical cyclone wind signal

Figure 8.1 ACAP Services - Special Weather Forecast page

ACAP's system updates its Special Weather Advisory information by automatically scanning, extracting, and uploading the latest Tropical Cyclone data from PAGASA's Tropical Cyclone Bulletin web page to ACAP's database.

ACAP's automatic Special Weather Advisory updates run daily every (2) two hours, starting from midnight PH time, with a lag time of 20 minutes to (1) one and a half hours.

Figure 8.2 ACAP Special Weather bulletin PDF

Updating the Special Weather Forecast Data

1. After signing in, navigate to ACAP Settings, then Press the Tropical Cyclone tab. This tab contains a user interface (UI) for manually updating ACAP's Special Weather Forecast data. The latest successful automatic (or admin-initiated) special weather update log shows in the Current Data Update Summary section, with a SYNC button and the Wind Speed List Editor UI.
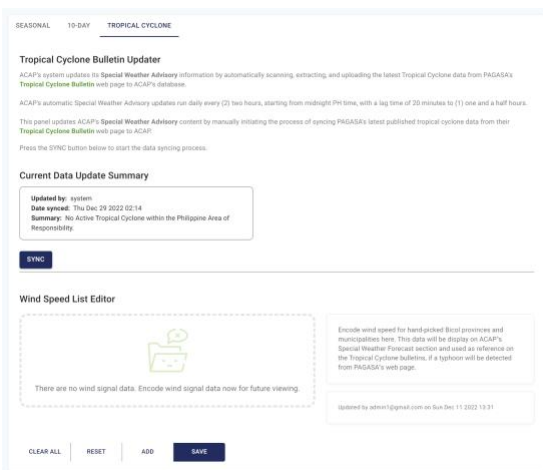
Figure 8.3 ACAP Settings - Tropical Cyclone data updater

2. Update the main special weather forecast contents.
   a. Press the SYNC button to start the special weather forecast data syncing process. ACAP will start copying the current contents of PAGASA's Tropical Cyclone Bulletin web page to ACAP's database right away.

Figure 8.4 Special weather forecast SYNC button

   b. Wait for the syncing process to finish. A notification will appear after a successful (or failed) data syncing update.
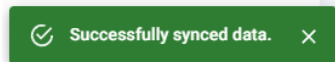
Figure 8.5 Special weather forecast sync success

3. Select and add municipalities affected by tropical wind signals under the Wind Speed List Editor.

Figure 8.6 Wind speed list editor UI without municipalities

   a. Press the ADD button to reveal the Wind Signal input.
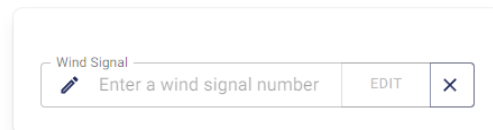
Figure 8.7 Blank Wind Signal input

   b. Enter a wind signal number (1-10) on the Wind Signal input to enable the EDIT button.

Figure 8.8 Wind Signal input wind signal no. 1

   c. Press the EDIT button to launch the Affected Provinces and Municipalities Form.

Figure 8.9 Affected Provinces and Municipalities Form

d.   Select a province on the Affected Provinces and Municipalities Form.

e.   Then, select affected municipalities under the selected province.

f.   Press the OK button to confirm the selected province and municipalities. The municipalities will appear grouped by province under the Wind Signal UI.

Figure 8.10 Selected municipalities affected by wind signal number

g.   Delete the selected province and all selected municipalities under it by pressing the DELETE button beside the affected province and municipalities group.

h.   Repeat steps **c - g** to ADD or EDIT provinces and municipalities under a Wind Signal.

Figure 8.11 Multiple provinces and municipalities groups affected by a common wind signal number

i.   Repeat steps **a - f** to ADD new Wind Signal groups.

Figure 8.12 Multiple wind signal numbers (1 - 4) with list of affected provinces and municipalities

j.   Press the SAVE button to save the wind signal numbers and selected municipalities and provinces.

Figure 8.13 Wind speed list editor buttons

k.   Press the CLEAR ALL button to remove all wind signal groups and their selected provinces and municipalities.

l.   Press the RESET button to revert back to the last SAVED data.

Troubleshooting

1.   ACAP's automatic (and admin-initiated SYNC process) for updating the special weather forecast contents currently works with PAGASA's latest Tropical Cyclone bulletin web page as of December 2022.
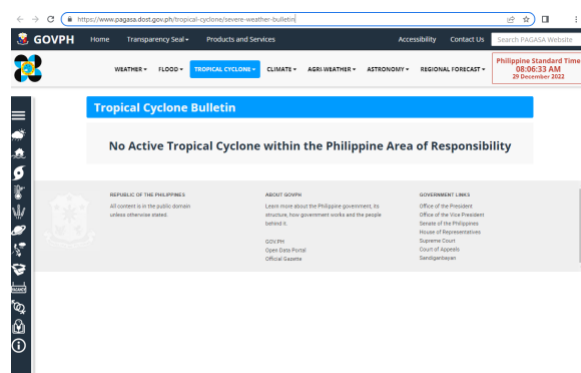
Figure 8.14 Screenshot of PAGASA's Tropical Cyclone Bulletin web page
taken on December 2022

The automatic or manual SYNC process may not work and
fail with an error if it detects changes on PAGASA's Tropical
Cyclone bulletin web page contents and layout.

ACAP's web scraper script will need to be updated to sync
with PAGASA's new Tropical Cyclone bulletin web page
layout.

Software Requirements Specification

Project Information

Project: Agro-Climatic Advisory Portal - Bicol (ACAP-BICOL)

Release Number: 3.4

Date Created: December 29, 2022

Attached Documents

- ACAP System Requirements

Introduction

The Agro-Climatic Advisory Portal - Bicol (ACAP-BICOL) is an online web application for disseminating weather and climate information of the Adaptation and Mitigation Initiative in Agriculture (AMIA) Villages in the Bicol Region.

The portal aims to guide extension workers in creating and disseminating relevant and tailored advisories and recommendations for farmers and fisherfolk that will help them address the impacts of climate change thru the use of its online-accessible tools for automatic bulletins creation, centralized process of making information available for general viewing or download and by relaying PAGASA weather-related data for laymanized public viewing in a readily-accessible and timely manner.

This document discusses ACAP's high-level components and features in detail.

Use Cases

The use cases are organized into four categories with subcategories.

I.   Use Cases by Functional Area

ACAP divides use cases according to their functional specification. Fifteen (15) subcategories are made; the _login and user authentication component_, which has the use cases for user login authentication; the _accounts management component_, which has use cases for administering the admin users; the _PDF bulletins generator component_, which has use cases for drafting, rendering and publishing crop recommendations PDF bulletins; the _10-day weather forecast component_, which has use cases for periodically scraping and formatting PAGASA's daily 10-day weather data excel files and displaying them on-site; the _seasonal weather forecast component_, which has use cases for administering the Seasonal Weather data manual input or uploading PAGASA's seasonal weather forecast excel file and displaying the encoded data on-site, the _cropping calendar component_, which has use cases for displaying an interactive crop calendar data on-site and allowing data to be used as reference by the PDF bulletins generator component; the _public seasonal recommendations generator_, which has uses cases for generating seasonal crop recommendations for public viewing preview; the _public 10-day farm outlook and weather advisory generator_, which has use cases for generating 10-day farm outlook and weather advisory crop recommendations for public viewing preview; the _bulletins (PDF downloads) component_, which has requirements for organizing and displaying generated PDF's on-site for download; the _admin crop recommendations management component_, which has use cases for creating, previewing and deleting user-created seasonal and 10-day weather farm outlook and weather advisory crop recommendations PDF bulletins and reports, the _phonebook component_, which has use cases for managing contacts in a phonebook; the _sms management component_, which has use cases for for sending SMS; the _acap settings component_, which has use cases for manually updating the site-wide seasonal weather forecast, 10-day weather forecast and special weather advisory data thru manual encoded data input with reference to PAGASA data, and semi-automatic site data updates via excel files upload for other relevant weather data that are not yet possible to have automatic updates; and the _automatic weather forecast data syncing component_, which has use cases for regularly and automatically syncing PASAGA's 10-day weather forecast excel files, El Nino/La Nina page and Severe Tropical Cyclone Bulletins page contents to ACAP's database on scheduled time intervals.

II.   Use Cases by Stakeholder
     a.   Three (3) types of stakeholders can access the website portal: the _public viewer_, _administrator_, and _super administrator_. Use cases are divided according to the stakeholders' roles and key needs.

III.   Use Cases by Priority
     A.   Use cases are partitioned into three priorities; essential, expected and desired.

IV.   Use Cases by Business Object and Actors

A. There are five (5) business objects defined that interact with the actors; user records, report logs, (site-wide) PDF bulletin reports, weather data records, and the public-viewable website pages.

Details:

- Actors are described as follows:

  - All

    - Stakeholders that can view and access the public-viewable website pages over the network

    - Key Needs:

      - Convenient access to the website's content over the network

  - Administrator

    - These stakeholders can create reports and PDF bulletins while referencing the site's current weather forecast data. Administrators can send SMS text versions of generated reports to their contacts on ACAP's SMS Management page.

    - Key Needs:

      - Account security

      - Convenient automatic access to the site-wide weather data, incorporated into the PDF bulletin and report

      - Add, view, and delete own seasonal and 10-day weather farm outlook crop recommendations report logs

      - Generate and automatically upload site-wide crop PDF bulletins for public download from own reports

      - Create new contacts in own Phonebook

      - Send the SMS text version of reports to their Contacts list

      - Update and view the site-wide weather data (seasonal rainfall forecast and 10-day weather forecast)

  - Super Administrator

    - Super administrators have the responsibility for the housekeeping of Administrator users

    - Key Needs:

      - Account security

● Create, view, update and delete Administrator user accounts

Functional Requirements

The software provides the same set of use cases and features. Superadmins can create Administrator users who can log in to the site and update or delete their user accounts. Administrators can manage crop recommendation reports by generating their own, which triggers the automatic creation of site-wide final PDF bulletins made available on the bulletins download page. Administrators can also manually update the site's weather data and send SMS texts of generated crop recommendations to Contacts in their Phone Books. Whereas regular public site views can view weather data on the weather services page and generate partial-complete seasonal and 10-day crop recommendations on the Crop recommendations page.

Non-Functional Requirements

Usability requirements

The system must ensure user-friendly use case steps that will help users use the system easily. It will provide step-by-step procedures on each use case and feature.

The user interfaces should be as familiar as possible to users who have used other similar climate services web portals. E.g., we will follow the UI guidelines for naming menus, buttons, dialog boxes, and UI layout whenever possible.

Reliability and up-time requirements

*The system should be able to host a moderate amount of Administrator users (~50+) and medium size of weather and user/site data not exceeding 1GB at a stable phase.

The server should have a 99.9% up-time with at most 45 minutes of downtime.

Safety requirements

ACAP utilizes stable technologies to build the system. Minimum risk and hazard are expected from the system. Safety must also be managed during the operation and maintenance of the system. The application, currently deployed on free-tier cloud services, will have its backend component deployed on DA AMIA's clean and secure bare metal OS with enough security to avoid risks and hazards.

Security requirements

The website prompts users to input their superadmin-provided username and password to control Admin site access.

Only Superadmins can create authentic new users and edit or delete existing Administrator accounts.

Only Administrators can configure the site's weather data, create crop recommendations PDF bulletins and reports, and send SMS text versions of generated recommendations to contacts.

Various software exploits will be observed and avoided to ensure the reliability and security of the site. For example, XSS, etc.

Details:

- o   Passwords will be 4-16 characters long and alphanumeric.

- o   We will use encrypted communications (SSL) for this website.

Performance and scalability requirements

The system should be able to perform well given Firebase's generous Spark plan (free) pricing tier and the DA AMIA server's bare metal OS hardware specification for the backend. Firebase Authentication can support 100+ user accounts, while a pay-as-you-go pricing for Firestore database and Cloud Firebase Storage may be required if site data exceeds Firebase's Spark plan limits.

The backend, where ACAP's other core server components reside and are hosted on an Individual plan (free-tier) Render server, will be moved to DA AMIA's more powerful bare metal OS and will try to use minimal default standards to avoid performance and scalability issues on the software side.

If needed, minimal database and server optimizations will be done during the support and maintenance of the system but will require expert reviews regarding overall server networking and security. Dedicated expert advice on server/database management is in place after migrating ACAP to use local databases (remove Firebase cloud).

Maintainability and upgradability requirements

Maintainability is our ability to make changes to the product over time. We will address this by anticipating several types of change, and by carefully documenting our design and implementation.

The system is planned for future releases, which will happen when new system features are requested. This will require updating the initial design and architecture of the current stable running system, and implementing the code changes. Should a future release be requested, we must be able to deploy and upgrade with minimal downtime and service disruption.

Business life-cycle requirements

The business life-cycle of a product includes everything that happens to that product over a period of several years, from the initial release, through important but infrequent use cases, until product retirement. Key life-cycle requirements are listed below.

Details:

- o   The product should be stable. It will be designed to live until the technologies used are considered obsolete and an upgrade is critically needed.

System hardware requirements

ACAP relies on the free-tier hardware specifications of the following cloud services discussed in more detail in the attached ACAP System Requirements document.

- Project progress and code revisions tracking – GitHub
- UI web hosting
    - Github Pages
        - around 80-100MB total files size in its associated GitHub repository
    - UI hosting will be moved to DA AMIA's server
- User authentication, registration, login – Firebase Auth (spark plan)
    - can support ~100+ users
- Database – Firestore (Spark plan) for storing user and site data
    - Stored data: 1 GB total
    - Network egress: 10 GB/month
    - Document writes: 20K writes/day
    - Document reads: 50K reads/day
    - Document deletes: 20K deletes/day
- Storage – Firebase Cloud Storage (spark plan) for storing and hosting PDF files
    - GB stored: 5 GB
    - GB downloaded: 1 GB/day
    - Upload operations: 20K/day
    - Download operations: 50K/day
- Backend – Render Individual plan (free-tier plan) Web Services for hosting a NodeJS backend with custom-created API endpoints for managing miscellaneous background processes.
    - Running hours per month: 750 hrs
    - RAM: 512MB
    - Bandwidth: 100GB
    - Always on: Sleeps after 15 min of inactivity
    - As mentioned, the backend will move from Render to DA AMIA's servers. PM2, open-source software for running NodeJS applications will ensure the backend runs just as expected on its new server host.

See the Firebase spark pricing plan and the Render free web service pricing plan for more information.

System software requirements

The web server must have the following:

- A web server that can host static HTML, JavaScript for hosting the website's UI.

The backend server must have the following:

- A NodeJS web server for doing background processes and hosting ACAP's APIs.

The database, storage and user authentication uses a Firebase spark plan project.

*Please view the attached ACAP System Requirements for more details.

Application program interfaces (APIs)

The standard web (JavaScript) API for Firebase and NextJS (React) are used for building the UI. These are open-source and can easily be acquired. NodeJS, also a JavaScript runtime for servers, is used to create and run the backend REST APIs.

Data import and export requirements

The system will store all data in a Firestore NoSQL database, where it can be accessed by other programs over the web.

System Requirements

Technology Stack Summary

This section discusses ACAP's main technological components and stacks. Detailed information on the cloud-based services used by ACAP is provided in the table below.

ACAP uses Firebase (Spark plan), a Google-backed Backend-as-a-Service (Baas) application development software for powering its main stack components (Database, User Authentication, and File Storage). Its backend server runs on a Render (Individual plan) Web Service. There are immediate plans to host the backend on the DA-AMIA servers while retaining using Firebase and a long-term plan to replace Firebase cloud services with a local database, file storage, and user login authentication solutions.

1. Website Front End
   - The website's page components are composed of static HTML5, CSS, and JavaScript web pages built using React/NextJS' Static-Site Generation (SSG) for improved Search Engine Optimization (SEO) and to allow simple static website hosting deployment on GitHub Pages
   - The website is available on **Github Pages** https://amia-cis.github.io, and it has plans to be moved and hosted on DA AMIA's servers with the backend.
2. Backend
   - The website uses a NodeJS (Express) app running on Ubuntu 20.0 hosted on Heroku's (free plan) App and Dyno for its backend server
   - The backend hosts several secure REST API endpoints on https://amia-cis.onrender.com/ that requires admin login authentication (Bearer Authorization Token)

- As mentioned, the backend will move from Heroku to DA AMIA's servers. PM2, open-source software for running NodeJS applications will ensure the backend runs just as expected on its new on-premise server host.
3. <u>Database</u>
   - The website uses Cloud Firestore database, a NoSQL database
4. <u>Login and Authentication</u>
   - The website uses Firebase Authentication (Firebase Auth) to manage and detect user login
5. <u>File Storage</u>
   - Admin-created PDF files are automatically stored and hosted on Firebase Storage
6. <u>Github</u>
   - ACAP uses Github as a version control system for managing and tracking code progress and revisions, and to trigger continuous integration and deployment (CI/CD) workflows to staging and production environments (GitHub Pages for the front-end and Heroku for the backend)
   - ACAP regularly uses **GitHub's Actions scheduled workflows** to run **CRON jobs** that syncs the site-wide weather data and content on the ACAP Services page from PAGASA:
     i. 10-Day Weather Forecast data and El Nino/La Nina sections
     ii. Special Weather Forecast section

Cloud Infrastructure References (Free Plan/Tiers Pricing Features)

	Website Frontend	**NodeJS Backend**	**Firebase Project (includes Firestore Database, Firebase Authentication and Firebase Storage)**
Hosting	GitHub Pages https://amia-cis.github.io	Render (Individual plan) https://amia-cis.onrender.com/	Google Firebase
Pricing References	https://github.com/pricing#compare-features https://docs.github.com/en/pages/getting-started-with-github-pages/about-github-pages	https://render.com/docs/free#free-web-services	https://firebase.google.com/pricing
Free tier features	Pages and Wikis are always available for public repositories. **Size limit:** 1GB (published sites and source repositories) **Bandwidth limit:** 100GB/month (soft	**RAM:** 512MB **Running hours/mo:** 750 hrs **Bandwidth:** 100 GB **Always on:** Sleeps after 15 min of	**Firebase Authentication** **Email/Password usage:** unlimited **Firestore Database** **Stored Data:** 1GB **Network egress (usage):** 10GB/month **Document writes:** 20K writes/day

bandwidth limit)	inactivity, otherwise always on depending on your remaining monthly free dyno hours.	**Document reads:** 50K reads/day **Document deletes:** 20K deletes/day **Firebase Storage** **GB Stored:** 5GB **GB Downloaded:** 1GB/day **Upload Operations:** 20K/day **Download Operations:** 20K/day

Operating System (OS) Specifications

The following local machine OS and specifications are recommended for deploying all ACAP's software and technical components on remote local machines or servers. These requirements, however, only cover the installation of ACAP's **Frontend** and **Backend**. ACAP will still use the free-tier **Google Firebase** (Firestore **Database**, **Authentication**, and **File Storage**) as ACAP needs to be rewritten to fully replace these cloud services with locally installable counterparts beyond the September 2022 soft deadline.

ACAP requires an initial manual installation of the front end and back end on local machines, after which it can be automated for succeeding updates.

ACAP's frontend and backend will run on the bare metal OS provided by DA AMIA with the following hardware and OS specifications. An Amazon Elastic Container (EC2) **t2.medium** Instance was previously mentioned for reference.

- **Type:** Canonical, Ubuntu, 20.04 LTS, amd64 focal image build on 2022-06-10
- **Architecture:** 64-bit (x86)
- **vCPU:** 4
- **RAM (Memory):** 8GB
- **Disk Space/Storage:** 300GB
- **Network/Firewall Settings**
    - Allow HTTPs traffic from the internet
    - Allow HTTP traffic from the internet
    - (Optional) Allow SSH traffic (from concerned parties' IP)
    - (Note: Network settings setup may require further discussion)