

LISA PLATFORM ADMINISTRATOR MANUAL (D4.2/D4.3)

CLIMATE RISK ASSESSMENT FOR SUBNATIONAL ADAPTATION AND
ESTABLISHMENT OF A LOCAL CLIMATE INFORMATION SYSTEM FOR
CLIMATE CHANGE ADAPTATION (LISA)



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Prepared for: **UN-CTCN and MoE**
Prepared by: **ICEM**



DISCLAIMER

This document was prepared for the United Nations Climate Technology Centre and Network (UN-CTCN) by an ICEM consultant team engaged to undertake the *Technical Assistance – Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia*. The views, conclusions and recommendations in the document are not to be taken to represent the views of the UN-CTCN.

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ABBREVIATIONS

BTB	Battambang
CMS	Content management system
CNMC	Cambodia National Mekong Committee
CPU	Central Processing Unit
CRA	Climate risk assessment
CSV	Comma Separated Values
CSS	Cascading Style Sheets
DCC	Department of Climate Change
HTTP	HyperText Transfer Protocol
ICEM	International Centre for Environmental Management
JS	JavaScript
LCLU	Land cover, land use
LISA	Local Climate Information System for Climate Change Adaptation
MoE	Ministry of Environment
MRC	Mekong River Commission
NDDI	Normalized Difference Drought Index
NASA	National Aeronautics and Space
OSM	Open Street map
PIN	People in Need
RAM	Random Access Memory
RCP	Representative Concentration Pathway
TA	Technical Assistance
UN-CTCN	United Nations Climate Technology Centre and Network
URL	Uniform Resource Locator
VPS	Virtual Private Server
WMS	Web map service

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1. INTRODUCTION

The United Nations Climate Technology Centre and Network (UN-CTCN) is funding the technical assistance – *Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA)*. The project involves the creation of an intuitive and user-friendly web-based data visualization platform (called LISA) that enables users to explore future climate scenarios and potential impacts and adaptation options for future climate-resilient planning in Battambang municipality. The project is managed by the Department of Climate Change of the Ministry of Environment and is being implemented by a team of consultants led by the International Centre for Environmental Management (ICEM).

This document, the *LISA Administrator Manual*, integrates two deliverables under Output 4 of the terms of reference:

4.2: Report on the design of the process of data management for LISA

4.3: Report on the management protocols for LISA

The first section of the report details the data integrated into the LISA platform, and the second part describes the software used to develop the open source LISA platform and its management.

Hyperlinks to LISA:

LISA application (frontend): <https://icem.com.au/lisa>

LISA GeoServer application (data catalogue): <https://dss.icem.com.au/geolisa>

Note that the current platform is hosted on an ICEM company server until it can be deployed to a government machine. A future training programme, also addressing deployment, is detailed in output 4.4, as included in the LISA project final report (submitted separately from this report).

2. LISA DATA MANAGEMENT (OUTPUT 4.2)

This part of the report details the datasets integrated into the LISA platform. It is recommended that readers also reference the *LISA User Guide (D4.1)* which provides further information on the use of the platform for planning purposes:

ICEM 2023. *LISA Platform User Manual (D4.1)*. Technical Assistance: Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA). Prepared for UN-CTCN

2.1 Data inputs

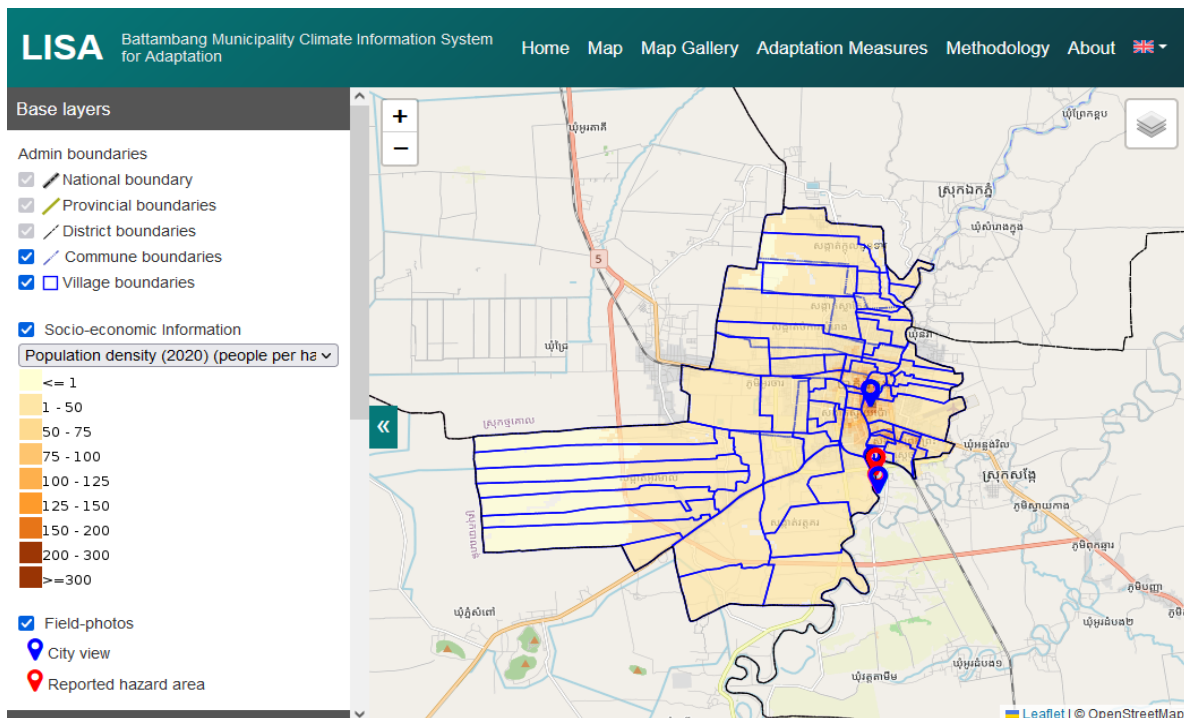
All datasets integrated into the application are linked to the GeoServer backend, and there are some additional background maps shared via third-party sources. Data have been collected from various sources, and non-spatial data has been joined with spatial datasets for displaying in the map interactively. There are 4 groups of datasets included:

- Base layers
- Hazards and climate change
- Impact and Vulnerability Assessment
- Background layers from third-party sources

2.1.1 Base layers

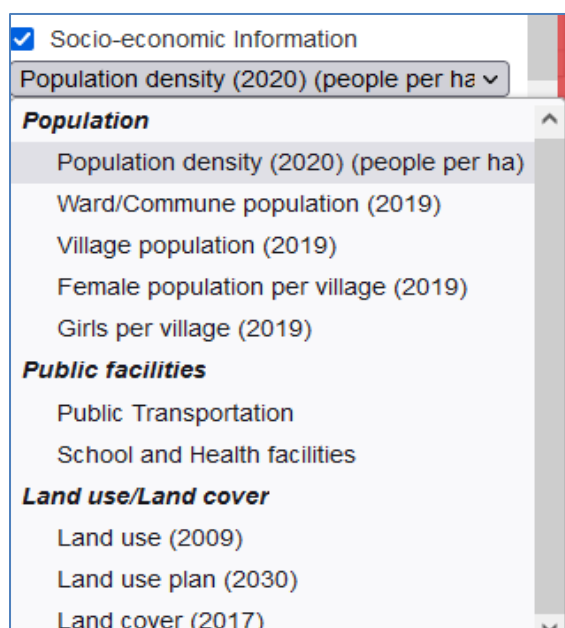
Base layer data are grouped into four categories: admin boundaries, socio-economic information, and field photos. Admin boundary layers are published using Geoserver and listed with a legend icon on the left. By default, the national, provincial, district boundaries are always displayed (checked), while the commune and village boundaries can be turned on or off as required by the user.

Figure 1: Base layers



Socio-economics data are grouped and accessible from a dropdown menu and can be selected by clicking on a menu item (Figure 2). When the box is unchecked, the selected layer is removed from the map and the dropdown list is disabled.

Figure 2: List socio-economic information in LISA map viewer



Field photographs are linked to points symbolised with map-marker icons in red and blue. The red colour represents photographs from hazard areas and the blue colour is linked to photographs showing the general environment (called city view). Data are stored in a CSV file which can be updated using the WP-Plugin (Table 1). The field photos CSV file is located at [theme folder]/csv/photos.csv and has 5 columns:

- fname: file path to picture (jpeg file)
- type: content type of image, which can be 'city' for city view pictures or 'hazard' for reported hazard areas.
- desc: description of image, shown as text under the picture.
- lat: decimal latitude of the point, which should be 8 decimal points for accurate display on the map.
- lon: decimal longitude of the point, which should be 8 decimal points for accurate display on the map.

Table 1: Example of the field photo CSV file

fname	type	desc	lat	lon
photos/DJI_0570.JPG	city	Battambang municipality	13.10339611	103.2007141
photos/DJI_0572.JPG	city	Battambang municipality	13.10339825	103.2007136
photos/DJI_058a.JPG	hazard	Flood	13.08209875	103.2024338

fname	type	desc	lat	lon
photos/DJI_0588.JPG	hazard	River bank erosion	13.08209981	103.2024328
photos/DJI_059a.JPG	hazard	River bank erosion	13.08213058	103.2024255
photos/DJI_0600.JPG	city	Battambang municipality	13.082811	103.2015119
photos/DJI_0834.JPG	hazard	River bank erosion	13.07691236	103.2026519
photos/DJI_0852.JPG	city	Battambang municipality	13.07656064	103.2030713
photos/DJI_0013.JPG	hazard	Flooded area	13.10028806	103.1921965
photos/DJI_0593.JPG	city	Railway	13.10371533	103.1941721
photos/DJI_0368.JPG	hazard	Modelled flood area	13.0958615	103.2074014
photos/DJI_0373.JPG	city	Battambang municipality	13.10705122	103.1991335
photos/DJI_0074.JPG	city	Battambang Railway Station	13.09761647	103.1943548
photos/DJI_0587.JPG	city	Battambang municipality	13.10343314	103.1937556

2.1.2 Hazards and climate change

There are two groups of data categorised in the ‘Hazard and Climate Change’ section. A hazard layer can be selected and shown on the map after checking the box next to the ‘Hazard’ label (Figure 3 - Figure 4). The hazard layers have been grouped for flood, riverbank erosion and drought.

Figure 3: Display of modelled flood and project maximum temperature in the 2060s.

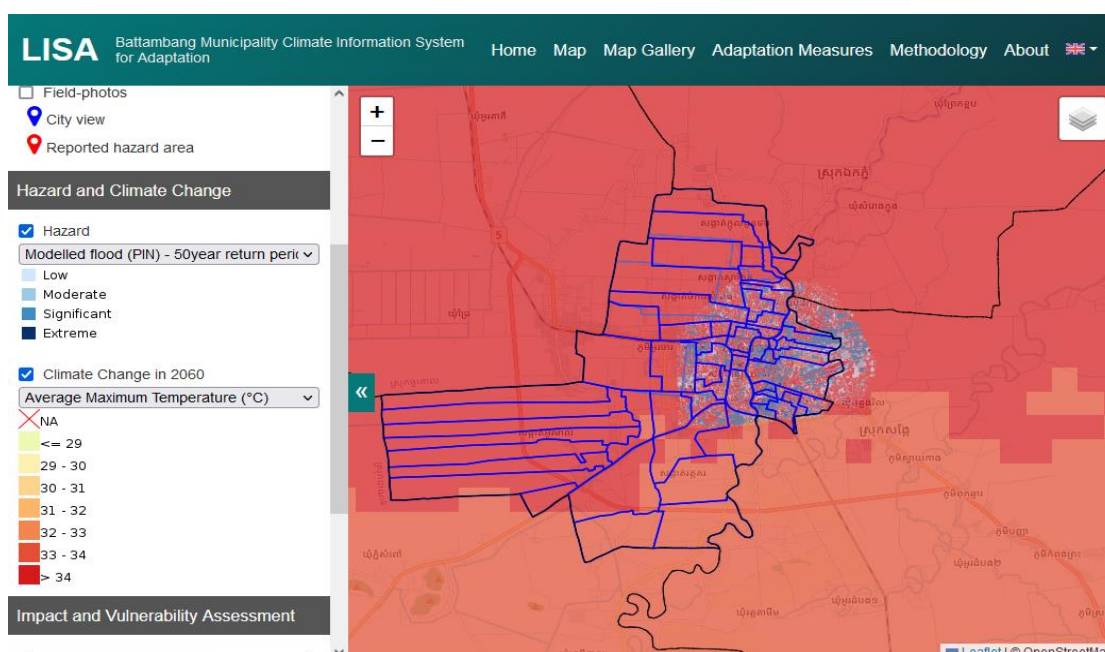
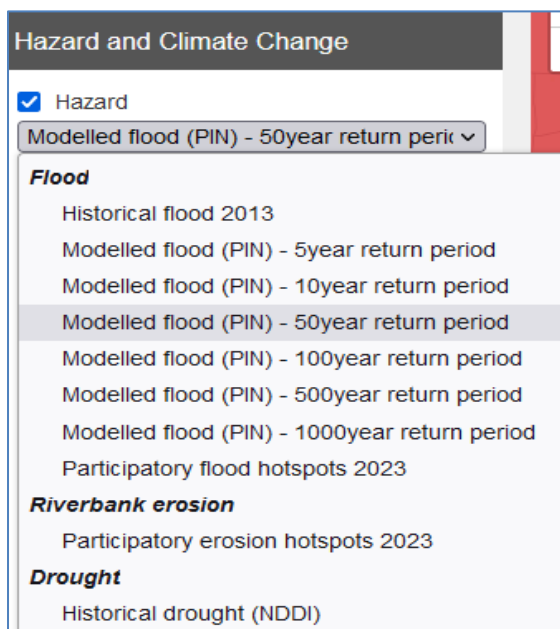
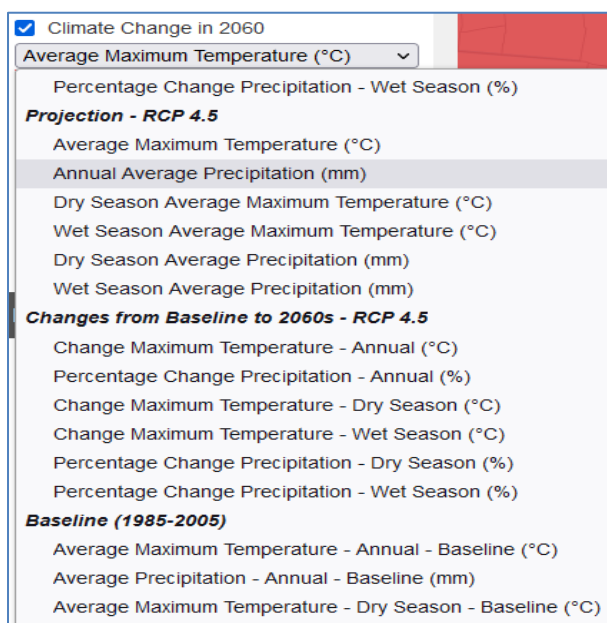


Figure 4: List of hazards accessible in the map viewer



Climate change layers include baseline conditions, future projections (2060s) and changes from baseline of maximum temperature and total rainfall for both RCP 8.5 and 4.5. Data also address annual, and wet and dry seasons (Figure 4 - Figure 5).

Figure 5: Climate change layers



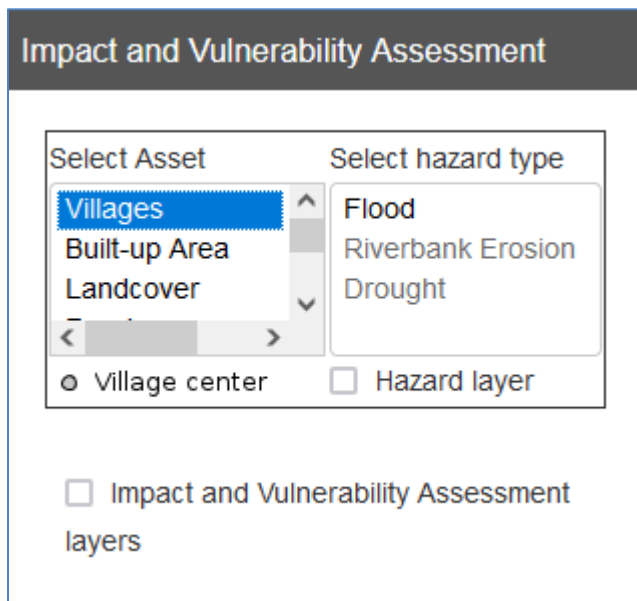
2.1.3 Impact and Vulnerability Assessments

Accessible datasets under the Impact and Vulnerability Assessment section of the menu were derived from the analyses as described in the methodology section of the Battambang *Climate Risk Assessment Report (D3.3)*¹. A full climate risk assessment was conducted for villages and flood, and

¹ ICEM. 2023. Climate risk assessment of Battambang municipality. Prepared for UN-CTCN as part of the project *Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA) in Cambodia*.

exposure assessments were conducted on other assets (road, railway, land cover, schools and hospitals). Impact and exposure of land cover to drought were also analysed. These datasets can be viewed in the map viewer by selecting the appropriate combination of asset and hazard, and then selecting (ticking) the impact and vulnerability assessment checkbox (Figure 6). Greyed out options in the table indicate that the data is not yet available. Figure 7 shows a map of village exposure to flood.

Figure 6: Menu for displaying outputs of the impact and vulnerability assessments



Accessible data layers are stored as a list in a CSV file: [theme folder]/csv/va.csv. The CSV file has 9 columns:

- asset: type of asset impacted by hazard.
- hazard: assessed hazard.
- lname: title of layer, which is shown in the *Impact and Vulnerability Assessment* menu.
- ws: workspace of data layer on GeoServer.
- style: layer style used (blank if using default style).
- layers: layer or layers or layer group on GeoServer. If layers are provided, they should be separated with “&”.
- zIndex: used to control the stacking order of layers on the map. While the hazard layer is set to 500; other layers can be set to 499 (under hazard layer) or 501 (on top of hazard layer).
- dlmap: the exported data layer map, which can be used for offline or reporting purposes. The path of dlmap is the relative path to [theme folder]/images/CRA.
- dlva: path to a short report of Impact and Vulnerability Assessment of selected asset to a given hazard. This link should be provided at the first layer of the group.

Examples of impact and vulnerability assessment layers are shown in [Table 2](#) below.

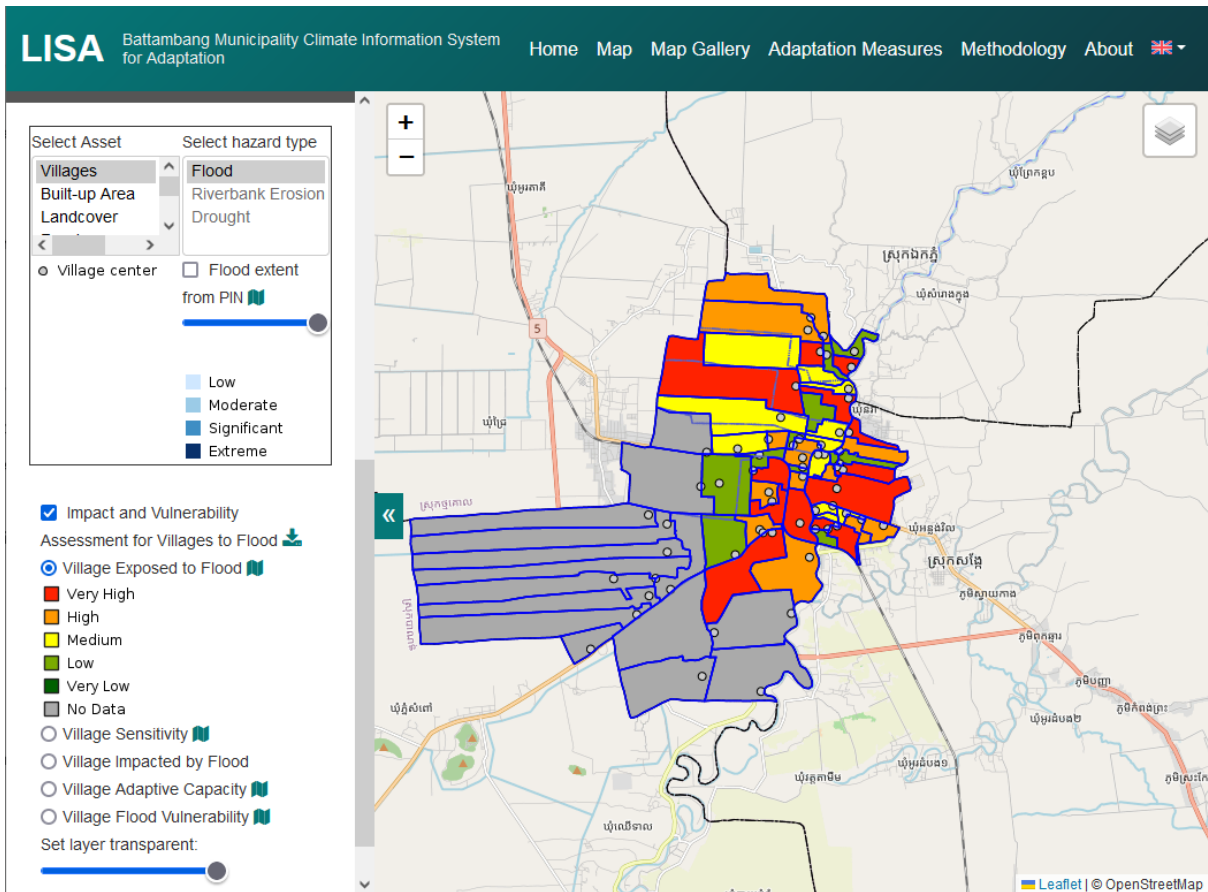
Table 2: Example of impact and vulnerability assessment data layers

asset	hazard	lname	ws	style	layers	zIndex	dlmap	dlva
ass_village	hz_flood	Village Exposed to Flood	va	Vill_Exp_Flood_PIN	BTB_vill_VA	499	05.Impact and Vulnerability Assessment for Villages to Flood\1.Battambang_Municipality_exposure.jpg	RESULTS OF A CLIMATE IMPACT AND VULNERABILITY ASSESSMENT FOR VILLAGES IN BATTAMBANG MUNICIPALITY.pdf
ass_village	hz_flood	Village Sensitivity	va	Vill_Sen_Flood	BTB_vill_VA	499	05.Impact and Vulnerability Assessment for Villages to Flood\1.Battambang_Municipality_sensitivity.jpg	
ass_village	hz_flood	Village Impacted by Flood	va	Vill_Imp_Flood_PIN	BTB_vill_VA	499		
ass_village	hz_flood	Village Adaptive Capacity	va	Vill_Cap_Flood	BTB_vill_VA	499	05.Impact and Vulnerability Assessment for Villages to Flood\1.Battambang_Municipality_capacity.jpg	
ass_village	hz_flood	Village Flood Vulnerability	va	Vill_VA_Flood	BTB_vill_VA	499	05.Impact and Vulnerability Assessment for Villages to Flood\1.Battambang_Municipality_VA.jpg	
ass_buildup	hz_flood	Built-up Exposed	exposure		Union_Flood_community_BTBLU200	501	04.Assets Exposed to Rainfall-induced Floods\6.Battambang_Municipality_PIN_build	

asset	hazard	lname	ws	style	layers	zIndex	dlmap	dlva
		to Flood	e		9		up.jpg	
ass_road	hz_flood	Road Exposed to Flood	exposure		Union_Flood_commune_BTB_mainroad&Union_Flood_commune_BTB_otherroad	501	04.Assets Exposed to Rainfall-induced Floods\6.Battambang_Municipality_PIN_road.jpg	
ass_railway	hz_flood	Railway Exposed to Flood	exposure		Union_Flood_commune_BTB_rail	501	04.Assets Exposed to Rainfall-induced Floods\6.Battambang_Municipality_PIN_rail.jpg	
ass_schhealth	hz_flood	School and Health Facility Exposed to Flood	exposure		school_health_flood_expose	501	04.Assets Exposed to Rainfall-induced Floods\6.Battambang_Municipality_PIN_schoolhealth.jpg	
ass_landcover	hz_drought	Landcover Exposed to Drought	drought		NDDI_BT30m	499	06.LCLU Exposed to Drought\2.Battambang_Municipality_exposure_farmland_drought.jpg	
ass_landcover	hz_drought	Landcover Sensitivity	drought		Lu2017_BT30m_reclassified	499	06.LCLU Exposed to Drought\2.Battambang_Municipality_sensitivity_farmland_drought.jpg	

asset	hazard	lname	ws	style	layers	zIndex	dlmap	dlva
ass_landcover	hz_drought	Landcover Impacted by Drought	drought		LC2017_NDDI_Imp	499	06.LCLU Exposed to Drought/2.Battambang_Municipality_impact_farmland_drought.jpg	

Figure 7: Map of village exposure to flood



2.1.4 Third-party background maps

Accessible third-party background maps from a variety of sources are indicated in Figure 8 and Table 3.

Figure 8: Accessing third-party background map in the map viewer

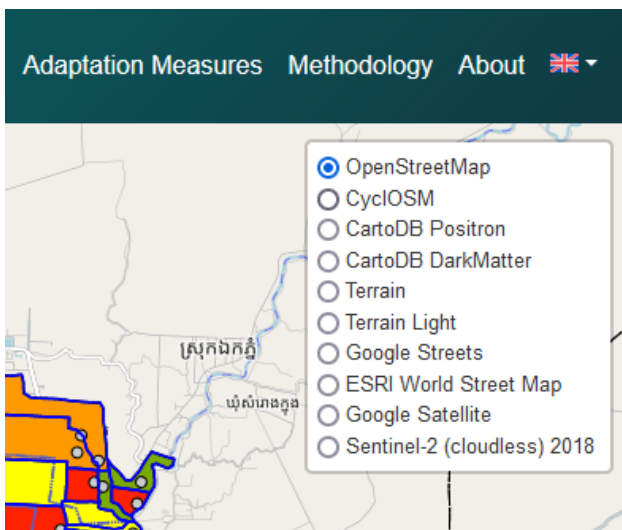


Table 3: Summary of data integrated into LISA

Data category	Name of dataset in menu of LISA app	Data source	GeoServer layer workspace and name
Base maps			
<i>Admin boundary</i>			
	National boundary	MOE-Cambodia	base:khm_admbnda_adm0_gov_wgs84
	Provincial boundary	MOE-Cambodia	base:khm_admbnda_adm1_gov_wgs84
	District boundary	MOE-Cambodia	base:khm_admbnda_adm2_gov_wgs84
	Commune boundary	MOE-Cambodia	base:khm_admbnda_adm3_gov_wgs84
	Village boundary	Battambang Province	va:BTB_vill_VA
<i>Socio-economic information</i>			
	Population density 2020	WorldPop 2020	socio:BTB_popden_2020
	Ward/commune population 2019	Cambodia Census 2019	socio:BTB_Population_2019_per_commune
	Village population 2019	Cambodia Census 2019	socio:BTB_Population_2019_per_village
	Female population per village (2019)	Cambodia Census 2019	socio:BTB_Population_2019_total_female
	Girls per village (2019)	Cambodia Census 2019	socio:BTB_Population_2019_child_female
<i>Public facilities</i>			
	Public Transportation facilities	ODM	socio:BTB_Transportation_Public_facility
	School and Health facilities	ODM	asset:School,Healthfacilities
<i>Land use/Land cover</i>			

Data category	Name of dataset in menu of LISA app	Data source	GeoServer layer workspace and name
	Land use (2009)	Battambang municipality	base:BTB_LU2009
	Land use plan (2030)	Battambang municipality	base:BTB_LU2030
	Land cover (2017)	Servir Mekong	base:BTB_Land_cover_servir2017
Field-photos	Field-photos	ICEM 2023	NA
Hazards and climate change			
<i>Hazard</i>			
	Historical flood 2013	ODM	hazard:BTB_Flood2013
	Modelled flood (PIN) – 5, 10, 50, 100, 500, 1000 year return period	PIN 2022	hazard:RP5,10,50,100,500,1000 Flood Hazard Levels
	Participatory flood hotspots 2023	Battambang participatory mapping 2023	hazard:BTB_Flood_prone_stakeholder
	Participatory erosion hotspots 2023	Battambang participatory mapping 2023	hazard:BTB_Riverbank_erosion
	Historical drought (NDDI)	ICEM 2023, Analysed based on NASA Aqua and Terra dataset	hazard:BTB_Drought_NDDI
<i>Climate Change</i>			
	Projection in 2060s - RCP 8.5	CNMC-MRC 2019	cc:RCP85
	Changes from baseline to 2060s - RCP 8.5	CNMC-MRC 2019	cc:RCP85
	Projection in 2060s - RCP 4.5	CNMC-MRC 2019	cc:RCP45
	Changes from baseline to 2060s - RCP 4.5	CNMC-MRC 2019	cc:RCP45
	Baseline (1985-2005)	CNMC-MRC 2019	cc:BL
Impact and vulnerability			
<i>Impact and Vulnerability Assessment for Villages to Flood</i>			
	Village Exposed to Flood	ICEM 2023	va:BTB_vill_VA
	Village Sensitivity	ICEM 2023	va:BTB_vill_VA
	Village Impacted by Flood	ICEM 2023	va:BTB_vill_VA

Data category	Name of dataset in menu of LISA app	Data source	GeoServer layer workspace and name
	Village Adaptive Capacity	ICEM 2023	va:BTB_vill_VA
	Village Flood Vulnerability	ICEM 2023	va:BTB_vill_VA
Impact and Vulnerability Assessment for Built-up Areas to Flood			
	Built-up Exposed to Flood	ICEM 2023	exposure:Union_Flood_commune_BTBLU2009
Impact and Vulnerability Assessment for Landcover to Drought			
	Landcover Exposed to Drought	ICEM 2023	drought:NDDI_BT30m
	Landcover Sensitivity	ICEM 2023	drought:Lu2017_BT_rec lassify
	Landcover Impacted by Drought	ICEM 2023	drought:LC2017_NDDI_I mp
Impact and Vulnerability Assessment for Roads to Flood			
	Road Exposed to Flood	ICEM 2023	exposure:Union_Flood_commune_BT mainroad & Union_Flood_commune_BT otherroad
Impact and Vulnerability Assessment for Railways to Flood			
	Railway Exposed to Flood	ICEM 2023	exposure:Union_Flood_commune_BT rail
Impact and Vulnerability Assessment for Schools & Health facilities to Flood			
	School and Health Facility Exposed to Flood	ICEM 2023	exposure:school_health_flood_expose
Third-party background maps		Tile URL	
	OpenStreetMap	https://tile.openstreetmap.org/{z}/{x}/{y}.png	
	Cycl OSM	https://c.tile-cyclosm.openstreetmap.fr/cyclosm/{z}/{x}/{y}.png	
	CartoDB Positron	https://s.basemaps.cartocdn.com/light_all/{z}/{x}/{y}{r}.png	
	CartoDB DarkMater	https://s.basemaps.cartocdn.com/dark_all/{z}/{x}/{y}{r}.png	
	Terrain	https://tiles.maps.eox.at/wmts/1.0.0/terrain_3857/d	

Data category	Name of dataset in menu of LISA app	Data source	GeoServer layer workspace and name
		efault/g/{z}/{y}/{x}.jpg	
	Terrain Light	https://tiles.maps.eox.at/wmts/1.0.0/terrain-light_3857/default/GoogleMapsCompatible/{z}/{y}/{x}.jpg	
	Google Streets	http://{s}.google.com/vt?lyrs=m&x={x}&y={y}&z={z}	
	ESRI World Street Map	https://server.arcgisonline.com/ArcGIS/rest/services/World_Street_Map/MapServer/tile/{z}/{y}/{x}	
	Google Satellite	http://{s}.google.com/vt?lyrs=s&x={x}&y={y}&z={z}	
	Sentinel-2 Cloudless 2018	https://tiles.maps.eox.at/wmts/1.0.0/s2cloudless-2018_3857/default/g/{z}/{y}/{x}.jpg	

3. LISA PLATFORM MANAGEMENT (OUTPUT 4.3)

3.1 Introduction

The LISA platform comprises opensource software components. The frontend is based on the WordPress content management system² (which uses the MySQL database³), the map viewer is developed using the Leaflet JavaScript library⁴, and the backend uses GeoServer⁵ to publish spatial data as web map services (WMS) (Figure 9, Figure 10, Figure 11). The WMS are integrated into the frontend which permits the overlaying of imagery within the map viewer.

Figure 9: Open source software components integrated to develop LISA



² <https://wordpress.org>

³ <https://www.mysql.com/>

⁴ <https://leafletjs.com>

⁵ <https://geoserver.org>

Figure 10: Wordpress

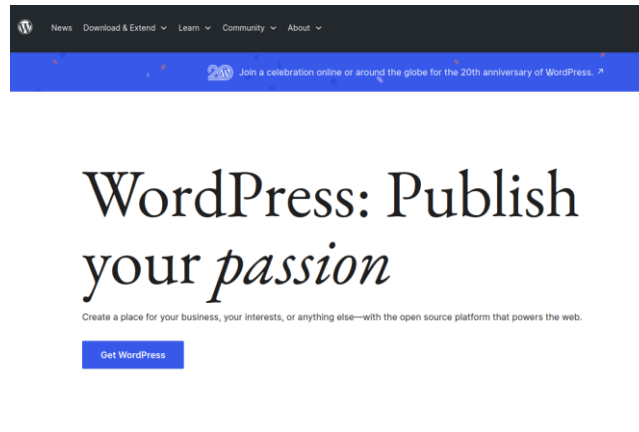
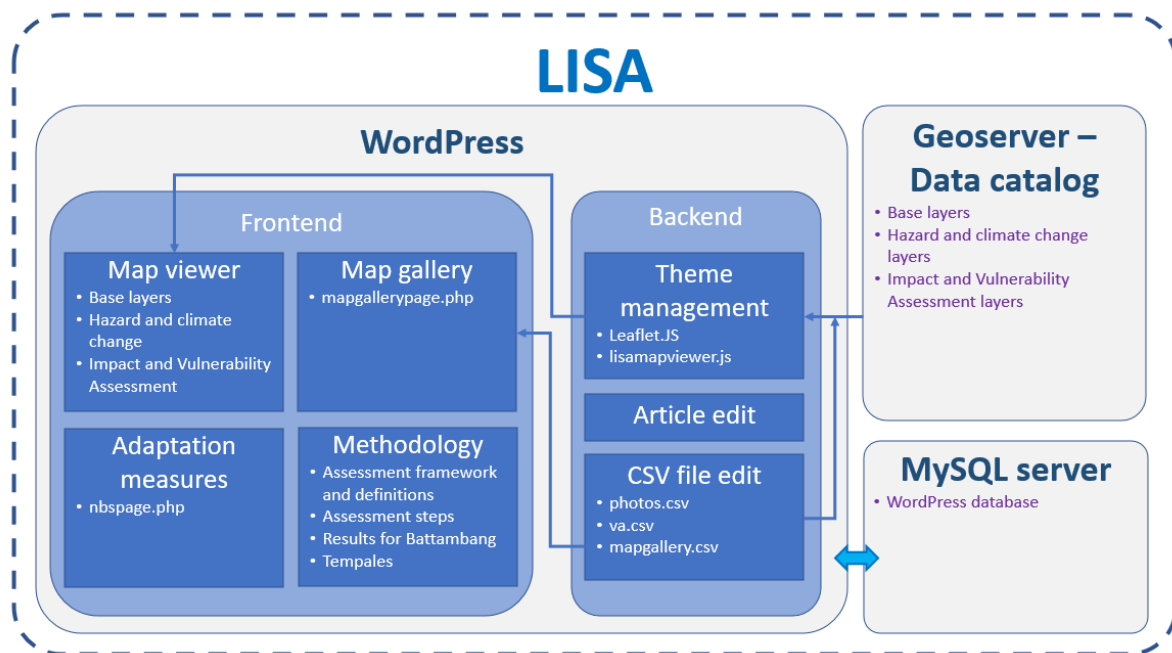


Figure 11: LISA software framework



3.2 Hardware specifications

The hardware specifications for key software components of LISA are detailed in this section. Section 3.2.1 identifies the key prerequisites for running WordPress, and section 3.2.2 details the requirements for operating a GeoServer installation.

3.2.1 WordPress CMS

Server requirements for running WordPress include the following⁶:

- PHP (<https://www.php.net/>) version 7.4 or greater.
- MySQL (<https://www.mysql.com/>) version 5.7 or greater OR MariaDB (<https://mariadb.org/>) version 10.3 or greater.

⁶ <https://wordpress.org/about/requirements/>

- HTTPS (<https://wordpress.org/news/2016/12/moving-toward-ssl/>) support
- Apache or NGINX
- Typically a Linux based OS - probably Ubuntu but almost any Linux distribution works

The CMS would run fine on a small VPS or cloud server (e.g. 2GB RAM, 2 CPUS, 10GB disk space), and it is unlikely if the number of concurrent users will be a factor (as in actually making concurrent requests, not just viewing), but the system could be scaled-up from the above server specs by adding more CPU and RAM; a doubling of these would likely address heavy usage.

At a bare minimum, WordPress needs a standard hosting account to run. Most web hosting providers would be able to provide a low- cost platform to host a WordPress website. In this case the provider would take care of all the server and networking side and also be able to provide technical support. Setting up a dedicated server is completely optional and dependent on available resources.

3.2.2 GeoServer

For LISA, Docker containerization⁷ is used in the GeoServer installation. LISA’s Docker/GeoServer application requires about 2.5 GB RAM, which is based on running a single Docker/GeoServer replica, which should be sufficient given anticipated usage by government agencies. Additional replicas can be added for future scaling up if required. The use of RAM and CPU resources will depend on the number of users interacting with the map viewer.

docker stats⁸

CONTAINER ID	NAME	CPU %
2777076d588e	geo9c9t_geo9c9tservice.1.k7682hwddqwsmizzijsogi0l2	1.06%

MEM USAGE / LIMIT

2.441GiB / 30.62GiB

Data sets can be updated directly via the web-based GeoServer application or by linking a desktop GIS to Geoserver (using web feature services, WFS, for instance).

3.2.3 Leaflet map

Leaflet is an open source JavaScript library used to build web mapping applications, supporting HTML5 and CSS3. Leaflet allows developers without a GIS background to readily display tiled web maps hosted on a public server, with optional tiled overlays. It can load feature data from GeoJSON files, style it and create interactive layers, such as clickable markers with popups.

Leaflet runs on client browsers, therefore, it can work with any web server, embedded in HTML or server script without any specific requirements. In LISA, the Leaflet JS library is included in the header.php in the [theme folder]. Custom map interactivity is implemented in the [theme folder]/js/lisamapviewer.js file.

⁷ <https://www.docker.com/community/open-source/>

⁸ This is based on running a single GeoServer replica, which should be sufficient given anticipated usage by government agencies. Additional replicas can readily be added for future scaling up if required.

3.3 Deployment and management

3.3.1 WordPress CMS

This guide assumes some existing knowledge of using and installing WordPress.

If you need to familiarise yourself with WordPress first, then it is recommended to also review the WordPress documentation at <https://wordpress.org/documentation/> and the WordPress Developer Resources at <https://developer.wordpress.org/>

We assume you already have a xAMP server environment set up for use by the WordPress website (e.g., Linux Apache MySQL PHP or Windows Apache MySQL PHP).

The server can also be configured with MariaDB in place of MySQL (like for like replacement) and NGINX instead of Apache (but recommend to include Apache's .htaccess compatibility).

You will be supplied with a .zip file containing all the WordPress files.

1. Extract the .zip to your web server public_html or www directory (exact directory will depend on your server configuration)
2. Set up a MySQL or MariaDB database on your server and create a database user for the app
3. Import the supplied database .sql file which is an export of the WordPress database
4. If migrating to a different domain name, use the WP CLI utility to search and replace the existing website URL (e.g. <https://icem.com.au/lisa>) with your new desired URL in the database.
5. If the installation is located in a subfolder (e.g. /lisa/) ensure the correct path is set in the .htaccess file (.htaccess is Apache based so if you are not using Apache you will need to check your specific environment requirements)
6. Edit the wp-config.php file to set your database name, database server, database user and database user password.
7. Visit <https://yourdomain.com/wp-admin/> and log in with your administrator user.
8. Go to Settings -> Permalinks and click the update button to reset the permalinks (this is not always required but is good practice to reset the .htaccess file in case of any environment oddities).
9. Visit <https://yourdomain.com> to visit your website.

How to maintain the WordPress CMS

a. Security

WordPress Website Level Security

For typical WordPress installations the following plugins are recommended to provide a basic level of security at the app level:

- Sucuri Security - Auditing, Malware Scanner and Hardening
- Anti-Malware Security and Brute-Force Firewall
- Limit log in attempts reloaded

These plugins will be set up and configured with recommended settings. They also have options to scan files and help recover from any malware infection if that were to ever happen.

In addition to these, it is important that WordPress core and plugin updates are performed regularly, as these typically address any widespread vulnerabilities. This is covered in the next section.

WordPress User Accounts

The WordPress admin area allows you to create additional user accounts for administration and content management. It is best practice that user accounts are not shared between people. Individual people should have their own user accounts and only given the user role required to perform their tasks.

As a general guide, you may want to create Administrator, Editor and Author users for managing the website:

- Administrator - can manage the full website and users
- Editor - can manage all content, but not users, themes, plugins, etc.
- Author - can add and edit their own content (if the page is assigned to them) but not other's posts and content.
- Contributor - not used
- Subscriber - not used

There should be two trusted administrator users for redundancy, but as a backup the system administrator would also be able to gain access through the database should the administrator user lose their password.

- Do not share user accounts.
- Ensure strong passwords are set.
- Disable any user accounts that are no longer needed.
- Do not leave the admin area logged in when not in use
- Do not save the password in the browser on shared computers

Server Level Security

As well as the WordPress website level security, it is critically important that the server environment is set up and secured at the OS, firewall and webserver levels. The server setup should follow best practices for security and be set up by an experienced system administrator that has extensive experience in setting up and running public web servers. It is impossible to learn everything about webserver security just from training - your system administrator will need real world experience and have handled different cases in the past.

It is also recommended to also use server software such as ModSecurity, firewalls, antivirus, malware and rootkit scanners. For extreme cases where you are the target of significant attacks such as DDoS attempts, then you will need to look into using a WAF (Web Application Firewall) and network level DDoS mitigation such as offered by CloudFlare. Your system administrator or hosting provider can advise on and handle this area.

b. Updates

Core and Plugin Updates

WordPress periodically provides core and plugin updates. These will appear as notifications within the WordPress admin area. You can go to Dashboard -> Updates to view and install available updates.

Generally, it is advised to install all available updates as soon as they are available. However, there is a risk of compatibility issues, so ensure that you have a backup available before running updates so you can roll back if there are any issues.

If you do encounter issues after running updates, roll back and then install updates one by one until you find the one that causes the issue. Once you find the one that causes the issue, roll back again and install all updates except that one. It is not usually critical if an update is not installed, but generally an app that is not updated will become unstable or insecure over time. If you have an issue with an update you can investigate that plugin further, or in many cases you can just accept the risk of not installing that update for now - often a plugin is updated again in future and will resolve the compatibility issue.

Plugin: WPML (WordPress Multilanguage)

A note regarding WPML. WPML (WordPress Multilanguage) is used to handle the translation functions. WPML is a premium plugin but a lifetime licence is included to use this. The licence key is already set in the backend but this is tied to a specific domain. When we hand over the website files we can update the licence according to your desired domain and website URL (you will need to advise us on the domain you plan to use), but if you move the website to a new domain name in the future then you will need to purchase your own key. You can find more about WPML and documentation at <https://wpml.org/>

Custom Theme & Theme Framework

The theme is based on the Understrap framework (see docs here: <https://docs.understrap.com/>) and uses the latest version 1.2.2 as of May 2023. The parent theme can be updated in WordPress admin area but as with core and plugin updates you must be aware of compatibility issues, especially if updating to a major version number (e.g., 1.2 -> 1.3). There should be no need to regularly update the customised child theme (lisa-theme) except in rare cases such as if the parent theme removes support for the child theme version in the distant future - in practical terms this would be many years. In that case you will need a developer to manually compare the files of the latest Understrap child theme and the lisa-theme to copy over any required updates to the lisa-theme directory.

If you are an experienced developer and wish to make changes to the theme files (e.g., to manage the map or gallery) you would edit the files within the /wp-content/themes/lisa-theme/ folder. If you are changing the CSS styling you would edit the SASS files and compile into CSS with a SASS compiler tool. Updating the theme should not be attempted except by an experienced developer. You should also reference the Understrap documentation regarding child themes: <https://docs.understrap.com/>

c. Backups

Backups should be handled at the server level by a capable administrator. We recommend the website files and database are automatically backed up nightly and stored offsite. It is advised to regularly check the integrity of your backups and ensure they can be easily restored.

If you are using cPanel or other hosting control panel there will likely be options within the control panel to view and restore backups. If you are using a third-party hosting provider then you can simply contact them to handle backups for you.

d. Monitoring the CMS is online

You should have service monitoring set up at the server/OS level with notifications sent to the system administrator.

You can also set up external http and network monitors using secondary servers or third-party tools (e.g., montastic.com). This is optional.

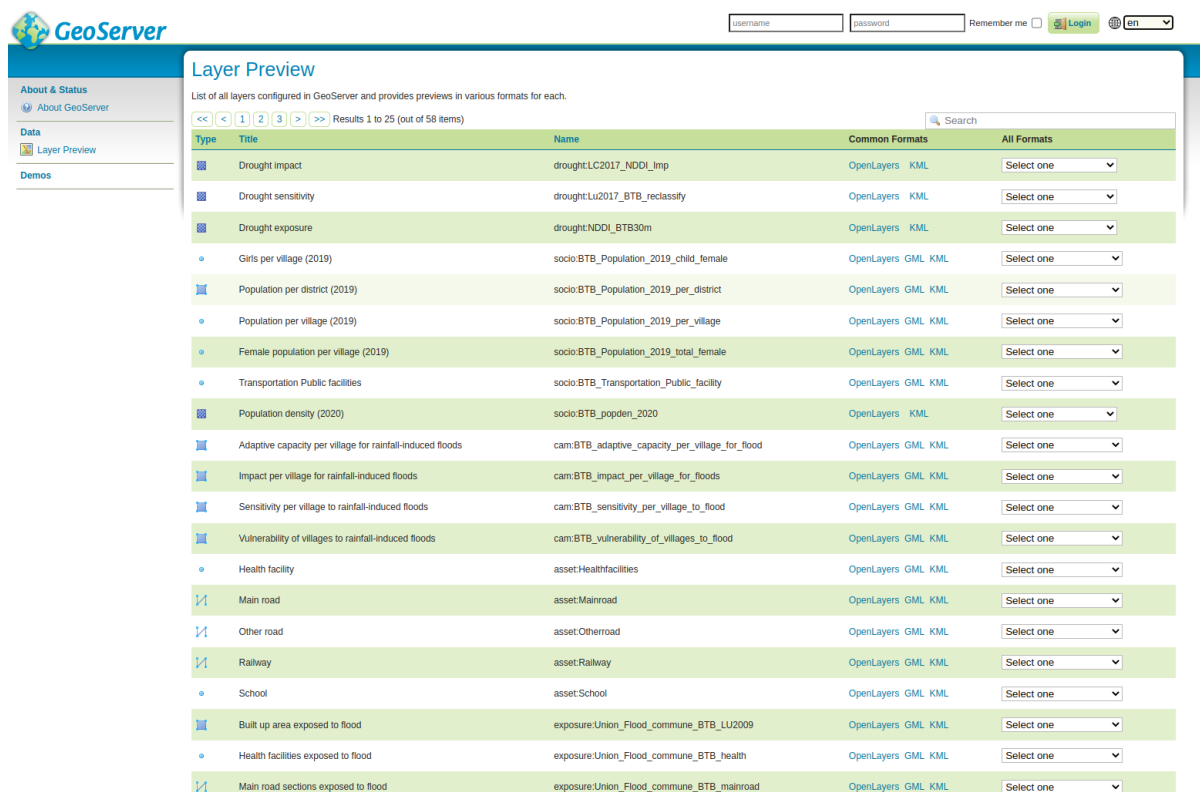
3.3.2 GeoServer

GeoServer is an open-source web server that allows the display, sharing and editing of geospatial data. It uses open standards set by the Open Geospatial Consortium (OGC) and is widely used and supported software. LISA uses GeoServer’s web map services (WMS) to share images of spatial data (Figure 12), which are integrated into the LISA map viewer.

GeoServer is integrated into a Docker container to ease deployment and management. Docker is an open-source containerisation technology that can facilitate software migration to other machines and is used for scaling up the application in production mode. Docker containers are lighter on computer resources than virtual machines such as VMWare and VirtualBox, and can be run on Linux or Windows machines.

The GeoServer database is stored directly on the host server and linked to the GeoServer Docker container. Refer to the section ‘Core and Plugin Updates’ for the general approach to updating software.

Figure 12: LISA’s GeoServer home page showing integrated datasets



How to maintain GeoServer:

a. Security

It is recommended that the IT administrator monitor security updates for each of the key LISA software components and to update the application accordingly if a significant risk to security is reported. Details on software security can currently be found at the following URL for GeoServer

GeoServer: <https://osgeo-org.atlassian.net/projects/GEOS/summary>

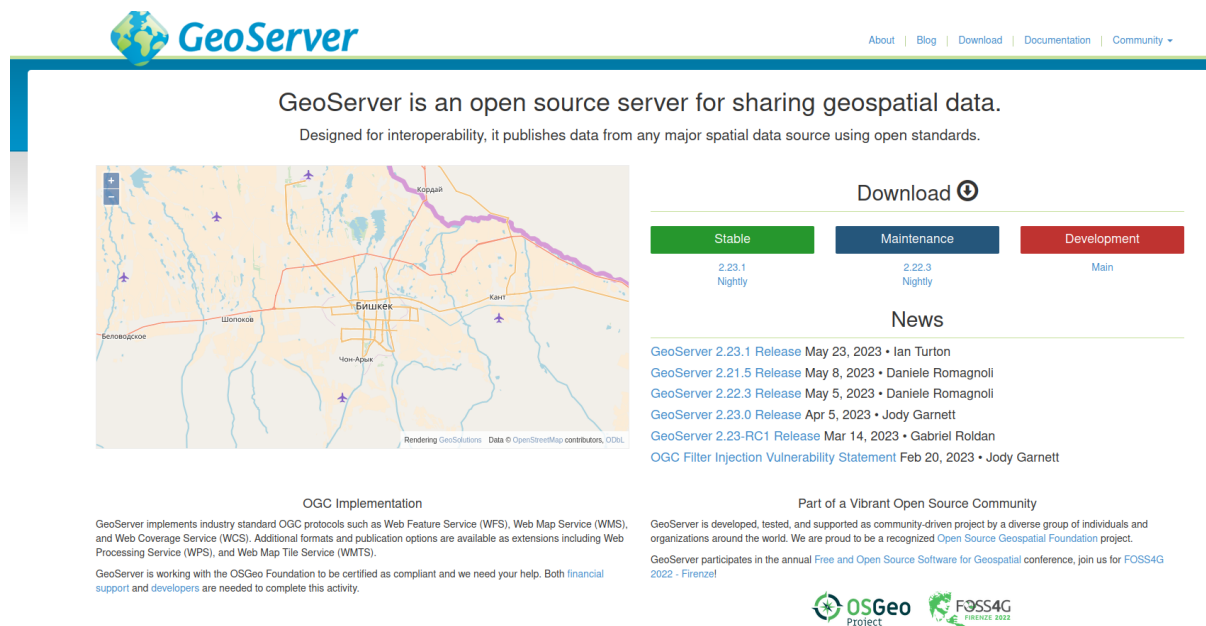
e.g., <https://osgeo-org.atlassian.net/jira/software/c/projects/GEOS/issues/?jql=project%20%3D%20%22GEOS%22%20ORDER%20BY%20priority%20DESC%2C%20updated%20DESC>

Recommendations on server level security are mentioned under the WordPress section above.

b. Updates

Periodic updates of GeoServer software are made available from the GeoServer website (Figure 13).

Figure 13: Home page of GeoServer site



c. Backups

The GeoServer database is located on the server at `/home/tomcat/9c9t_translated/`⁹

All directories (`geoserver_data`) and files within this directory should be regularly backed up, the frequency dependent on the frequency of data updates. It is suggested that backups of the database are made every one month initially. Secondary backups should be stored on another machine and in different location to avoid potential loss.

Also refer to the general recommendations under the WordPress backups section.

d. Monitoring GeoServer is online

⁹ Note: the path may change when LISA is migrated to a government server (check with the IT administrator).

Refer to recommendations under the WordPress section above.

3.3.3 Leaflet map

3.3.3.1 How to update the map

The data layers displayed in the Leaflet map can be updated by modifying the CSV file as mentioned above in section 2.1.

4. NEXT STEPS

A future capacity building programme (called LISA Phase II) has been proposed for training government officials in Battambang to manage the LISA platform, and to conduct and interpret the outputs of climate risk assessments. The proposed twelve-month training programme incorporates a total of four training modules to address technical management of the LISA platform and to better understand climate risk assessments.

The Phase II project aims to supplement the current LISA platform by integrating outputs from vulnerability analyses of all key assets to hazards in Battambang, and train government staff to maintain the LISA platform and develop the knowledge to use and interpret the data in LISA to improve resilience planning in the city.

In addition to training government staff, the outputs from the Phase II climate risk assessments will be integrated into the LISA website by the consultant.

In summary, the aims of the training programme are to:

- (i) provide technical training to Battambang government staff in the management of the LISA platform;
- (ii) provide training in conducting and interpreting climate risk assessments so that Battambang government staff can readily use the LISA platform and better integrate climate change into urban planning; and
- (iii) the LISA platform will be supplemented with new findings from climate risk assessments conducted in Phase II of the project

Further details about the proposed Phase II project can be found in the Final project report:

ICEM 2023. *Report of the final stakeholder workshop (D4.4/D4.6/D4.7): Technical Assistance: Climate risk assessment for subnational adaptation and establishment of a local climate information system for climate change adaptation (LISA)*. 26 May 2023. Prepared for UN-CTCN, and MoE, Royal Government of Cambodia.



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