



URBAN  
CLIMATE CHANGE  
RESILIENCE  
TRUST FUND  
Asian Development Bank



# ADB SPADE

## *SPATIAL DATA ANALYSES EXPLORER*



Viareggio, Italy

Ries Kluskens  
11 June 2019

# Introduction - Royal HaskoningDHV

- Engineering consultancy firm
- Active in aviation, buildings, energy, industry, infrastructure, maritime, mining, rural and urban development and water.
- Employing 6,000 professionals worldwide
- Digital Services Department
- Dedicated department specialized in GIS, Geo-ICT & Information Management (ca. 50 persons growing towards 125 people in the next 2 years)
- ESRI Gold Partner & company-wide ESRI EULA



# SPADE

Spatial Data Analysis Explorer

How to build resilient, livable cities



## WHAT IS SPADE

SPADE is a web-based platform on a centralized cloud-based server that contains various geospatial data which can be utilized for consultation, project preparation, production of maps, and analysis of climate change impacts.



Can support ADB strategies and projects, and scale up climate resilience thinking in urban planning



Funded by the Urban Climate Change Resilience Trust Fund



Piloted in 5 cities in 2 countries: Bagerhat and Patuakhali (Bangladesh), and Ha Giang, Hue, and Vinh Yen (Viet Nam)

## SPADE provides dynamic, relevant information

SPADE provides users with a simple and powerful interface to explore and analyze spatial data, allowing users to combine and/or compare different climate change scenarios with land use and infrastructure datasets that can inform project design and implementation processes and strengthen resilience across urban systems and sectors.

Disaster risk mapping and damage assessments



Urban settlements and population distribution mapping



Climate assessments, changes in temperature, precipitation, and sea level rise



- SPADE is developed for the Asian Development Bank under the Urban Climate Change Trust Fund (UCCRTF).
- The UCCRTF's priority is to help build resilience to the effects of climate variability and climate change



In collaboration with knowledge partners:



# SPADE Support to ADB Business Operations

## Strategy



Country Partner Strategy  
Regional Cooperation Strategy  
Knowledge & Support TA

- Policy dialogue
- Scenario mapping through Futures and Foresight tools
- Option/Choices for decision making
- Country level assessments
- Setting priority sectors and cities

## Identification



Concept Paper  
Project Preparation Study (TRTA)  
Project Loan Documents (RRP)

- Cross-sector teams design project
- Technology providers identified
- Climate risk and vulnerability assessment
- Align KSTA with TRTA
- Developing integrated plans

## Implementation



Approval and Implementation  
Progress monitoring

- Preparing detailed engineering designs
- Conducting Safeguard assessment
- Preparing Contract packages
- Training and capacity building
- Progress monitoring reports

## Evaluation



Monitoring and Evaluation Reports

- Process and results monitoring
- Evaluating of results
- Planning for Future projects
- Multi – (layers, criteria and dimensions) for decision analysis



# SPADE Support to ADB Business Operations

## Strategy



Country Partner Strategy  
Regional Cooperation Strategy  
KSTA

## Identification



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## Implementation

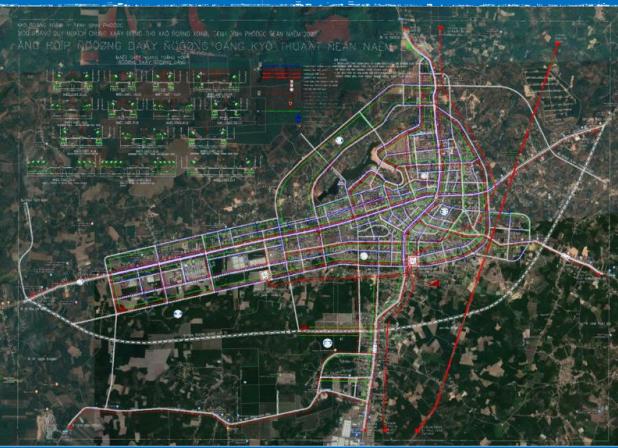
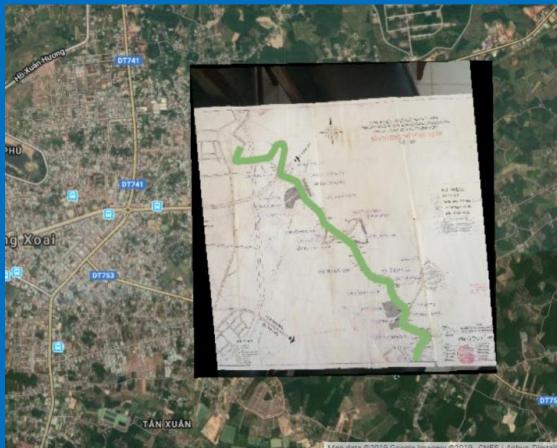


Approval and Implementation  
Progress monitoring

## Evaluation



Monitoring and Evaluation Reports



Digital and non-digital data are being collected from different sources to inform project identification process



# SPADE Support to ADB Business Operations

## Strategy



Country Partner Strategy  
Regional Cooperation Strategy  
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## Identification



Concept Paper  
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## Implementation



Approval and Implementation  
Progress monitoring

## Evaluation



Monitoring and Evaluation Reports



- Baseline Maps
- Data sets from safeguards and socio-economic surveys
- Climate change impact assessments



# SPADE in Project design (ADB Use Case)

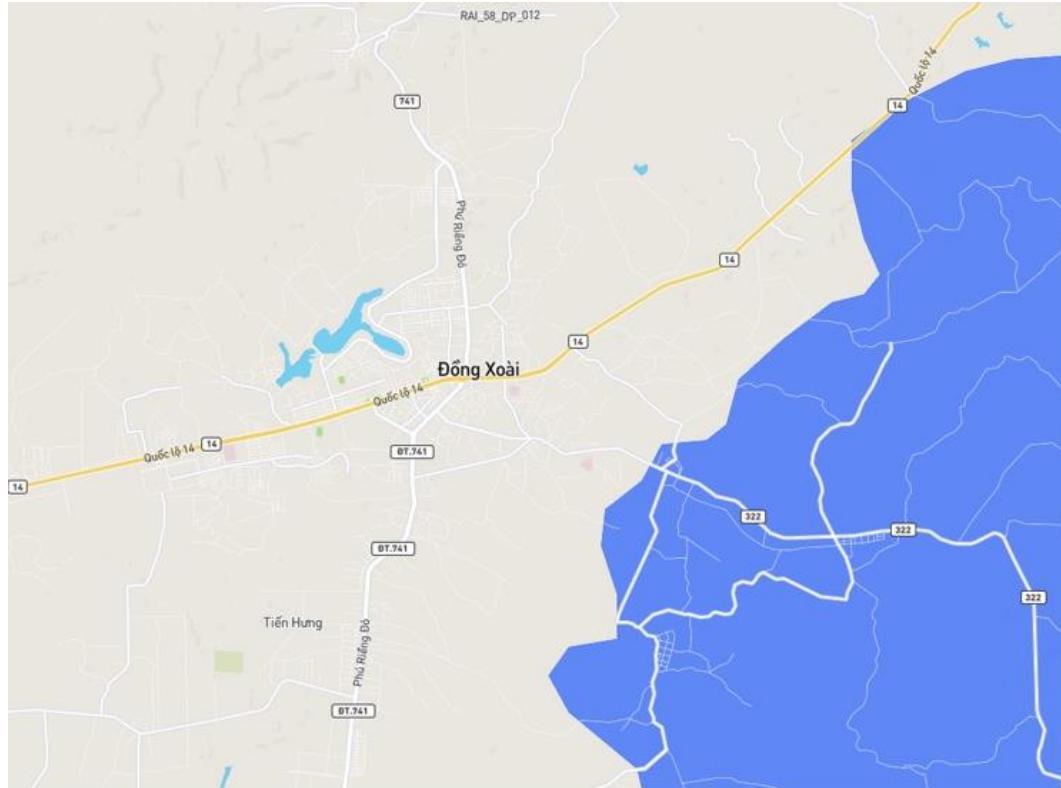


SPADE is used for Project Design and analysis on Secondary Cities Environment Improvement Project. Available digital and non-digital city/town profile information were collected from provincial line departments and plugged into the SPADE.

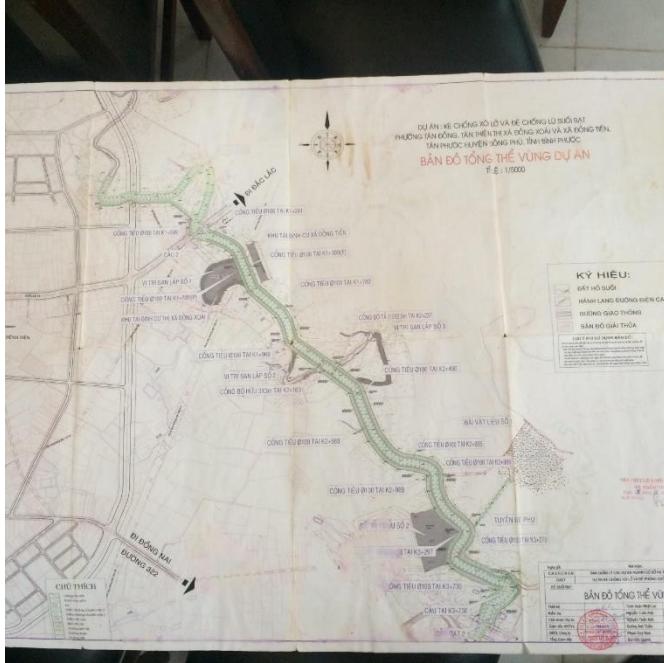


# Projects in Dong Xoai

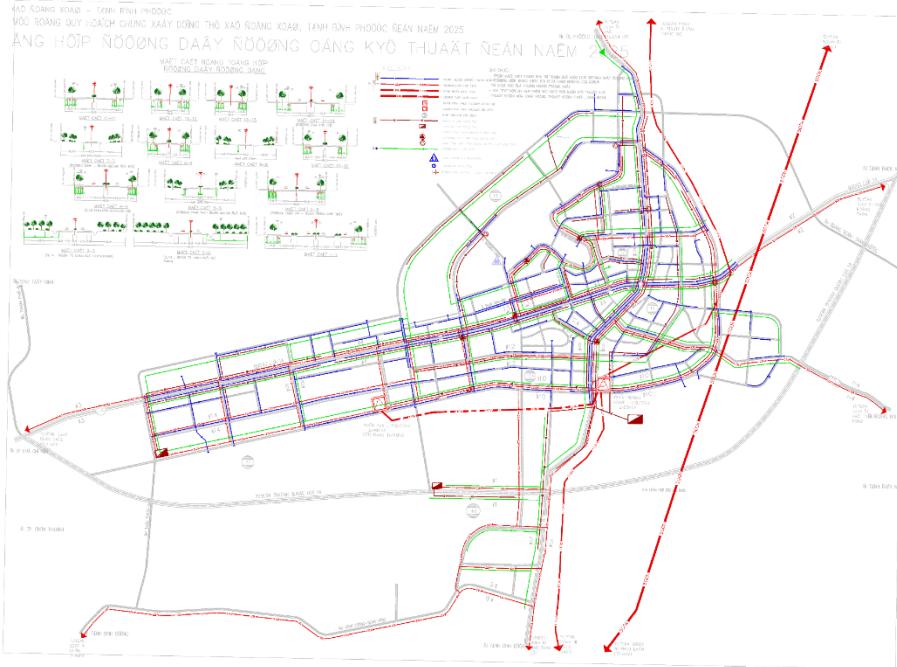
- Map of Dong Xoai with Protected Areas (Blue Shade)
- Project officers needed to know if projects in the area are falling within or outside the protected area



## Digital and non-digital data were collected from different sources

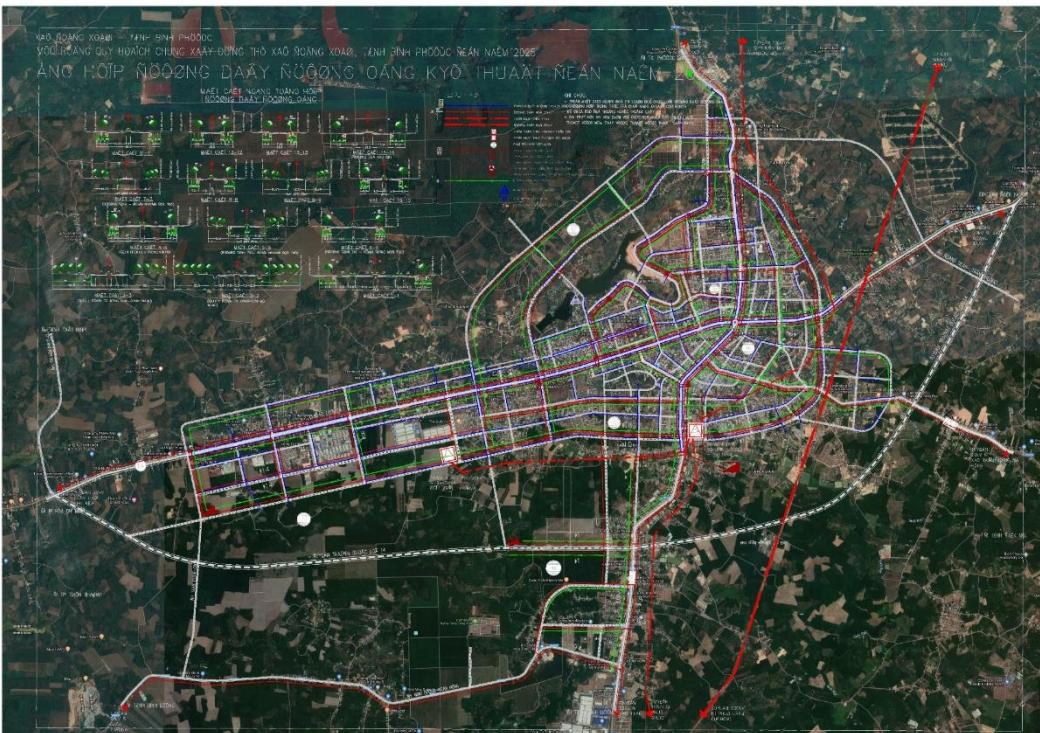
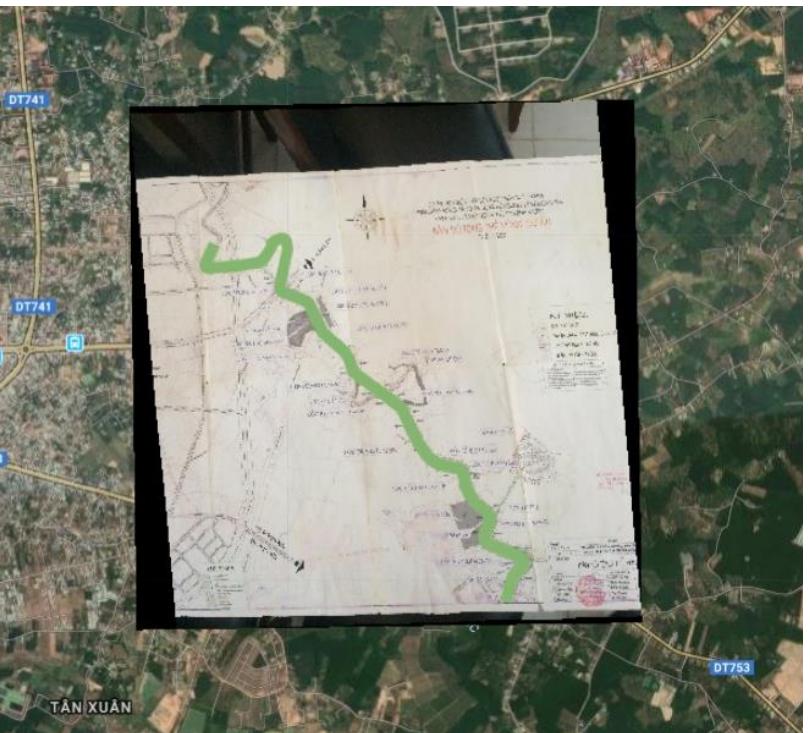


# Paper based map of river embankment



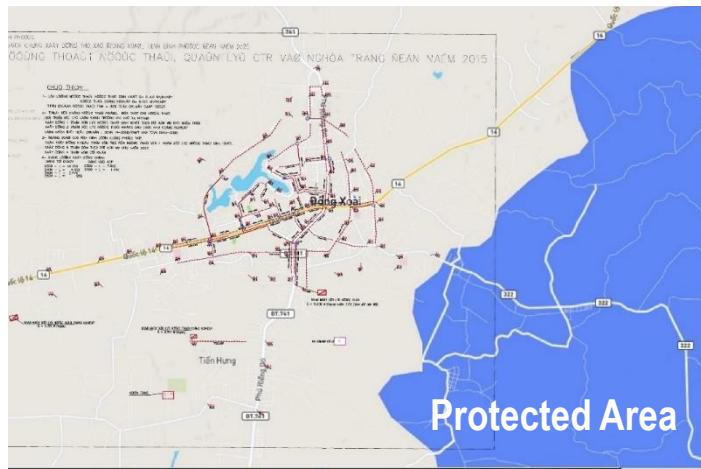
## Digital data of Facilities in Dong Xoai

Paper based maps were digitized, while digital maps not in GIS format were converted and uploaded to SPADE



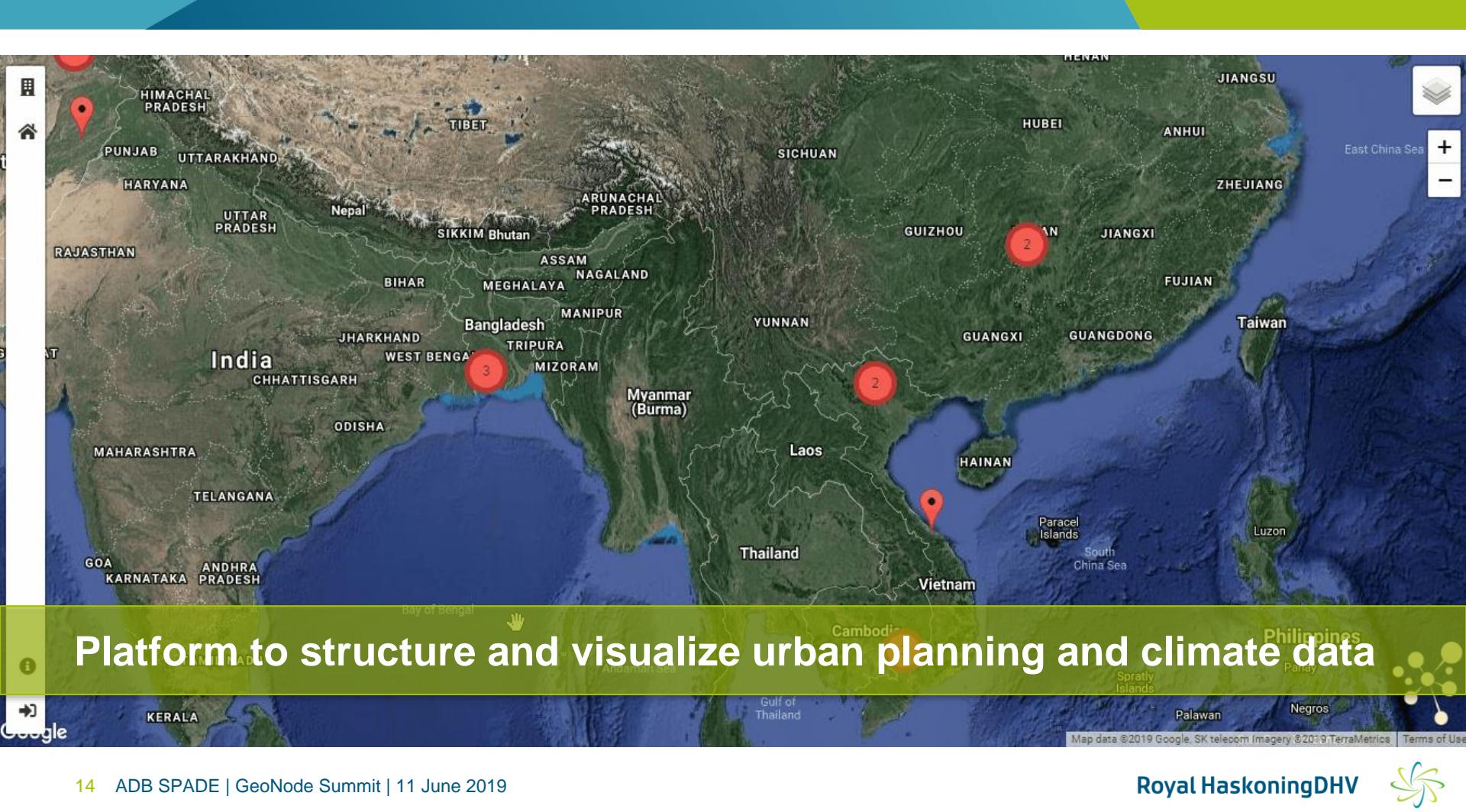
# SPADE aids project officers in planning and project design

- Water facilities plan overlayed to the map with protected areas
- It was concluded that water facilities component is outside of the protected area



- Paper based river embankment was digitized and georeferenced to have its location on the map
- It was concluded that River embankment is outside of the protected area





Black Sea

City Search

Search

[ Asia ]

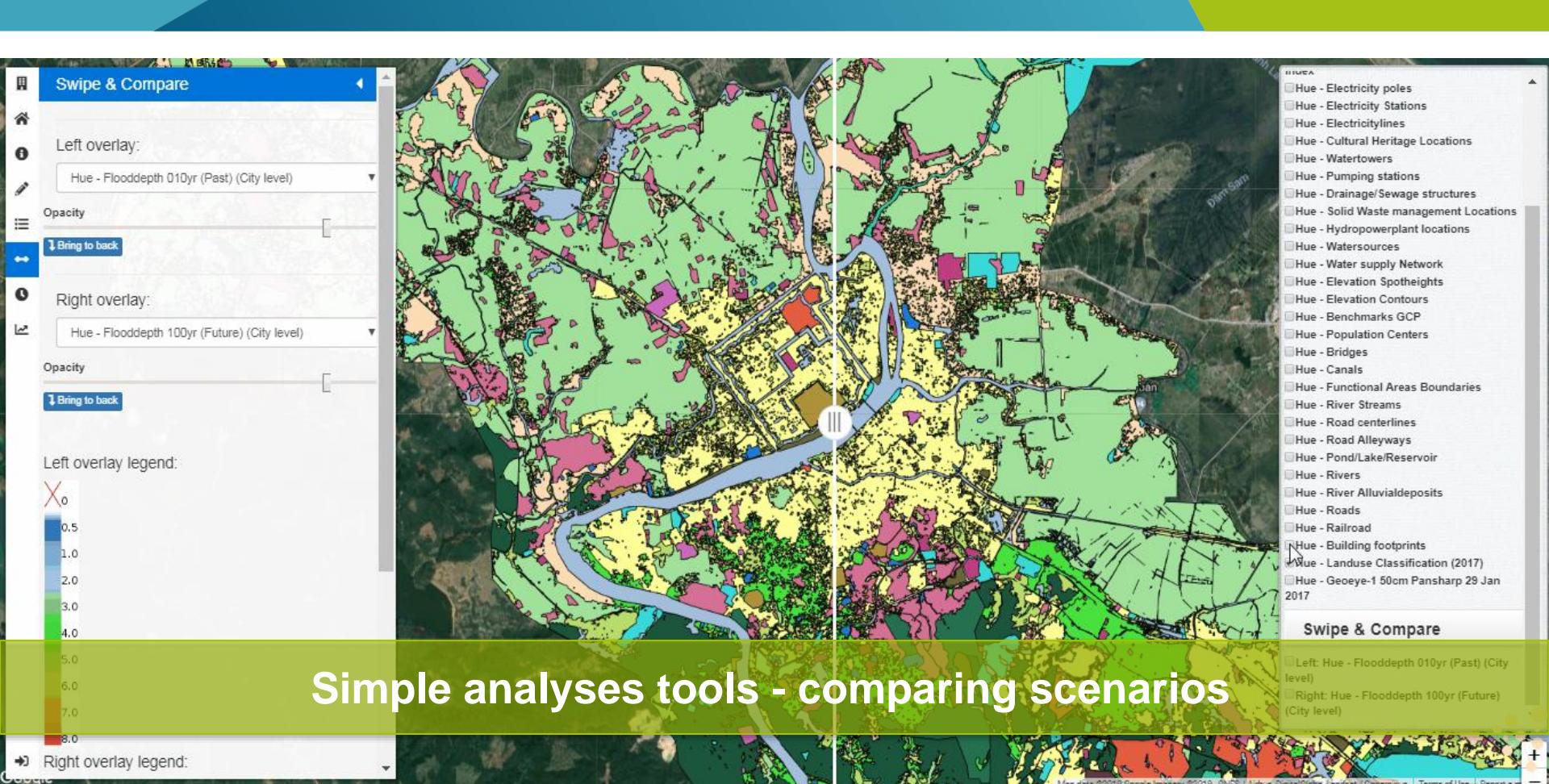
- BGD: Bagerhat
- BGD: Patuakhali
- CHN: Xinhua
- CHN: Yongzhou
- IND: Kolkata
- KHM: Kampong Chhnang
- PAK: Abbottabad

[ Pakistan ]

Google PAK: Morden

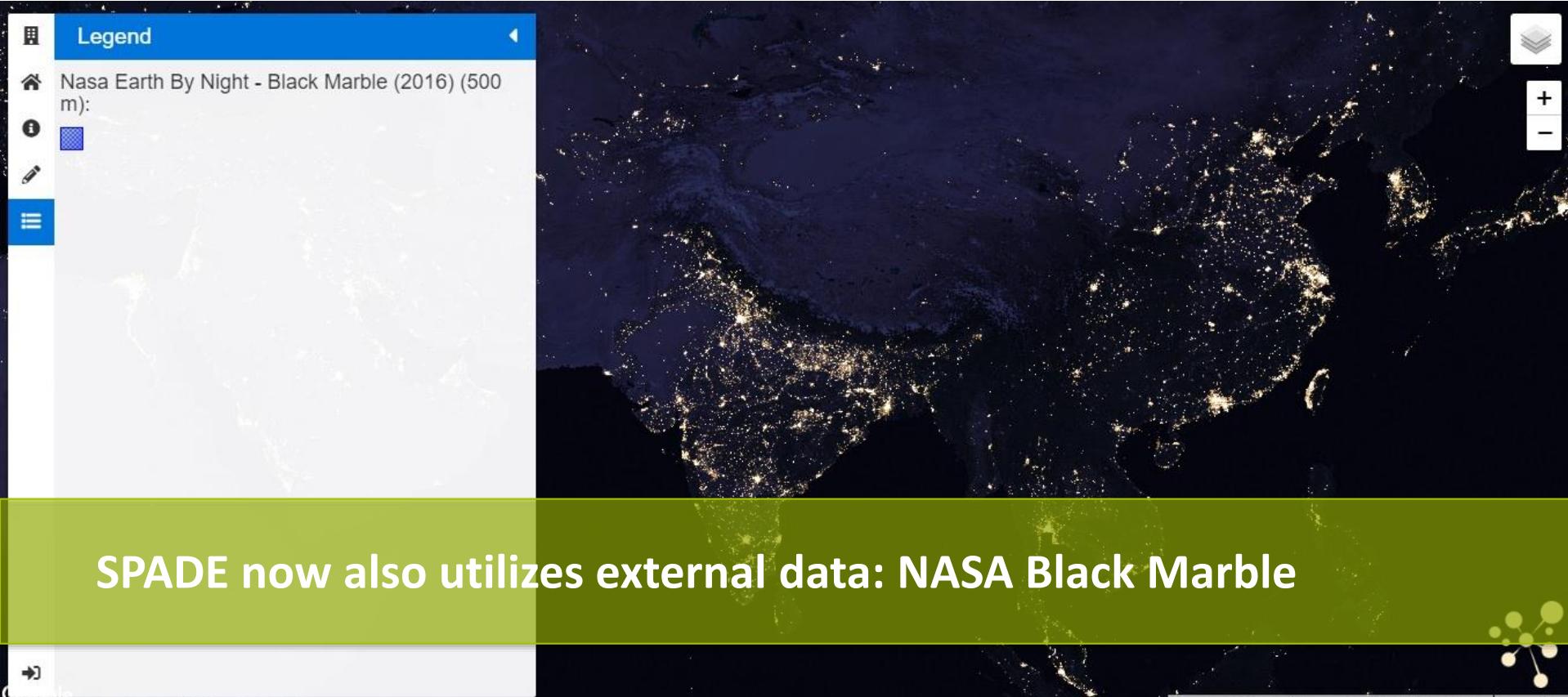
Kenya

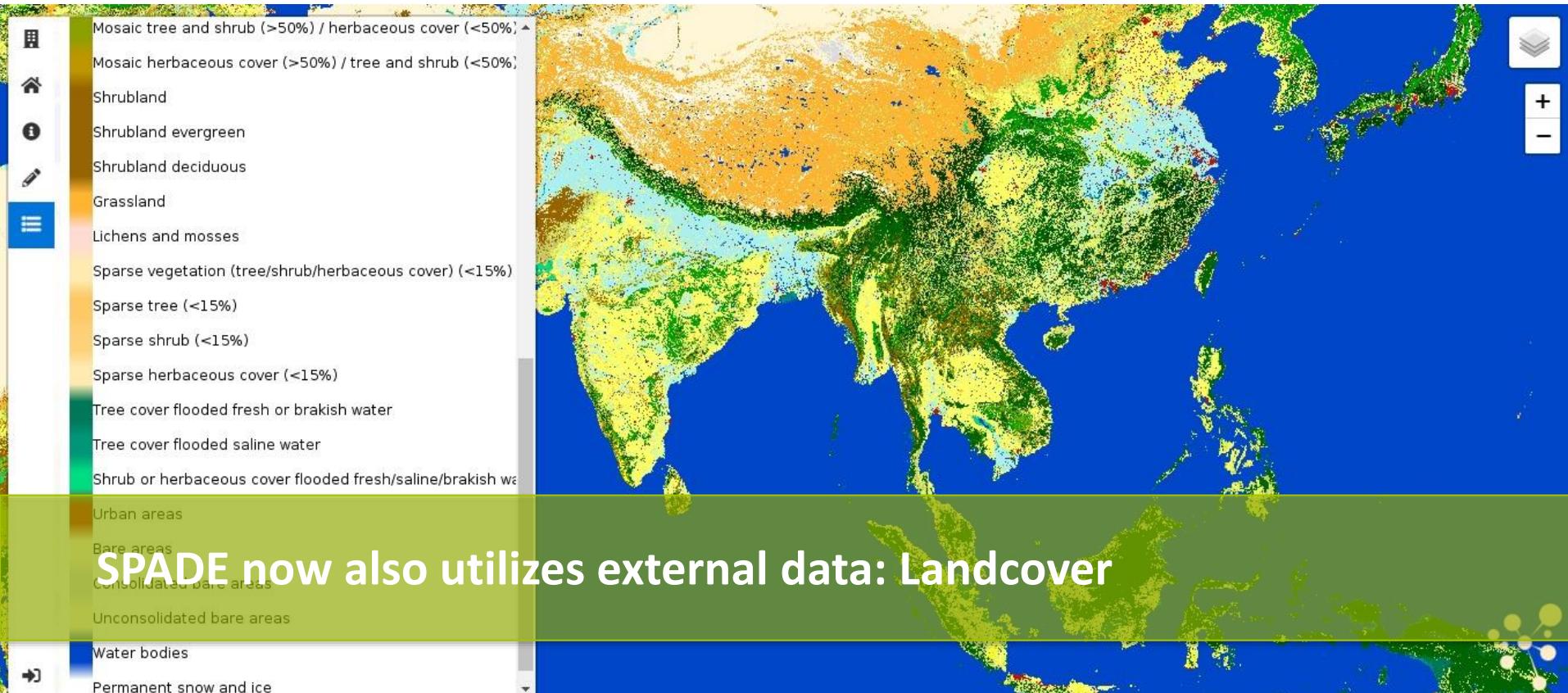


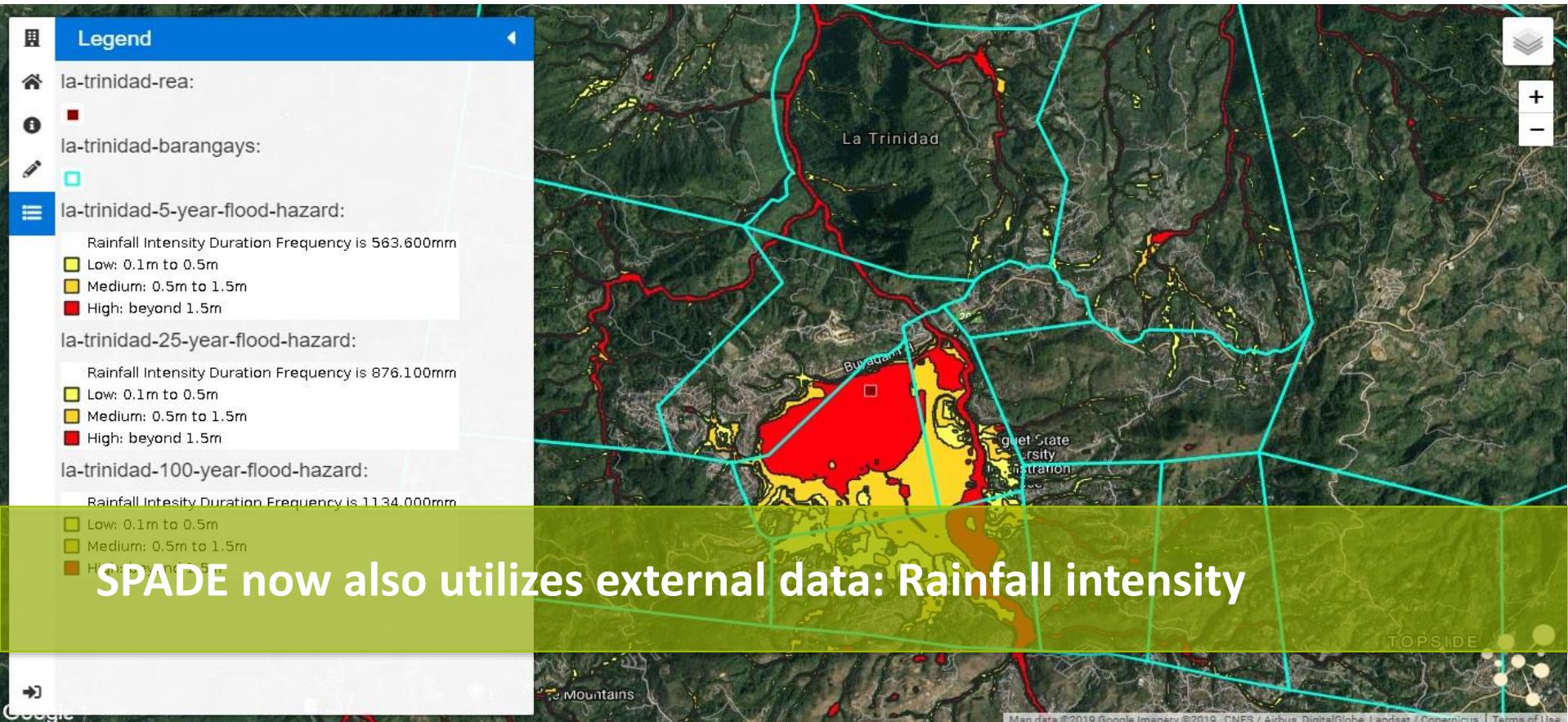


## Simple analyses tools - comparing scenarios

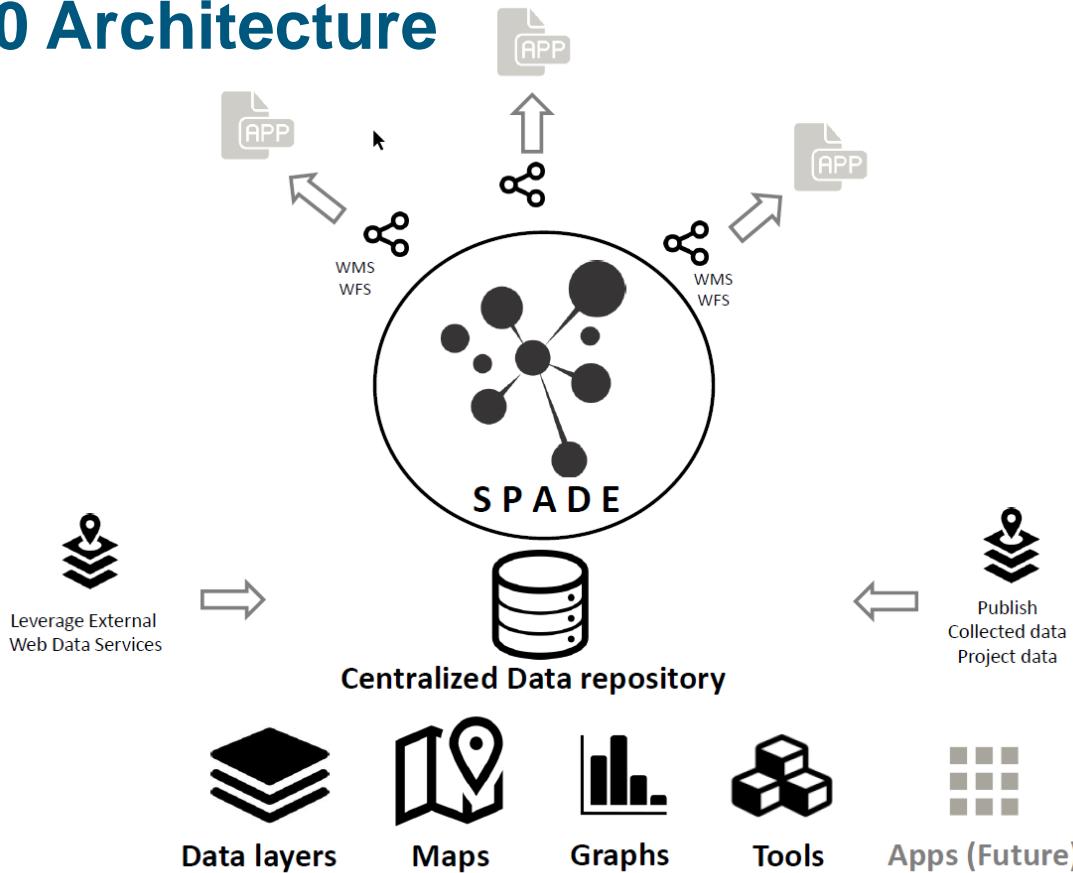








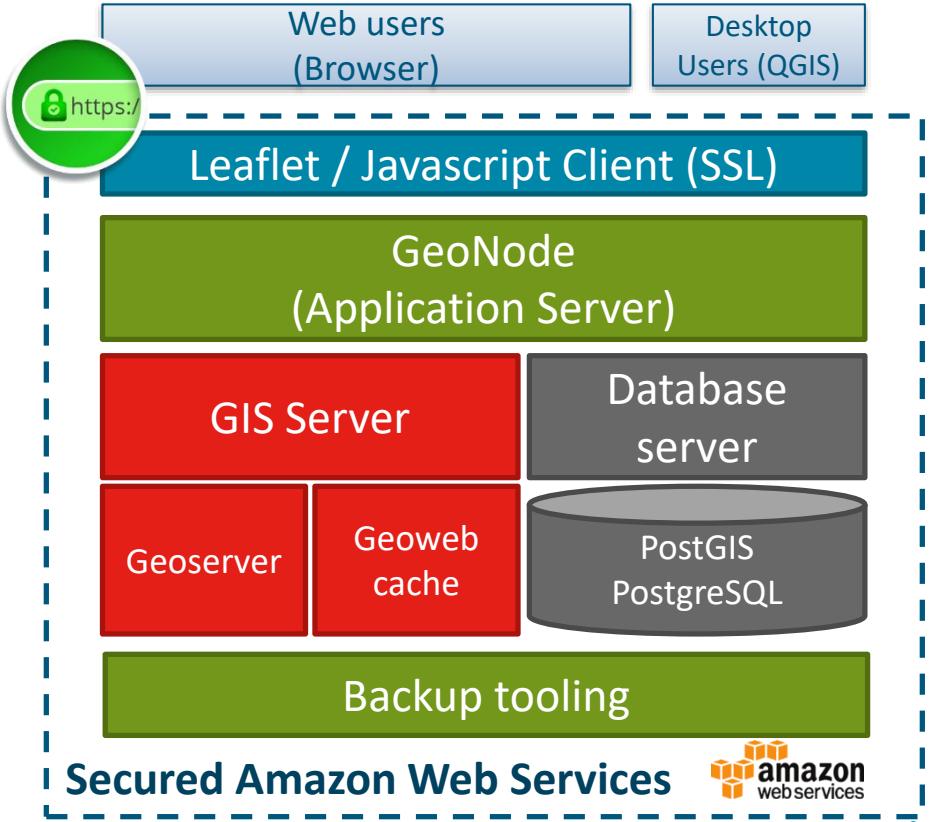
# SPADE 1.0 Architecture



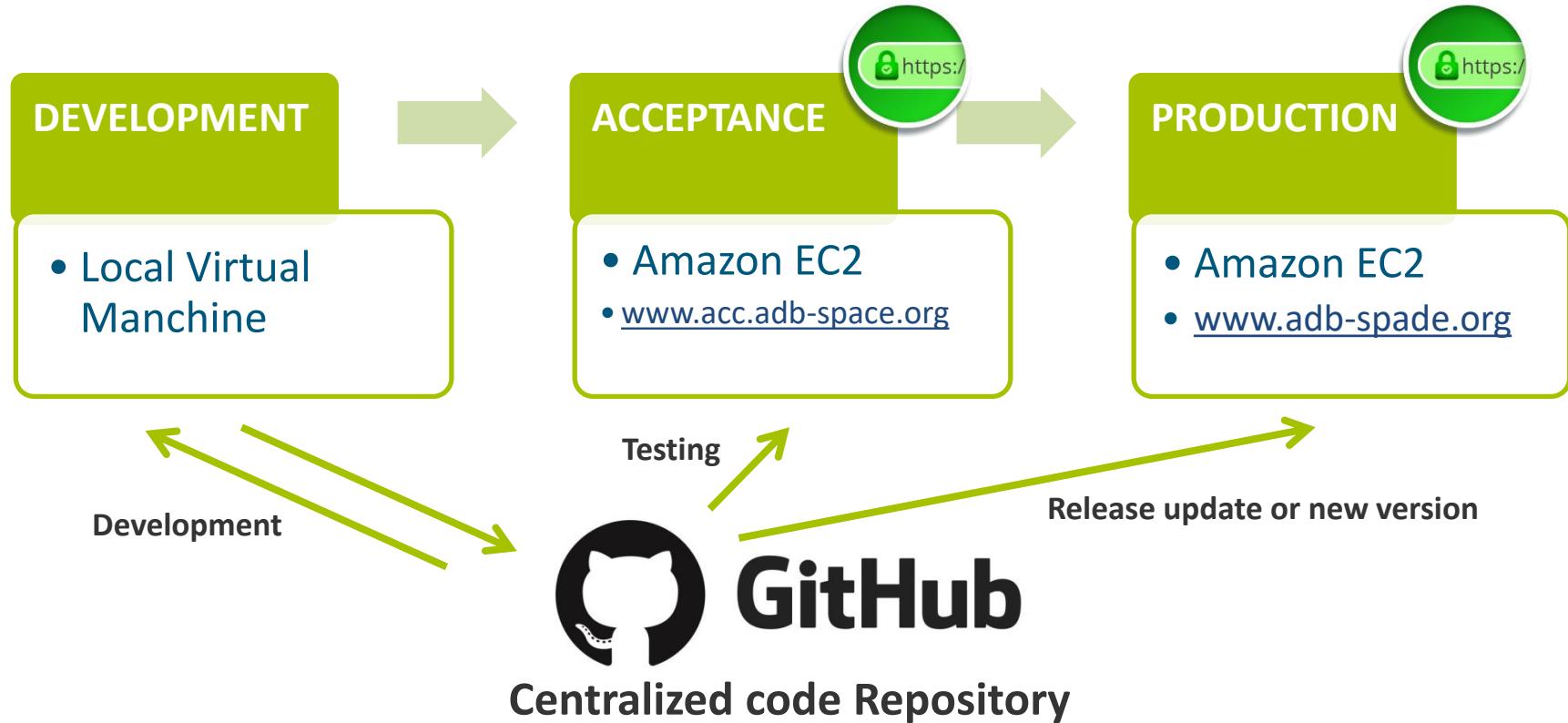
# SPADE 1.0 Online platform



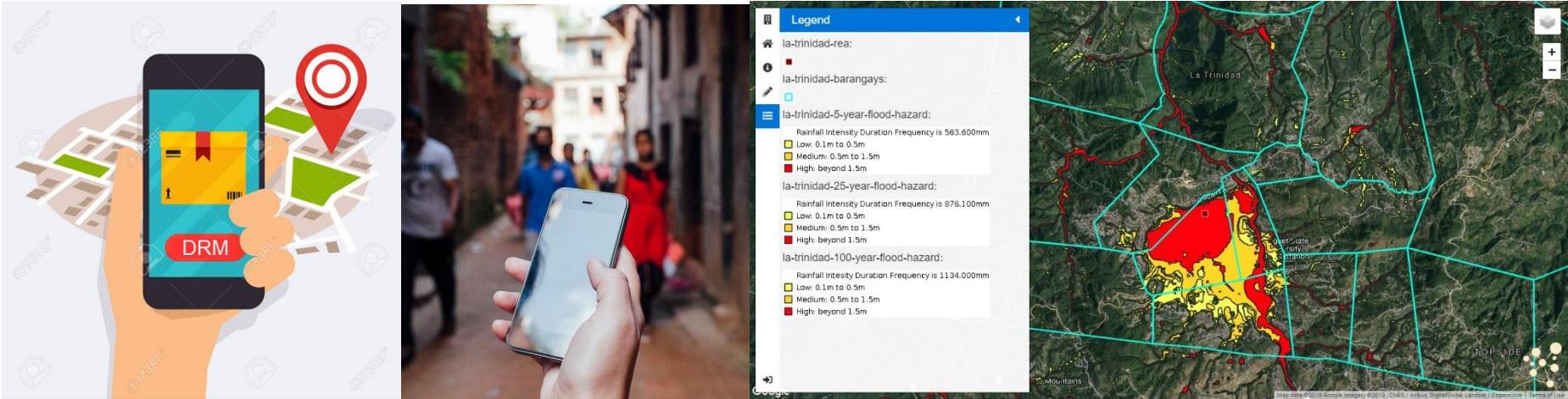
- Open source technology
  - Geonode 2.8, Geoserver 2.13
  - PostgreSQL, PostGIS
  - Leaflet / Javascript Client
  - Django
- Maximize out-of-the box, minimize customization
- Scalable and flexible cloud based infrastructure (Amazon Web Services)
- Secured webservices
- Easy Backup & Recovery



# SPADE Testing, Acceptance, Production

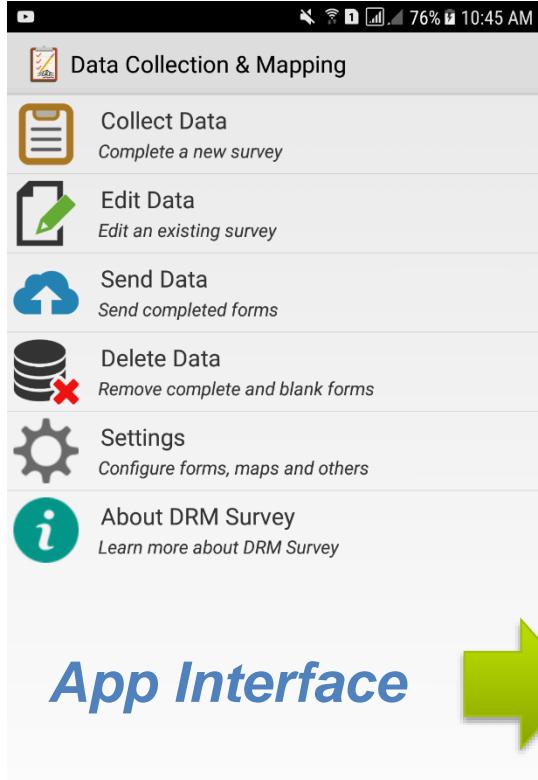


# Safeguards in SPADE

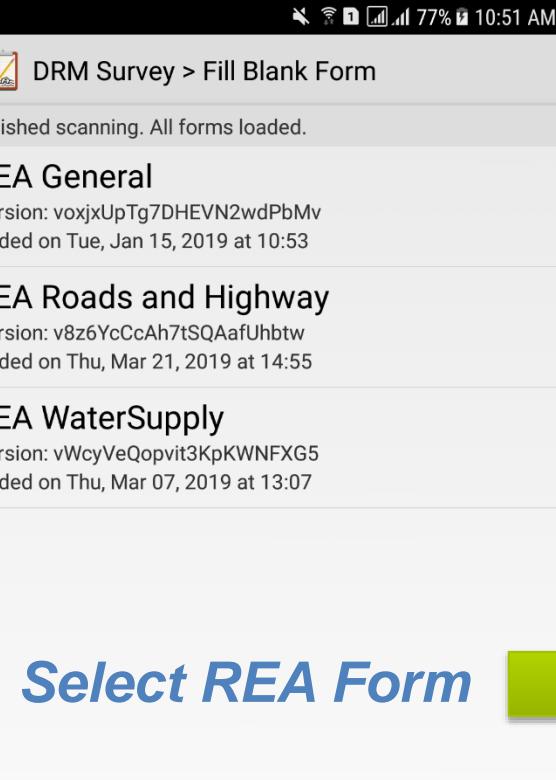


Use of safeguards app is piloted on Philippine Cities, with the result of the assessment uploaded to SPADE

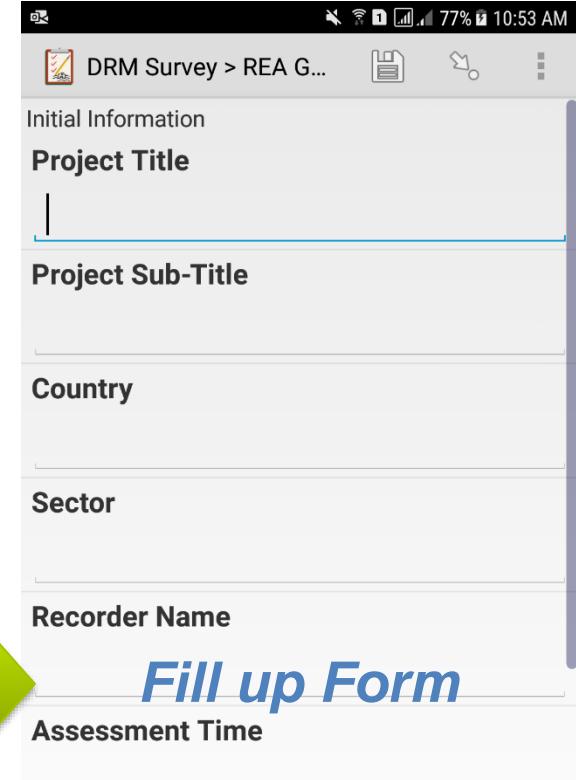
# Safeguards app was used in the field to collect data, then uploaded to SPADE



*App Interface*



*Select REA Form*



*Fill up Form*



# Parts of the Rapid Env. Assessment (REA) Form

## REA General

### Initial Information

#### Project Title

Building Resilience to Floods and Rain-Induced Landslides in Barangay Napaan

#### Project Sub-Title

Flood Control - Infra and Bio-Engineering

#### Country

Philippines

#### Sector

#### Provide the location

*GPS coordinates can only be collected when outside.*

latitude (x.y °)

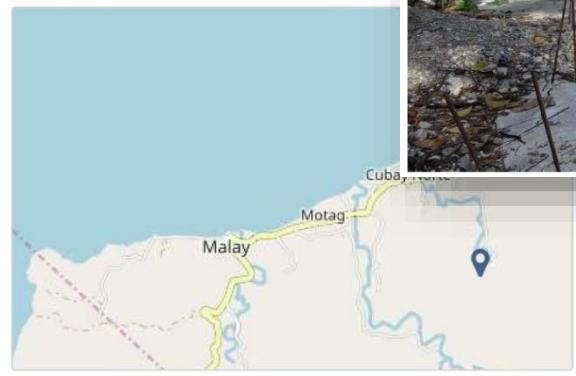
11.898049

longitude (x.y °)

121.94296299999999

altitude (m)

accuracy (m)



Provide the picture

1549500961871.jpg



# REA Forms are uploaded to SPADE

The screenshot shows the SPADE platform interface. At the top, there is a navigation bar with links for Data, Maps, About, and Tools. On the right side of the top bar, there is a search bar and a user profile icon for "Bon Masangcay". Below the navigation bar, there is a sidebar on the left containing filters and categories. The main area displays two uploaded documents:

- REA General\_La Trinidad.pdf**  
No abstract provided  
Uploaded by Bon Masangcay on 10 Mar 2019. 0 views, 0 downloads, 0 stars.
- REA Water Supply Janiuay.pdf**  
No abstract provided  
Uploaded by Bon Masangcay on 10 Mar 2019. 0 views, 0 downloads, 0 stars.

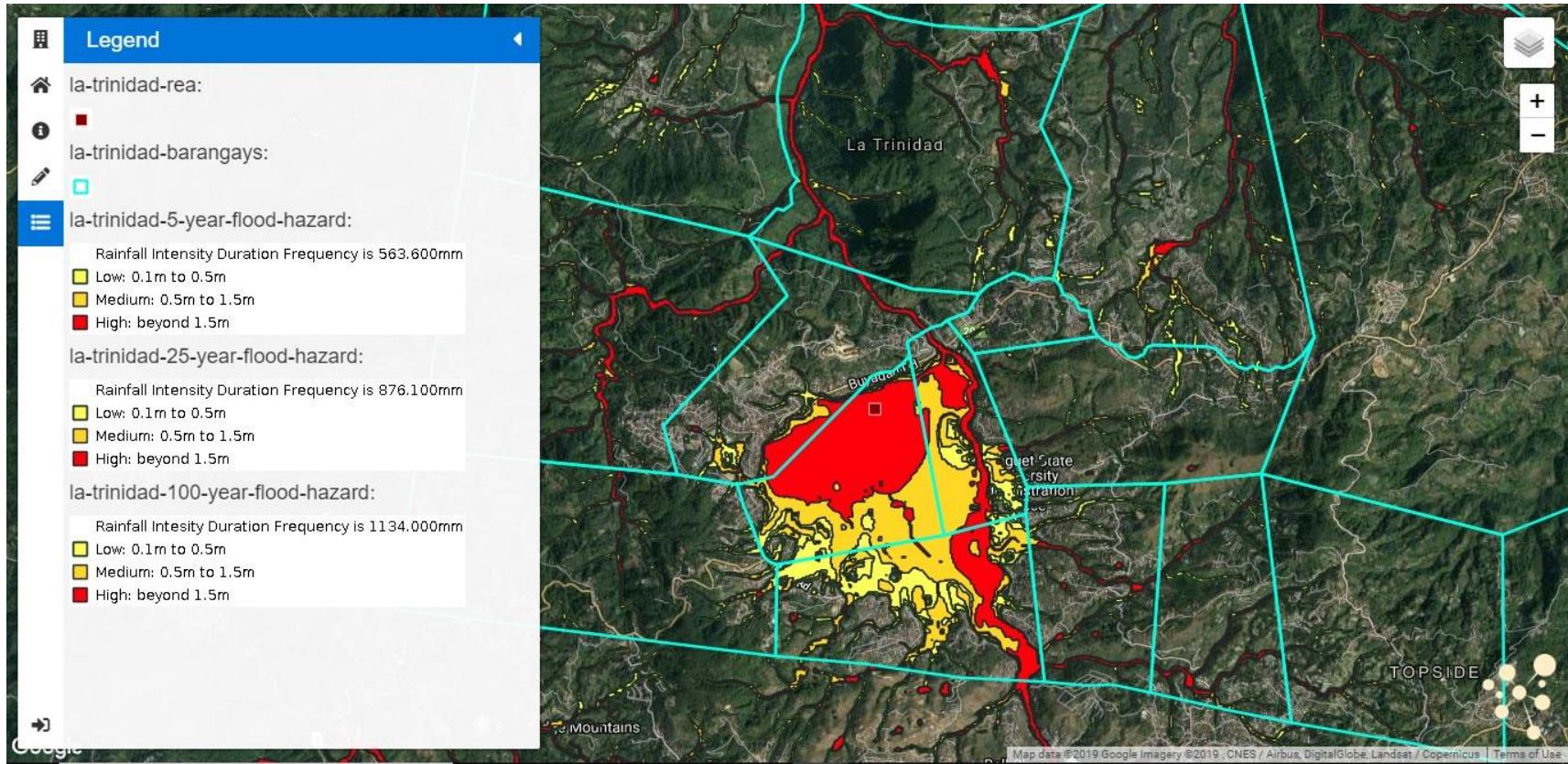
**Filters** (dropdown) TEXT (Search by text) DOCUMENT TYPE (dropdown) PRESENTATIONS (4) CATEGORIES (dropdown)

no image

no image



Since we have the assessed location geotagged by the app, then data can be reflected in SPADE. Hazard layers (like flood hazard) can then be overlayed over the location of the assessed area



# SP3 Climate Resiliency Officer Updates in SPADE

cro\_update\_april\_2019\_la\_trinidad

Month: April 2019

**CROUpdate:** Since the months of February and March, local tourists have been flocking to Baguio City and La Trinidad. Now that summer has officially began, people from the humid/hot provinces are going up in droves into the Cordilleras to beat the summer heat.

**CROName:** Napoleon Manegdeg

Tourism revenues will add to the income of La Trinidad and vegetable growers/gardeners from all over La Trinidad, particularly the pilot barangay of Betag, and other municipalities are taking advantage of the peak tourist season.

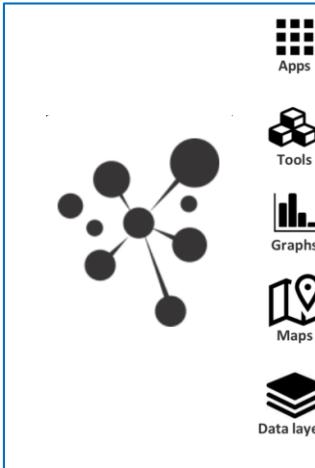
◆ With en masse tourists come the dreaded traffic, air pollution and waste generation. Reminders to keep Betag clean are prominently displayed along the roads going inside the strawberry fields.

Last 22 April 2019, ground shaking was felt in La Trinidad as a result of the 6.2 earthquake in Zambales province [176 kilometer distance]. After the quake, MDRRMO and MEO personnel checked public infrastructures and buildings for structural and surface

The figure is a satellite map of the La Trinidad area in Benguet, Philippines. A large red polygon covers the central part of the town, indicating the epicenter of the 6.2 magnitude earthquake. The map also shows several roads, including Route 54 to the west and Route 110 to the east. Other labeled locations include 'B'aguet State University Administration', 'TOPSIDE', 'Bell Church', and 'QUIRINO HILL'. A cluster of yellow dots is visible in the bottom right corner. The map includes standard Google Map controls like zoom, pan, and a legend.

Map data ©2019 Google Imagery ©2019, CNES / Airbus, DigitalGlobe, Landsat / Copernicus | Terms of Use

# SPADE Evolution



SPADE 1.0  
2016-2019

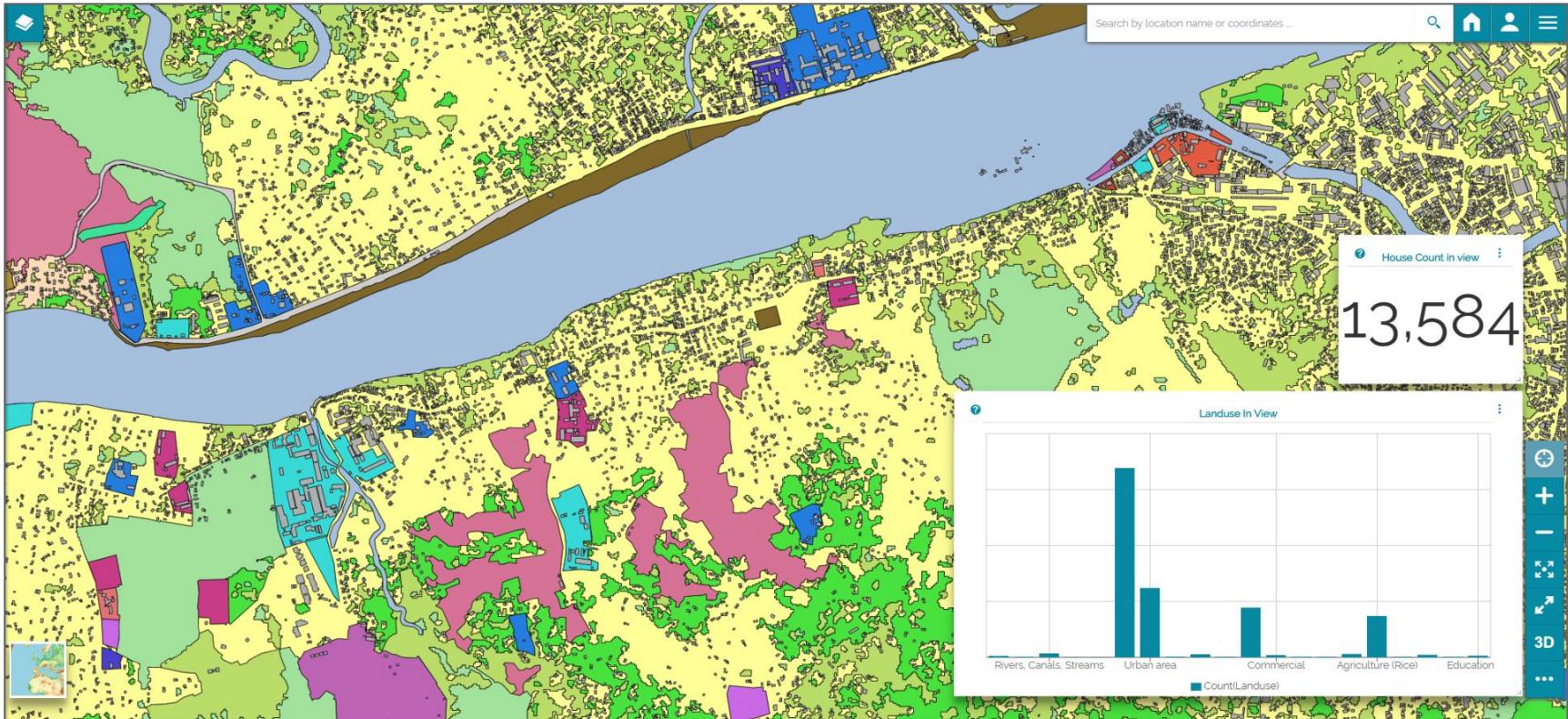


SPADE 2.0 2019-2021

## SPADE beyond 2022



# Towards SPADE 2.0 – Mapstore integration



# Implementation challenges

- Use of external (wms/wmts) data sources is not always stable
- SLD style creation to meet Geoserver's requirements
- It sometimes happens that layers duplicate themselves when using GeoNode's front-end to upload layers (in bulk)
- We weren't able to get the printing function to work
- User groups and user rights



# Concluding remarks

- Open source solutions like GeoNode are a very good alternative for proprietary software
- Applications need to be intuitive and self explanatory (look and feel are very important aspects)
- SPADE is being used more and more within the ADB and helps project officers with their project planning and project design because it can integrate various spatial data sources
- SPADE currently serves as a common system/platform within ADB that integrates data from over 700 different data layers for analysis



**Further information on SPADE visit:**

<https://development.asia/explainer/using-spatial-cloud-computing-build-livable-cities>

**If you have any questions, do not hesitate to contact us:**

[ries.kluskens@rhdhv.com](mailto:ries.kluskens@rhdhv.com)

[erwin.sterrenburg@rhdhv.com](mailto:erwin.sterrenburg@rhdhv.com)

[huong.phan@rhdhv.com](mailto:huong.phan@rhdhv.com)

[bhs.pintor@gmail.com](mailto:bhs.pintor@gmail.com)

[bmasangcay.consultant@adb.org](mailto:bmasangcay.consultant@adb.org)



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