GIS Working Group

Minute of meeting 26 Sept 2018

I. Introduction

The GIS Working Group discuss aspects of common interest for organizations involved in the management and creation of geospatial data and tools. The following points were mentioned in the opening as guiding the agenda:

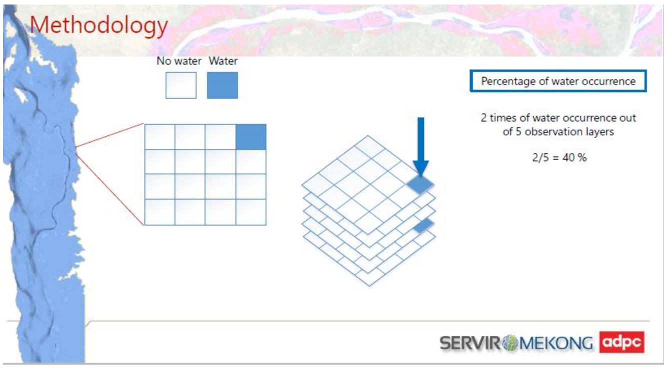
- exchange on new **geospatial tools**, techniques and methodologies
- share information on current **geospatial projects** and seek for possible synergies
- provide updates on **data** availability and promote **data standards**
- share information on **capacity building and events** related to GIS and Remote Sensing technologies

On this occasion, the meeting covered tools and systems for Flood emergency mapping and flood modeling.

II. Presentations

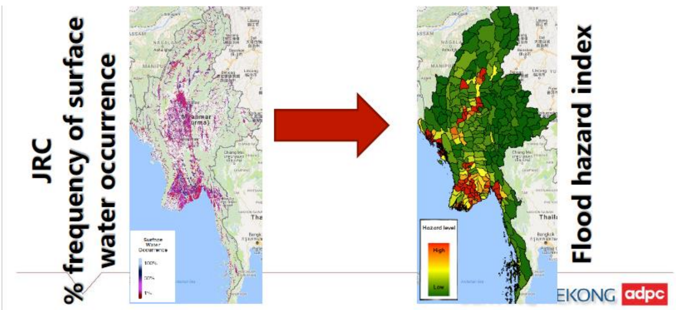
1. ADPC SERVIR-Mekong: Historical flood index tool

ADPC SERVIR-Mekong developed an online tool to map the frequency of flood occurrences through long-term satellite-based records (Landsat 1984 – 2015). It will allow users to assess flood hazard township by township.



Methodology:

1. Extract surface water from Landsat images (1984 – 2015), using Global Surface Water Dataset (JRC) which provides monthly water occurrence
2. Calculate the frequency of water occurrence and normalize it
3. Remove permanent water, based on average threshold (using Google Earth Engine)
4. Calculate % flood occurrence by township area and create flood hazard index at township level (using Google Earth Engine)



Limitations:

- not for flood real-time monitoring
- Landsat temporal resolution is 16 days. So historical events might not be captured

Discussion:

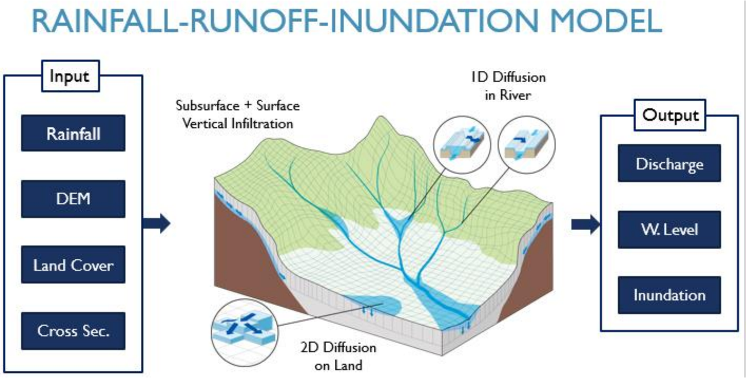
- Landsat is an optical sensor. Cloud cover prevents from any data collection during the monsoon/ flood season.
- Paddy fields are included in the water extract
- Average threshold for permanent water is the same for all the images. It should be adjusted
- Township level is too large for operational purpose. It would be better to aggregate the data at Village Tract (VT) level. If this data is too heavy, select only VT along the rivers and coast.

2. YTU, Development of Flood inundation map for Bago river basin using different models

YTU presented their findings on their research: they compared six different flood inundation models, based on hydrological and hydraulic analysis. The Bago river basin was used for the case study. The research was conducted in partnership with the University of Tokyo.

The models are:

- HEC-HMS
- HEC-RAS
- WEB-DHM
- RRI- GUI
- RRI-CUI
- SOBEK



Sayama, T. et al.: Rainfall-Runoff-Inundation Analysis of Pakistan Flood 2010 at the Kabul River Basin, *Hydrological Sciences Journal*, 57(2), pp. 298-312, 2012.

The research teams got very good results with several models. However there are constraints such as:

- Uncertainties in flood inundation mapping arise from many sources such as model mathematical background and configuration, model assumption, boundary condition, model parameters, input data, design discharge, topography, grid cell size, flow condition, water surface elevation, the gradients of the channel and floodplain, and Manning's roughness coefficients.

- Topographic datasets play a significant role in hydraulic modeling and the accurate prediction of flood inundation areas.

- The channel roughness also has a significant impact on hydraulic simulations.

3. **FAO: Rapid Flood Assessment Approach**

FAO has been using drones for assessments and community-based risk planning in Myanmar since 2016.
They contracted MAEU to build the drones and train the MOALI Drone Mapping Team in 2017.

From August 20, 2018, FAO conducted field assessments in 17 Village Tracts (VT) in flood affected areas. The team made rapid interviews and flew drones to get spatial patterns. Additional validation was conducted through analysis of flood extent map provided by MIMU (based on Sentinel 1A dated 2 August), known lowland paddy and other croplands areas (30m/pix resolution) and official statistics on cultivated areas.

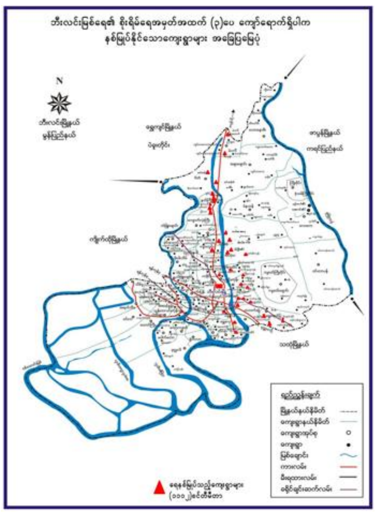
Discussion:
Systematic extrapolation of ground truth data collected by drone is yet to be defined. There is clear value-added in using drones to complement satellite data analysis both in pre- and post- disaster contexts. FAO will prepare a guidance note based on the experiences from the 2018 monsoon flood assessment.

4. **MIMU: Flood mapping**

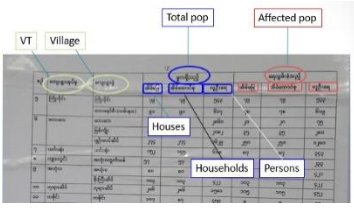
MIMU presented its mapping of the recent floods and aspects that has been found to effect quality of maps and their usefulness

The following elements were found:
- Flood extent: without prior ground truth validation the reliability of the flood extent is questionable (is the threshold correct?), the images cannot capture temporary and flash floods (only 2 images over more than 2 weeks due to 16 days temporal resolution of Sentinel1A images). We don't know if the paddy fields are inundated or not
- Village: Many affected villages are located on the edge of the probable flood areas. Many villages are elevated (few meters) but the DEM resolution does not allow to see it. The village locations from partners are slightly different than MIMU. Eventually, the MIMU village database is incomplete

In practice, it appears that partners in the field don't use these maps. The main reasons are:
- GAD provides the affected village list
- There is no habit to read and to use maps
- There is limited Internet bandwidth and printing capacity (no plotter) and little GIS capacity among partners



One GAD office at Township level took the initiative to develop a series of very useful maps to identify flood-affected villages according to danger level of the river (danger level at 0, 1, 2 and 3 feet above). For each map, a population sheet at village level informs on total and affected population with the number of houses, households and persons.



This presentation initiated a lively discussion around mapping hazards and its application in the field.

5. RoyalHaskoningDHV: Web-based application of disaster risk modeling

Royal HaskoningDHV made a presentation on their recent **risk modeling** at the national level and for Ayeyarwady Region. And the use of ArcGIS Portal to display hazard mapping data and layers on valuating the effects of water related hazard at Township level.
The GIS platform to be housed by One Map Myanmar.

Background:
The Government of Myanmar is implementing a project "Strengthening climate and disaster resilience in Myanmar", with technical support from the Asian Development Bank (ADB) and financial support from the Government of Canada. The first of the three outputs of this project aim at improving understanding of disaster and climate risk among government officials at national level and officials in Ayeyarwady Region. It will include supporting the Government to undertake disaster risk modelling at the national level and for Ayeyarwady region for climate-related hazards (tropical cyclones and flooding) by assessing the hazard, exposure and vulnerability while taking into account of impact of future climate change associated risks; assessing level of damage to assets (buildings and infrastructure) and losses to agriculture; and assessing the corresponding monetary loss figures.

Disaster Risk Modelling activity is led by Department of Disaster Management (DDM), Ministry of Social Welfare, Relief and Resettlement (MSWRR) in close collaboration with Department of Meteorology and Hydrology (DMH), Ministry of Transport and Communication (MOTC) and Environmental Conservation Department, Ministry of Natural Resources and Environment Conservation (MONREC). The project has engaged Deltares (the Netherlands) in partnership with Royal HaskoningDHV and Wageningen University & Research, to assist in the modelling, GIS platform development and capacity building activities.

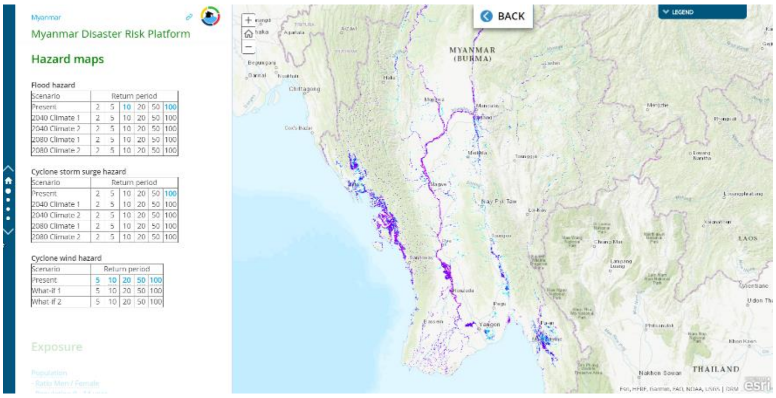
Modeling:
- National scale flood model
    - HEC-HMS & WFLOW-SMB (Simple Bucket Model, CSIRO)
- Cyclone Wind Hazard Model
    - DMH developed tools for cyclone wind hazard modelling
- Storm Surge Hazard Model
    - Delft3D in FEWS storm surge forecasting system
- Modeling on Ayeyarwady level
- Sobek is used (2D model)

Exposure data:
- Population data (including % male, female, population groups, female headed households)
- Housing data
- Agricultural data including crops, livestock, aquaculture
- Critical infrastructure: schools, power plants / power lines, post offices, roads, offgrid, water supply
- Landcover map
- GDP (district level)
- Special economic zones

Among those, many GIS data are still missing. Health facilities and schools will be collected in Ayeyarwaddy region before the end of the year.

Risk:
The risk (estimation of damage and loss in USD) will be calculated with the Delft Fiat tool.

Web application:
The web application, under construction, will allow the vizualisaiton of hazard, exposure and risk. A last page will allow users to create their own map based on the above.
It should be released by the end of December 2018.



III. AOB

The participants agreed to convene the next GIS Working Group meeting on an ad-hoc basis.

MIMU shared information on the availability of an ESRI training for one-day, offered free of charge by ESRI on ArcGIS suite of products. MIMU will send an online survey to the GISWG members to gather information on their potential training needs and interest. Future communication will be made to this effect.

Annex I:

Participants list:

No.	Name	Agency/ Organization	Position
1	Thandar Aye	DMH	Staff Officer
2	Chit Bo Bo Win	JICA/SATREPS	Project Assistant
3	Pyae Phyo Kyaw	WHO	Information Management Officer
4	Thein Soe	Consultant	GIS Specialist
5	Yee Mon Thu	Royal Haskaning DHV	Project Engineer
6	Quintijn Van AGTEN	Royal Haskaning DHV	GIS Expert
7	Dr. Win Win Zin	YTU	Professor
8	Tun Tun Thein	AGS Team	Team Leader
9	Khin Nawarat	Myanmar Maritime University	Teaching Assistant
10	Pyae Sone Kyaw Win	OCHA	GIS Officer
11	Roberto Sandoval	FAO	DRM- Fisheries
12	Jose Parajua	FAO	Technical adviser/ team leader
13	Xander van den Eelaun	Proximity Designs	Data Scientist
14	Sohee Hyung	Proximity Designs	Head of Data Analytics
15	Catherine Hendren	Proximity Designs	Donor relations
16	Lorioux Pierre	ICRC	Data Analyst
17	Wuti Yi Thaw	ICRC	GIS Officer
18	Myat Zaw	MGS	GIS Geologist
19	Tom Gerek	APML	Geologist
20	Jeroen Verhogen	Arcadis	Hydrology
21	Shon Campbell	MIMU	Manager
22	Catherine Lefebvre	MIMU	Information Management Analyst
23	S. Faheem Eqbali	MIMU	GIS Analyst
24	Zaw Win	MIMU	GIS Associate
25	Khin Thandar Tun	MIMU	GIS Associate

Annex II:

Pictures: