

Remote Sensing based Flood and Drought Monitoring

Case Studies from Asia and Europe

> 30 Years of experience in Geo Technology

> 230 Employees

Munich (Headquaters) & Neustrelitz (MV)

Geo-Information: Solutions from Single Source

– Geodata:

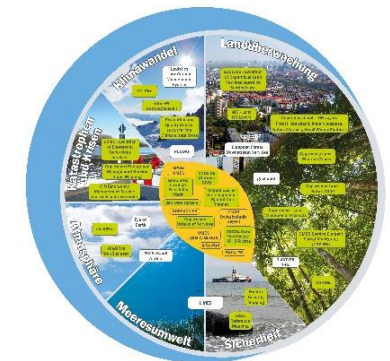
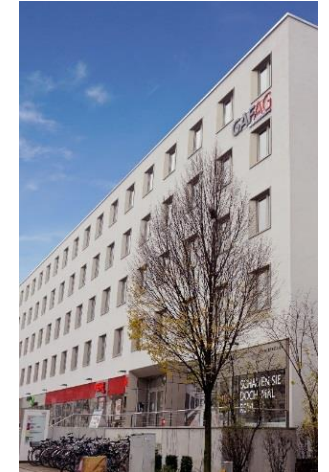
Reception – Distribution - Processing

– Services & Products :

Geoinformation Systems, Software & Integrated Satellite Services

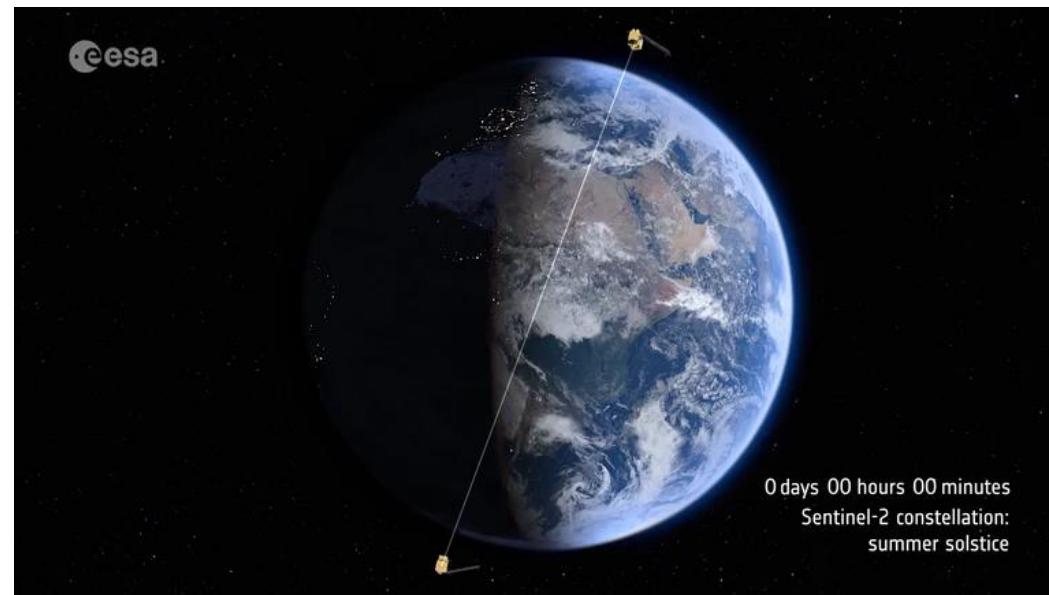
– Consulting Services in > 100 Countries

Professional & Institutional Consulting, Project Management

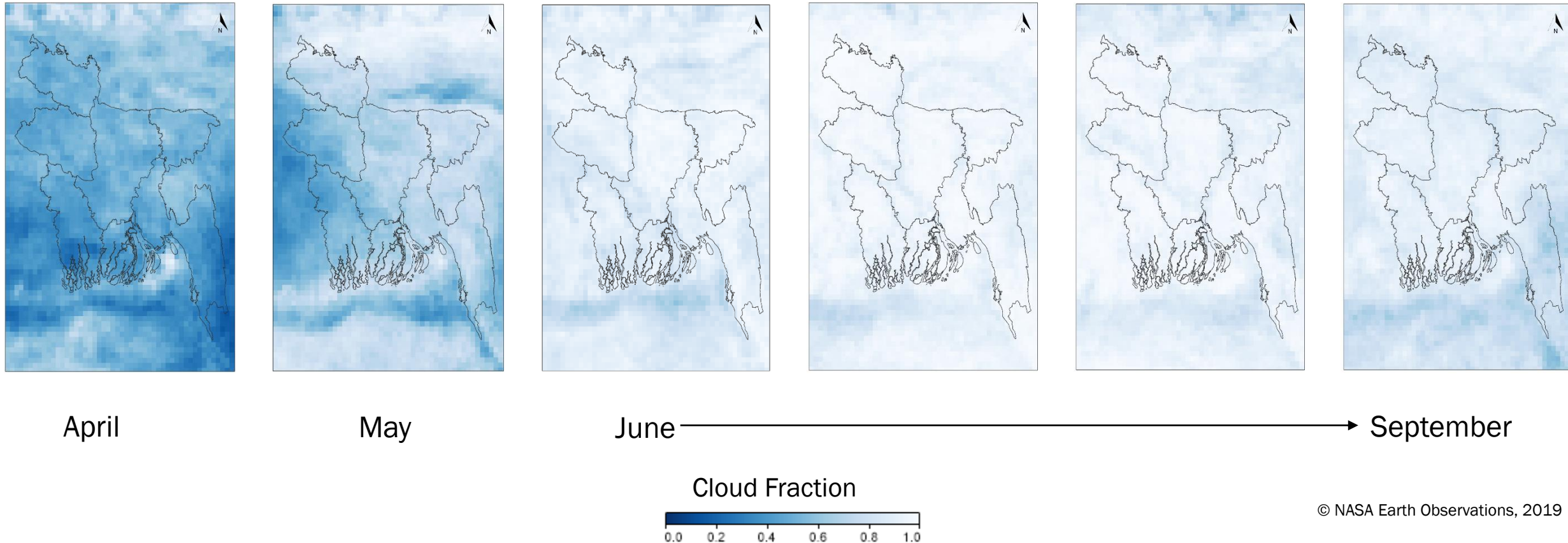


The potential is obvious:

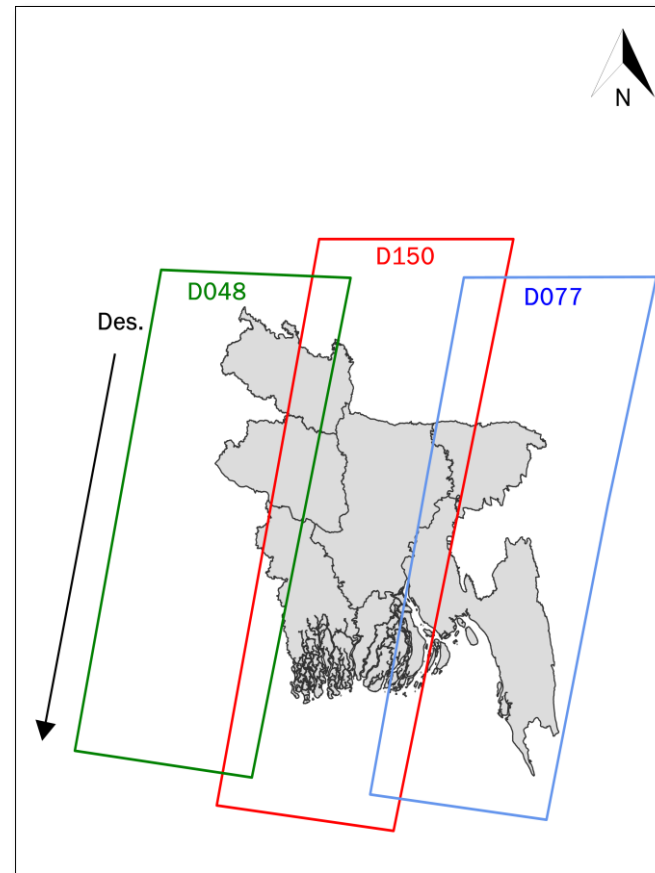
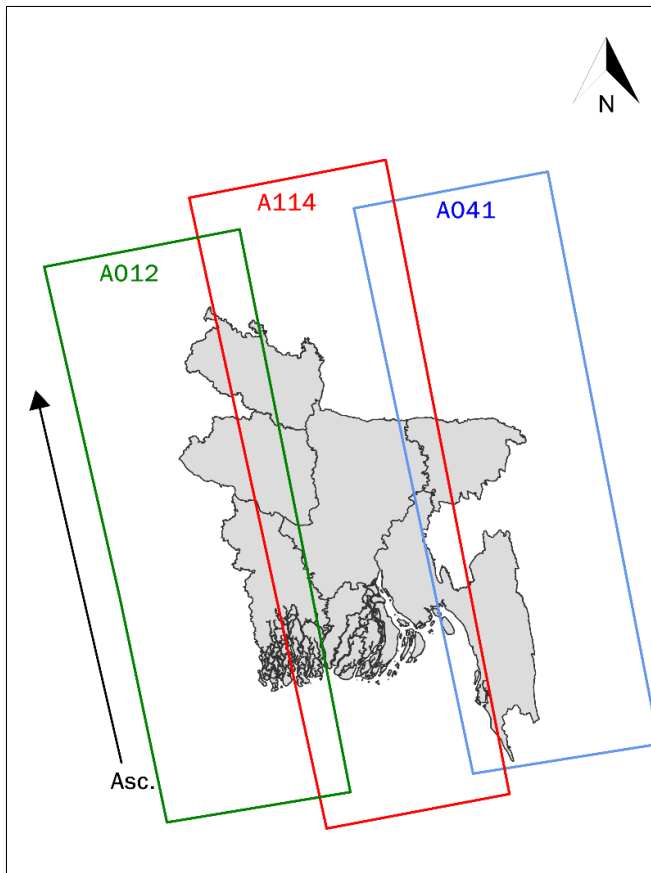
- Independent data from space ...
- Covering huge areas – everyday
- Partly free of charge



- Monthly Cloud Map for Bangladesh
- during monsoon it is difficult to monitor flood using optical data.
- Radar Data required, i.e. Sentinel 1



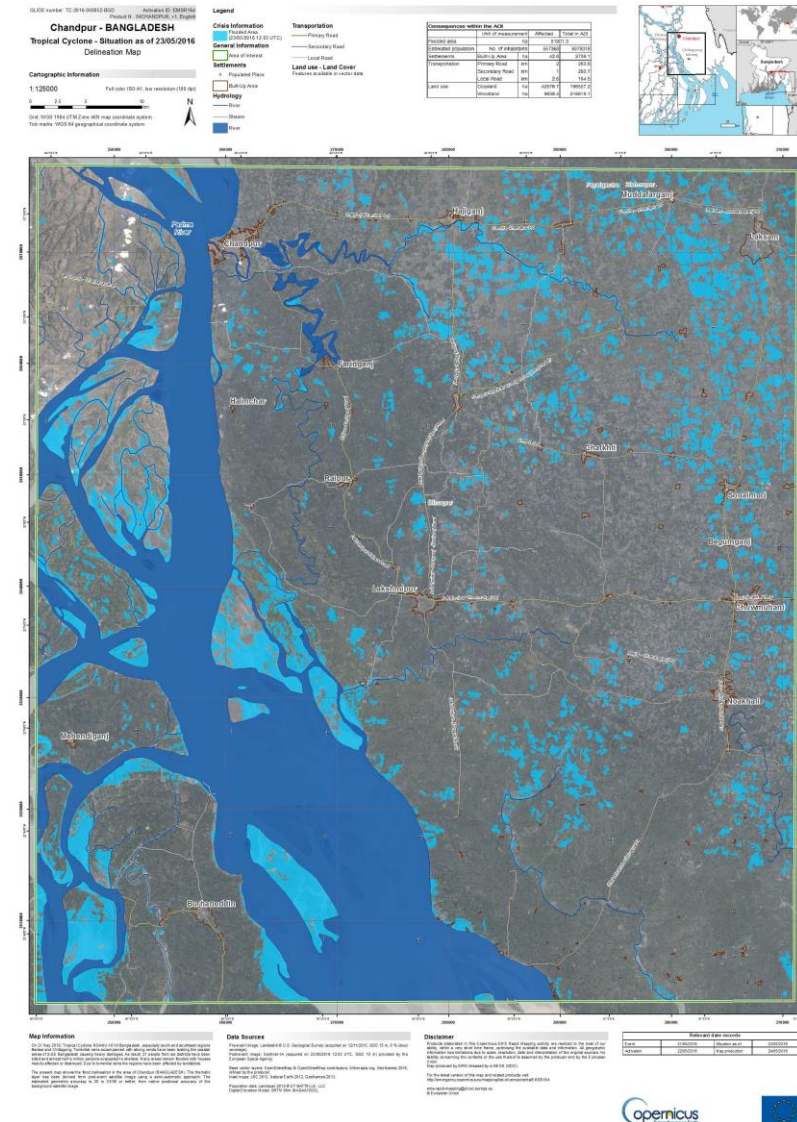
© NASA Earth Observations, 2019

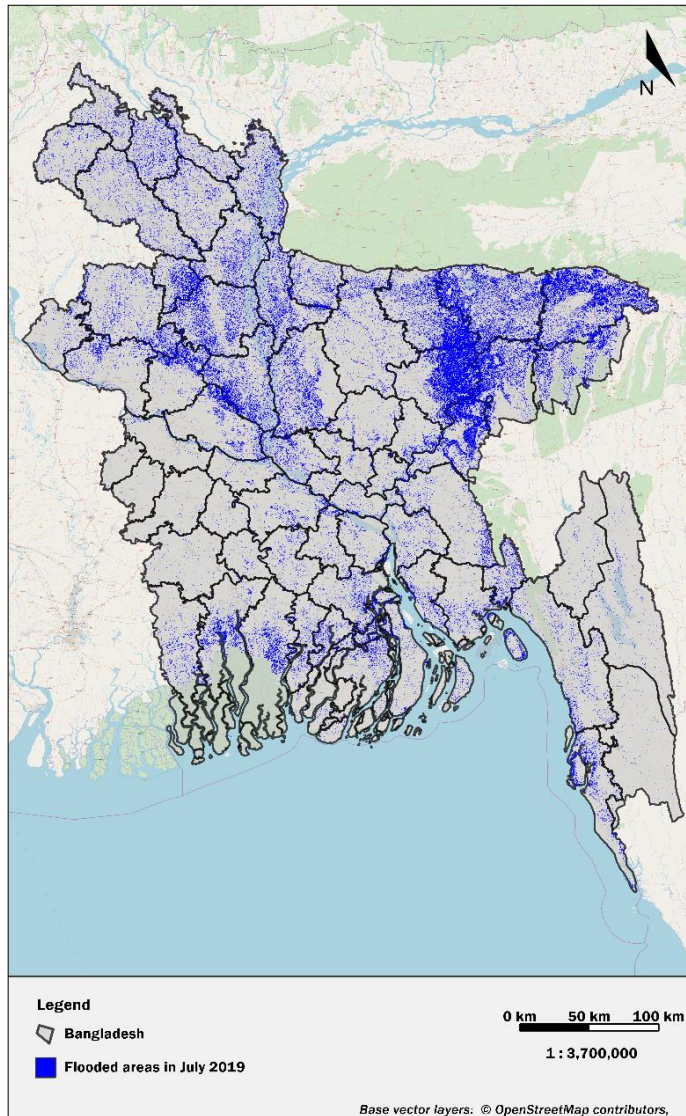


- Radar sensors: Independent of weather conditions, cloud cover and sunlight
- Resolution: 10 m
- 3 Ascending and 3 Descending passes
- 12 frames in ascending pass
- 10 frames in descending pass

Observation tracks and ground coverage of Sentinel-1 over Bangladesh
(Left : Ascending pass, Right: Descending pass)

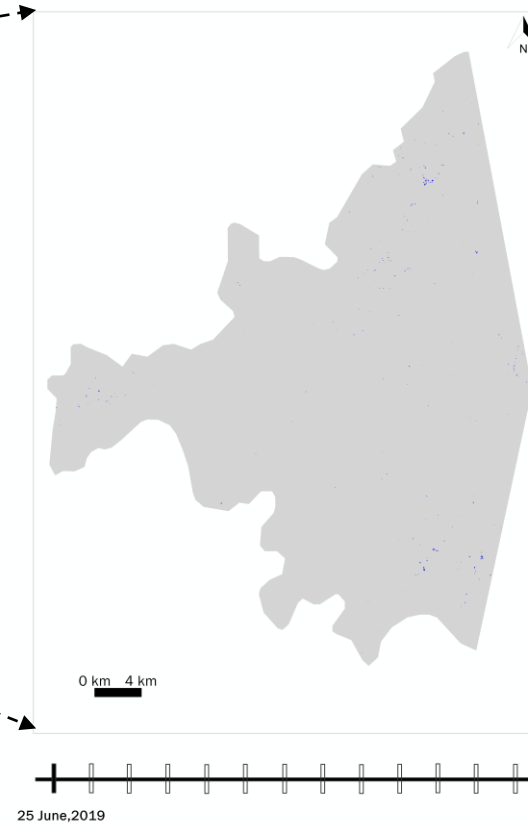
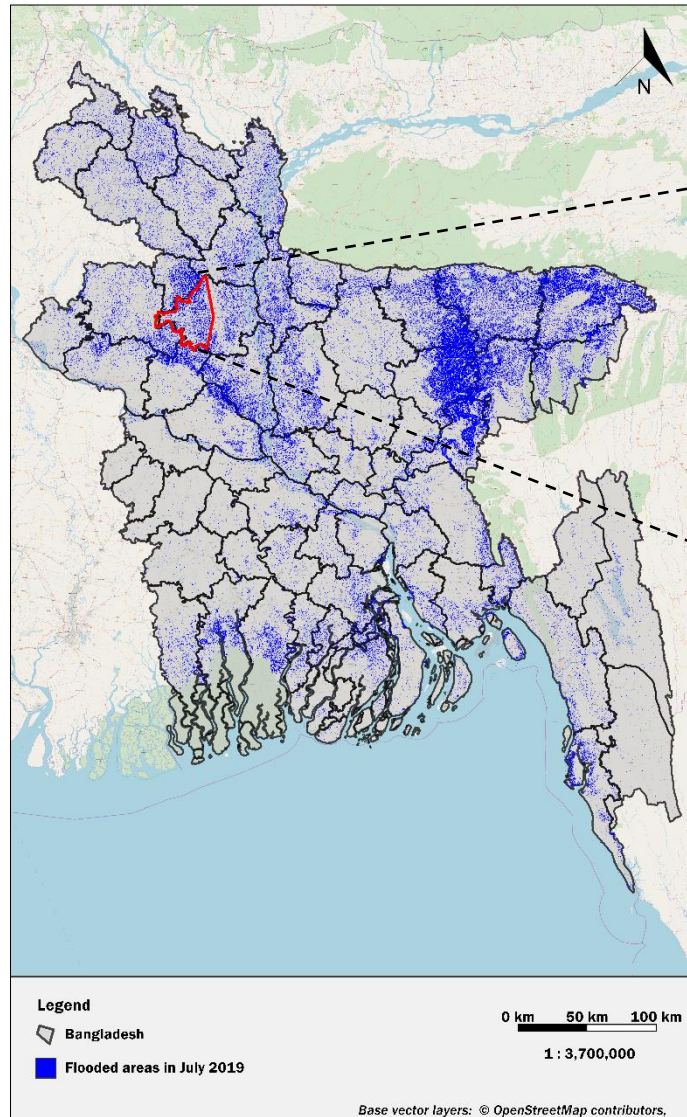
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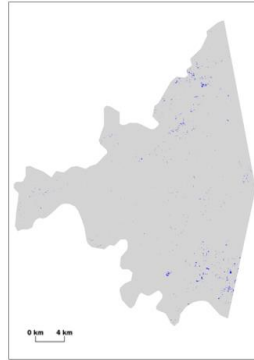
- Annual flooding of ~ 30% of country
- **29 districts** struck in 2019
- ~ 7.3 millions directly affected
- ~ 580.000 households damaged or destroyed
- ~ 140,000 ha of agricultural land damaged
(Source: Office of the UN Resident Coordinator, 29 July,2019).

Bogra among the 9 most severely affected districts.

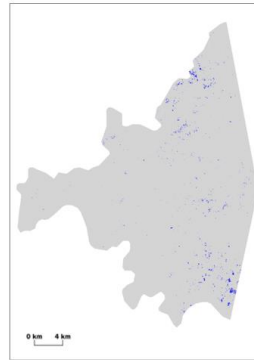




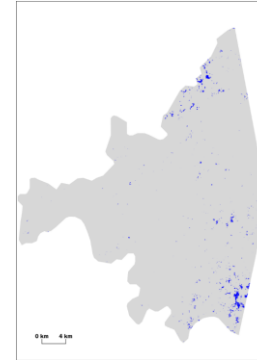
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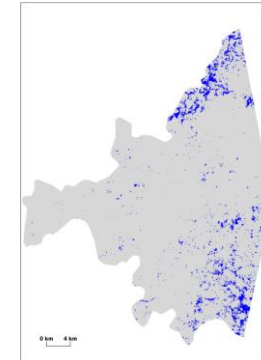
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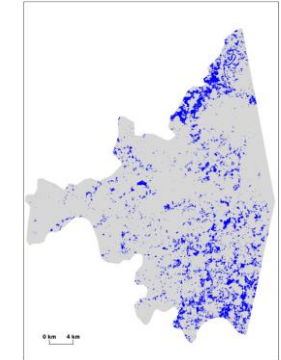
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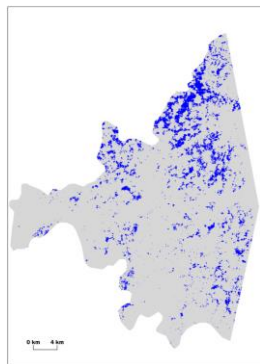
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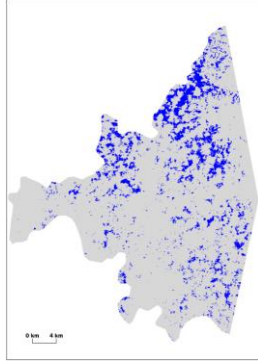
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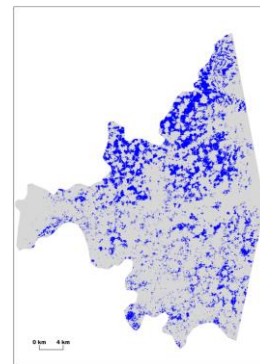
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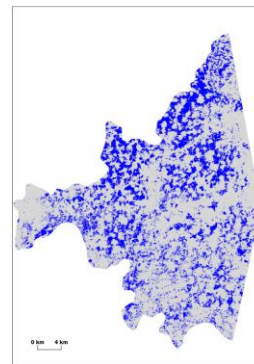
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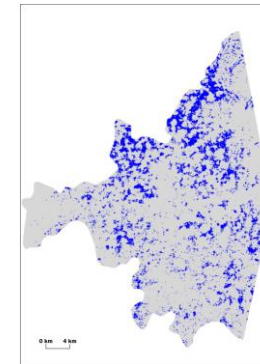
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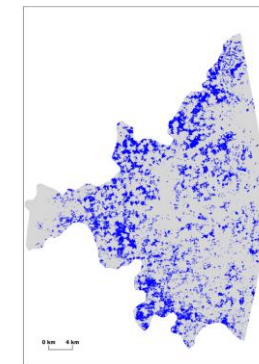
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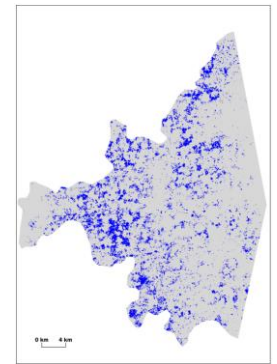
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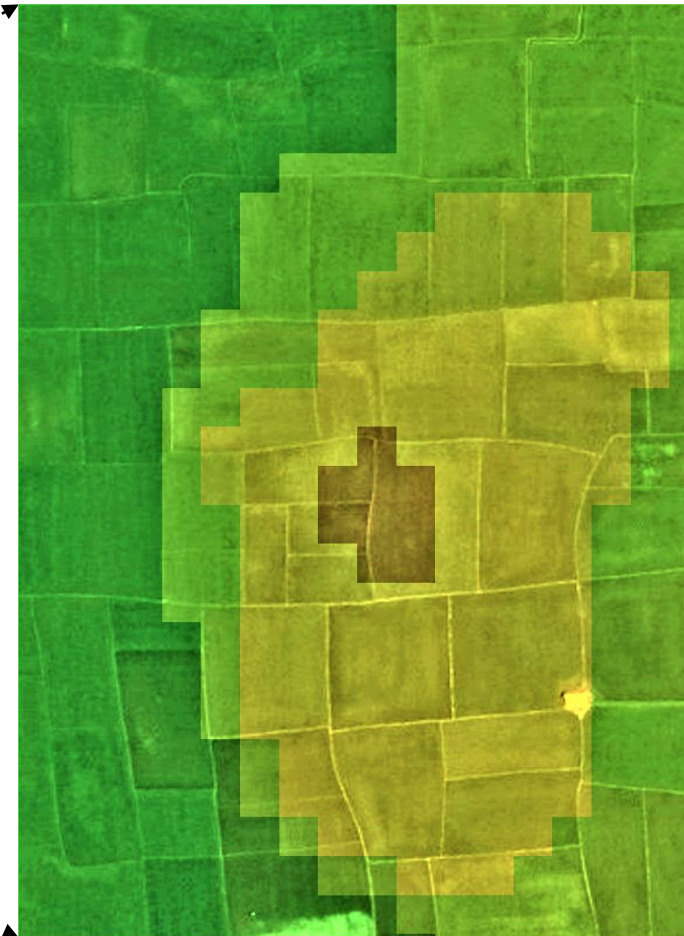
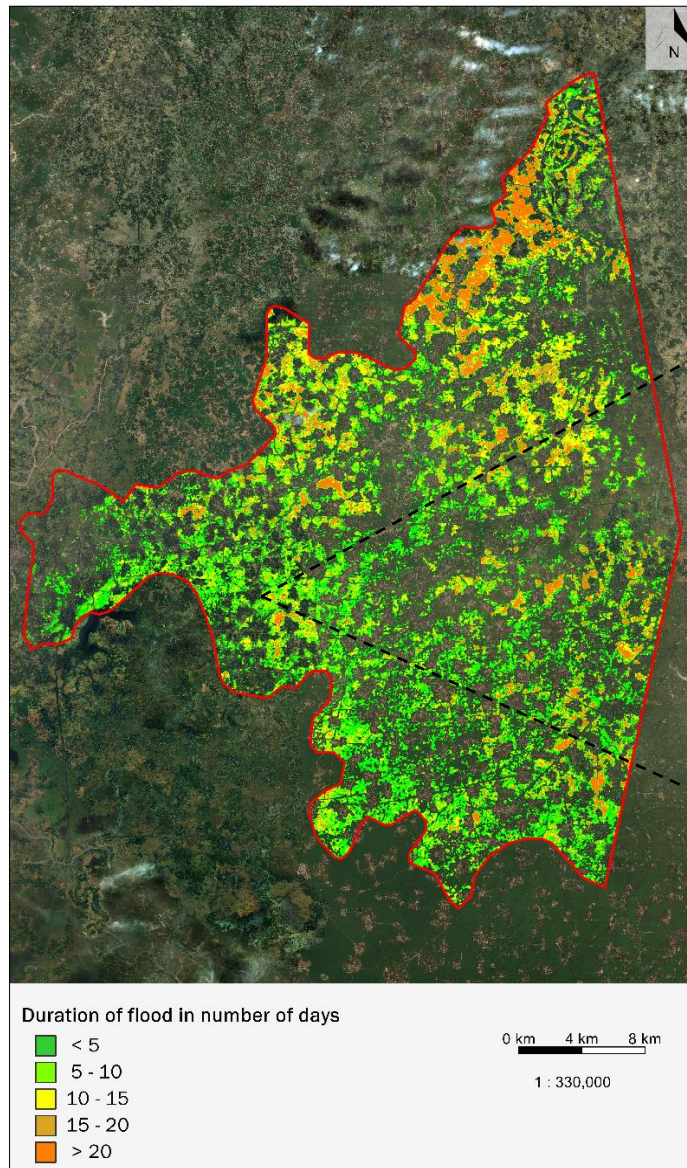
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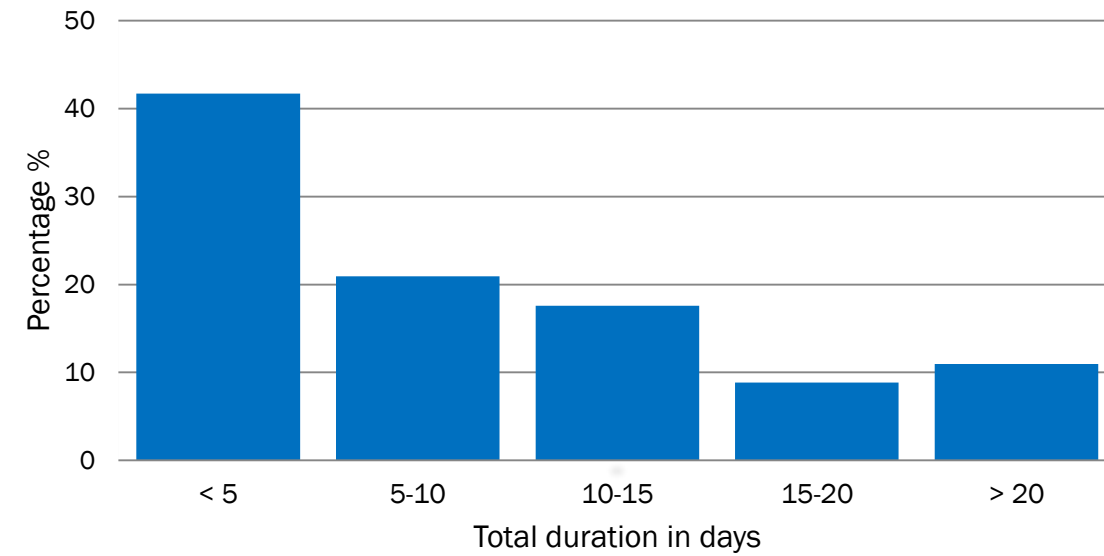
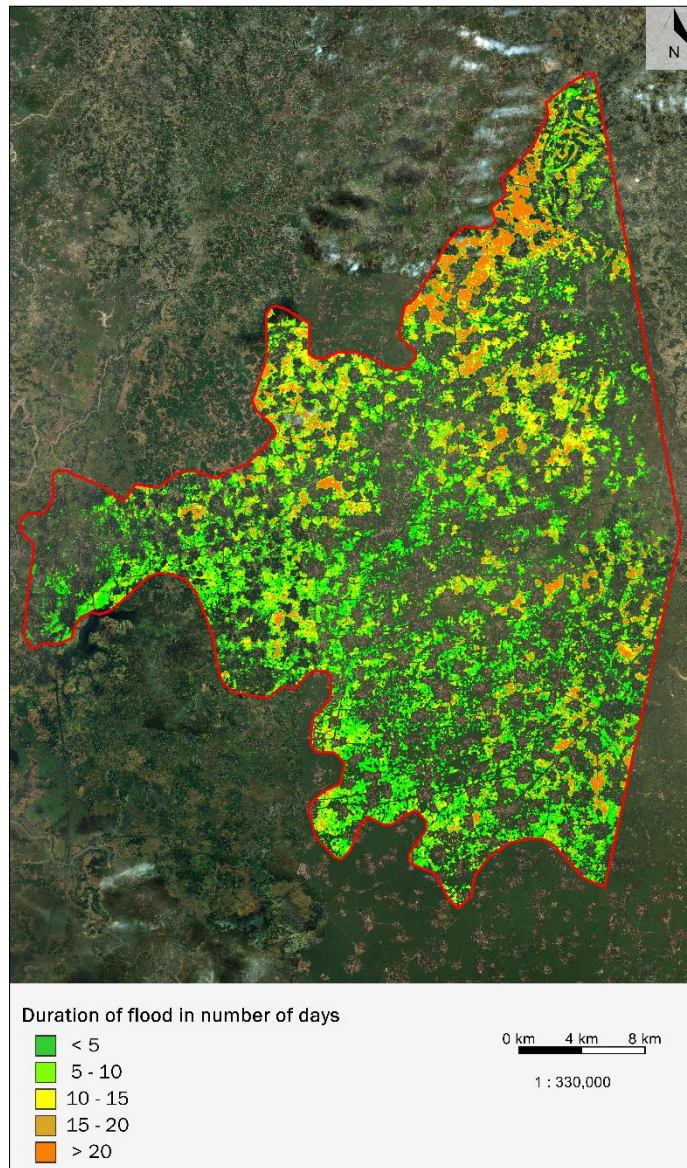
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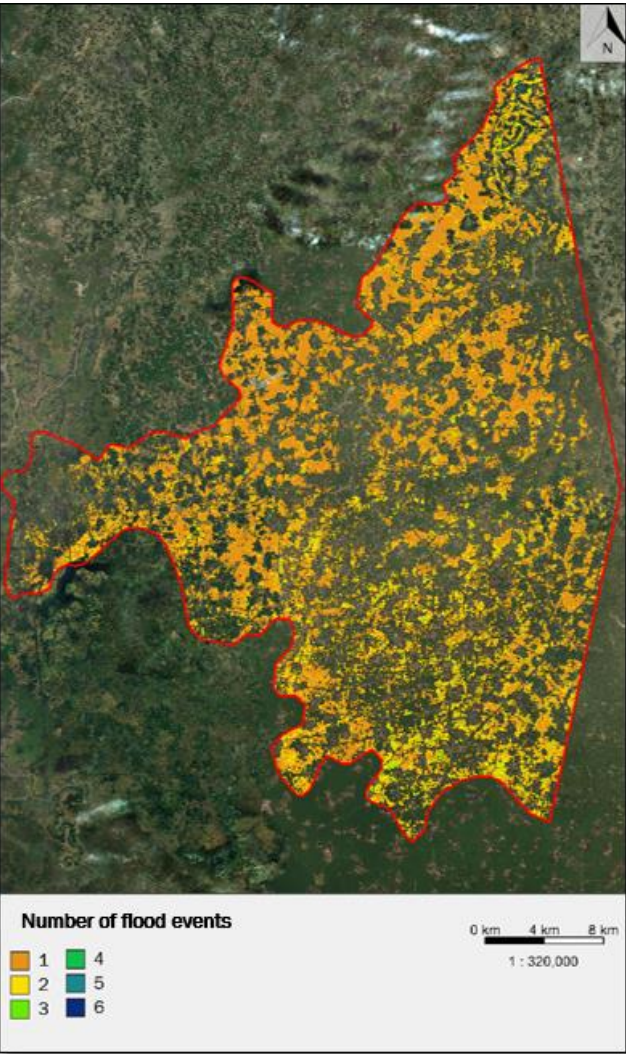
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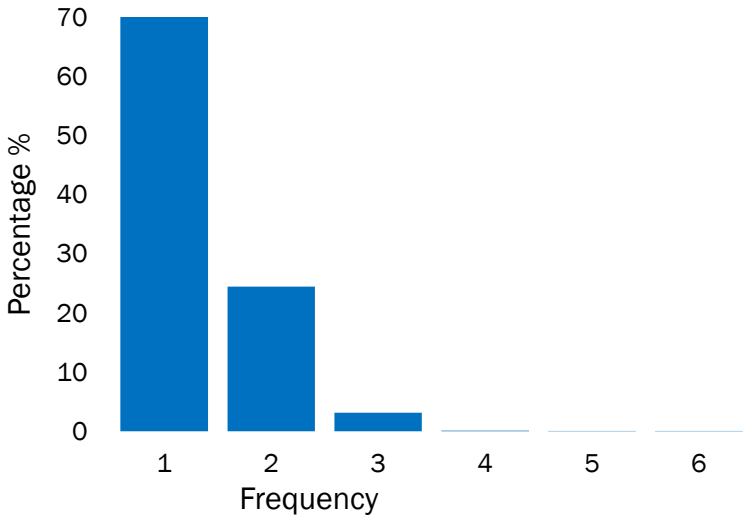
Total flood duration: 25th June 2019 to 5th August 2019.

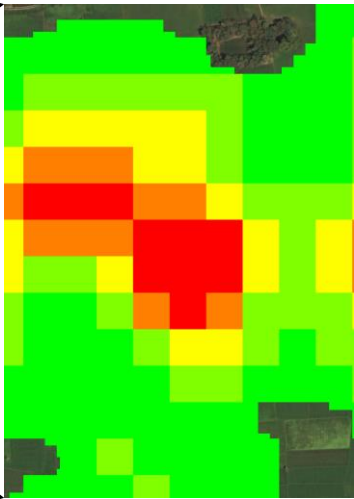
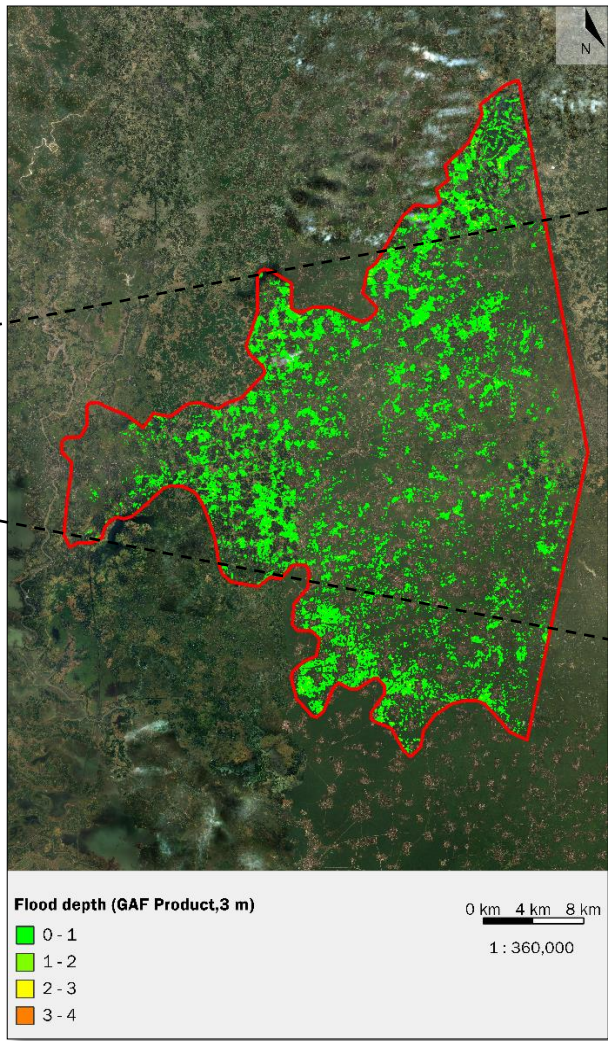
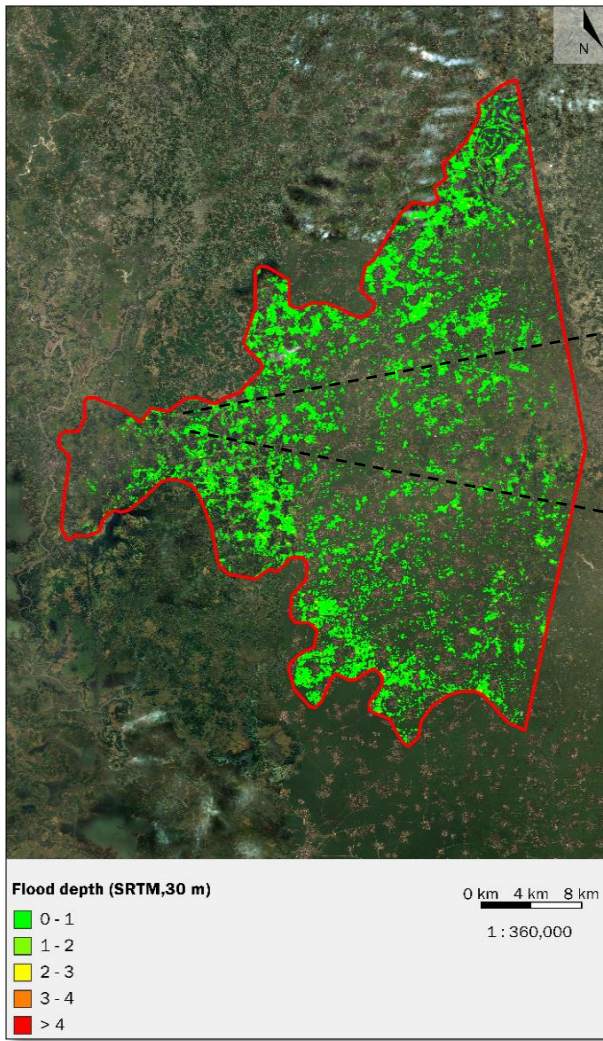


The majority of the flooded area is inundated for more than 5 days.

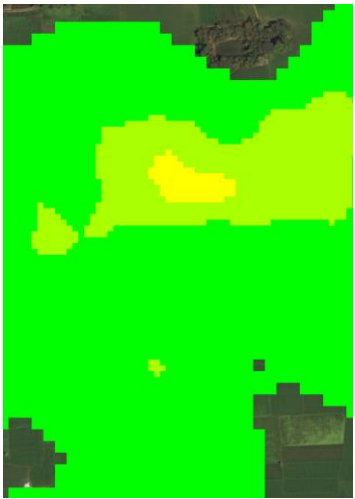


Frequency - Number of Floods Events



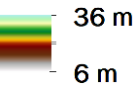
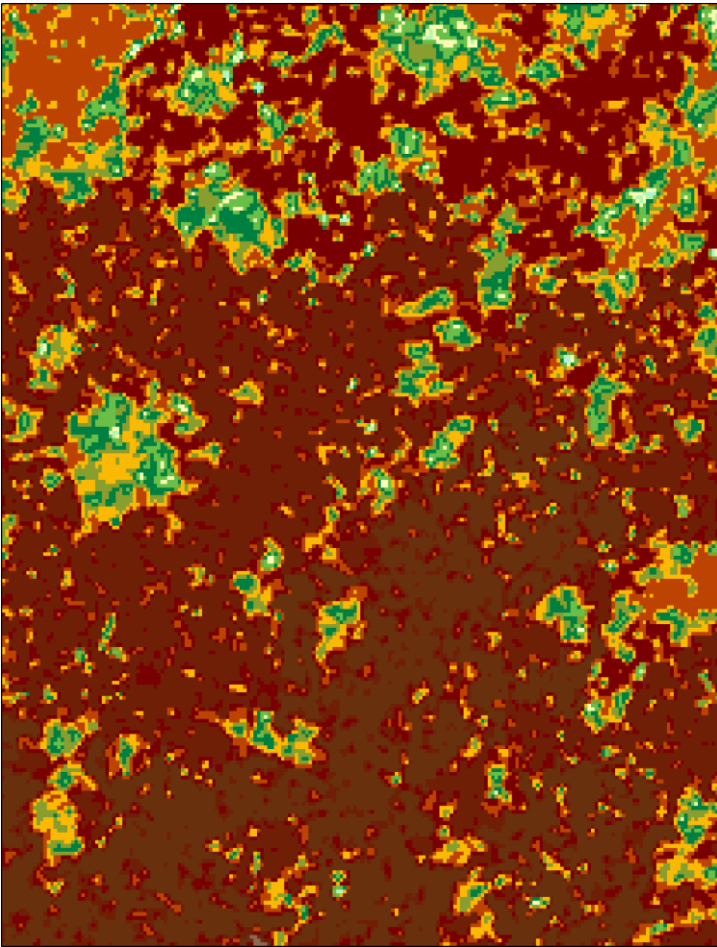


SRTM

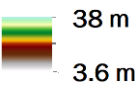
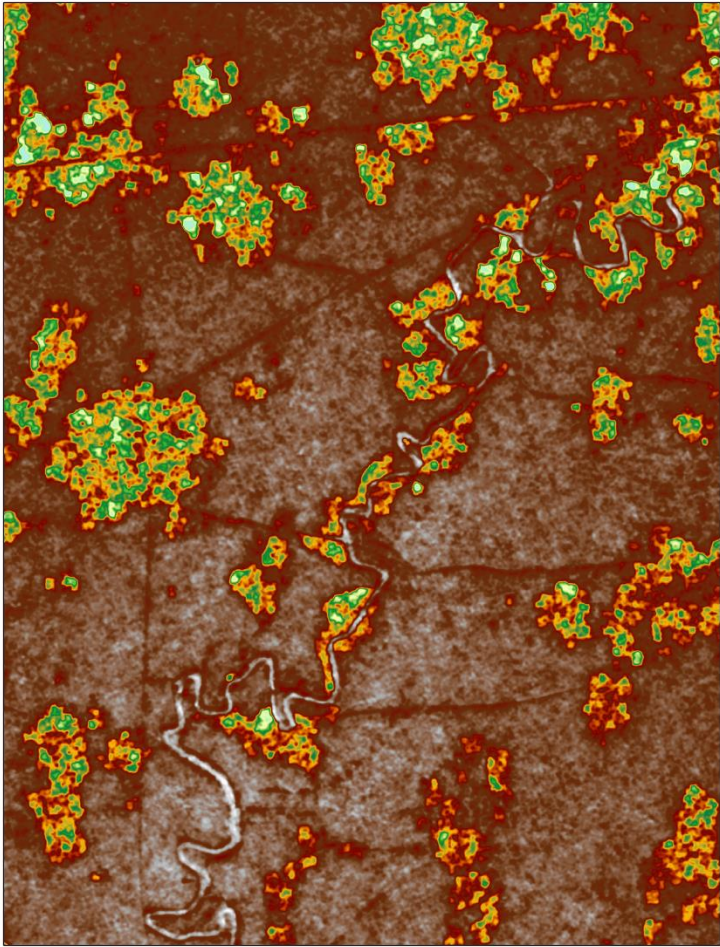


GAF DEM

Flood depth of 2nd August,2019



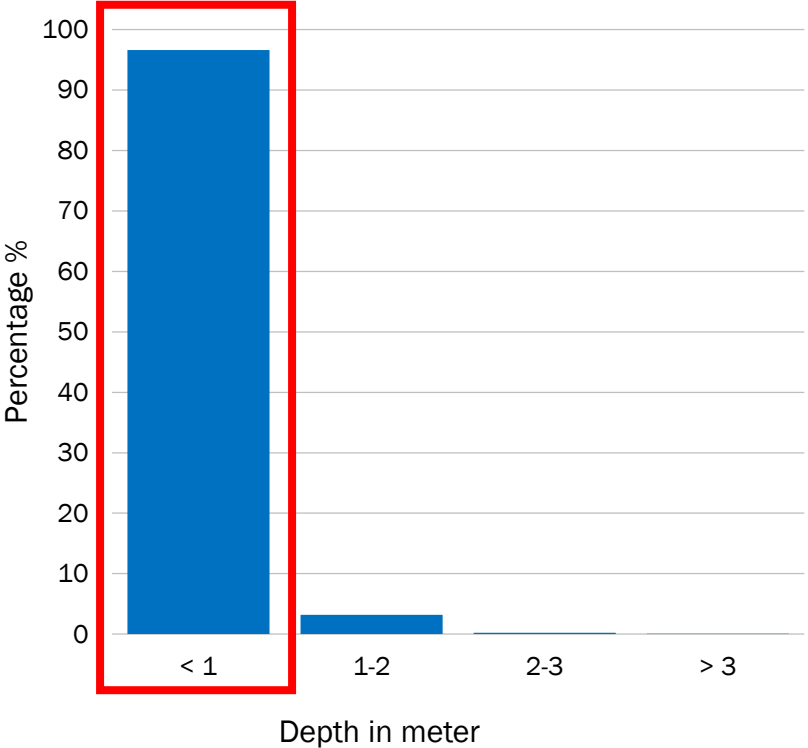
SRTM



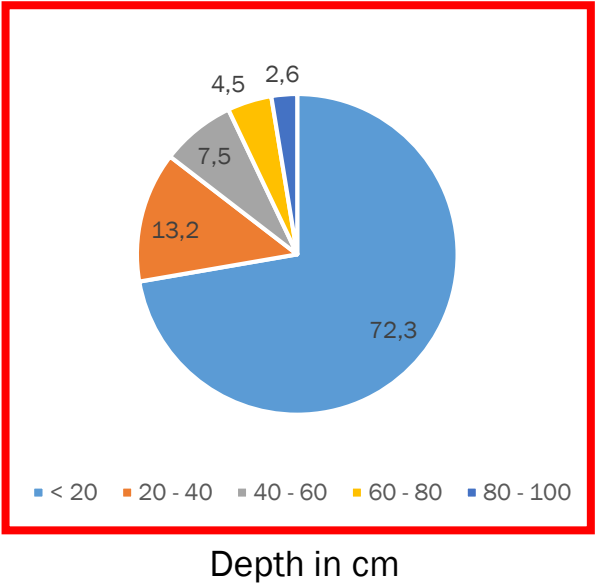
GAF DEM



Open Street Map

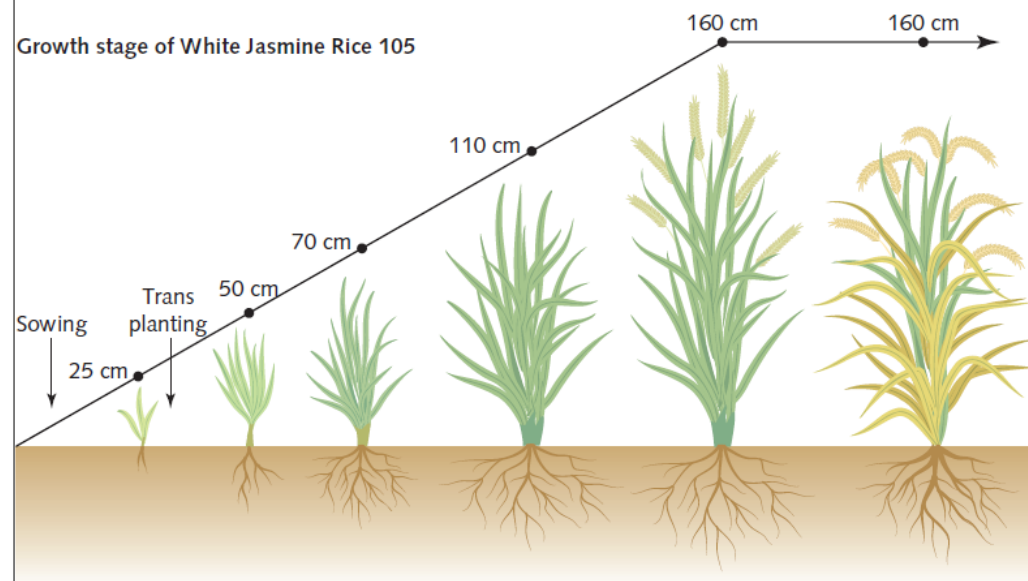


Flood Depth Analysis (GAF DEM (3m))



Flood Depth Analysis < 1 Meter

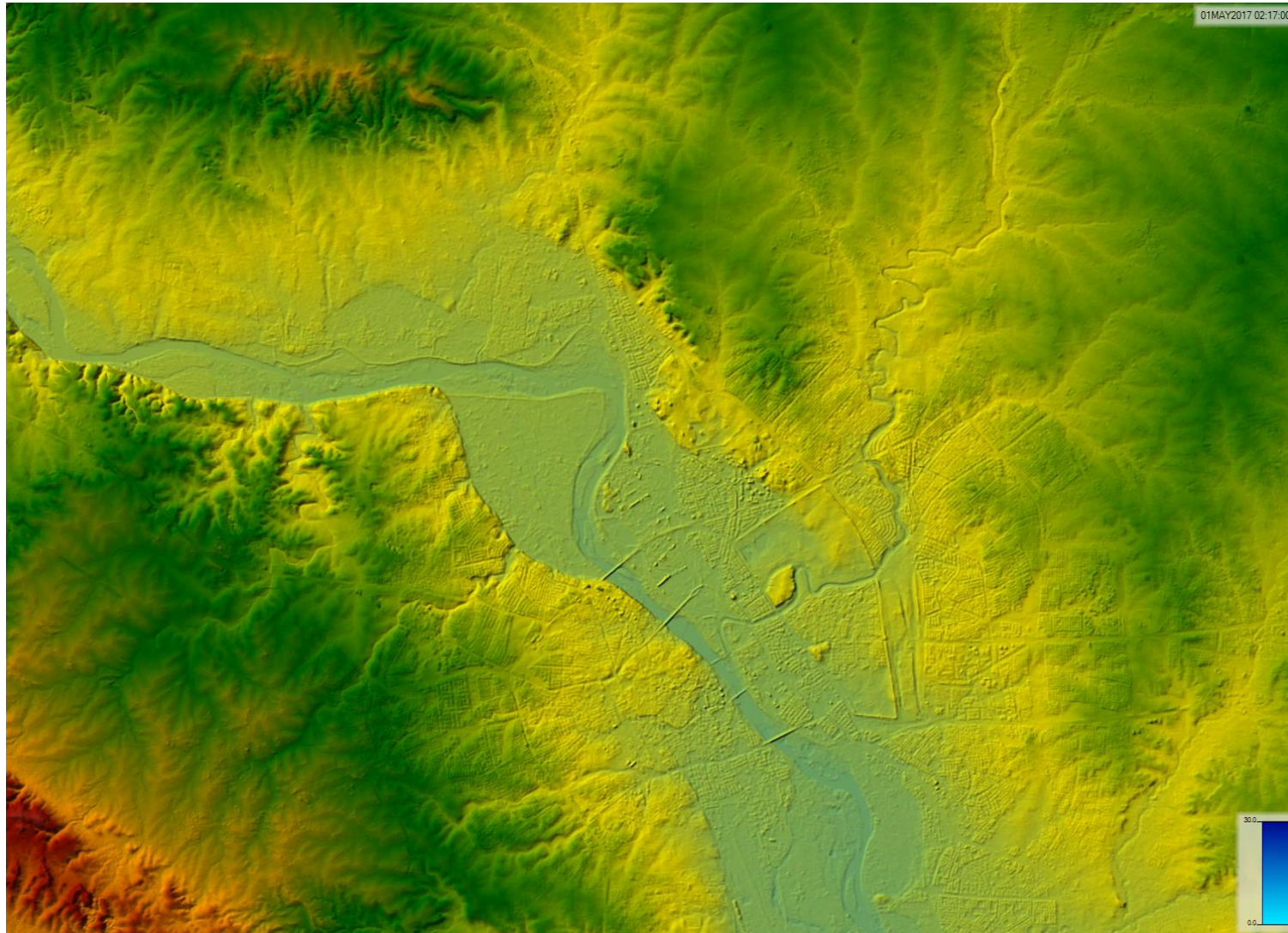
Figure 12 Example of flood loss criteria for rice according to different stages of crop growth. The example crop is the white jasmine rice 501 variety grown in the Pasak River Basin in Petchaboon, Thailand.



Growth Stage	June	July	Aug	Sep	Oct	Nov	Dec
	Seeding	Transplant	Tillering	Booting	Flowering	Reproductive (Grain Filling)	Harvesting day
Rice height (cm)	0–25	25–50	50–70	70–110	110–160	160	160
Critical water depth (cm)	25	25	40	70/20*	160	160	160
Critical flooding duration (days)	>3	>3	>4	>4	>4	>4	>4

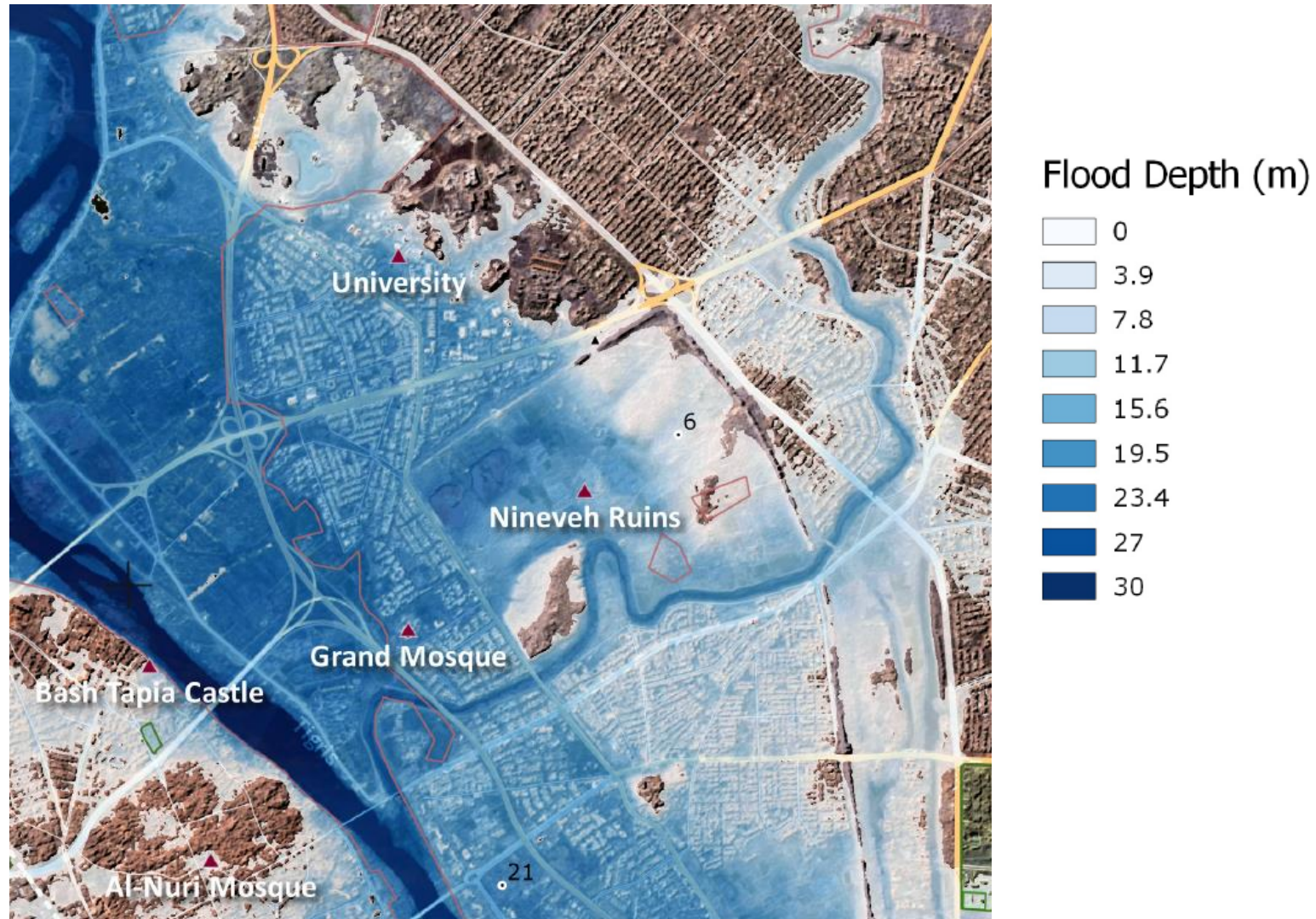
Source: Expert based assessment of critical flood parameters identified in the context of a flood index insurance feasibility study project in Petchaboon, Thailand (*The critical water depth during the first two weeks of September is 70 cm while the last two weeks is 20 cm, respectively). See ASDECON (2008).

High-Resolution Elevation Models for Flood Modelling



Euro-Maps 3D DSM Northern Iraq © 2017, GAF AG, includes Antrix material

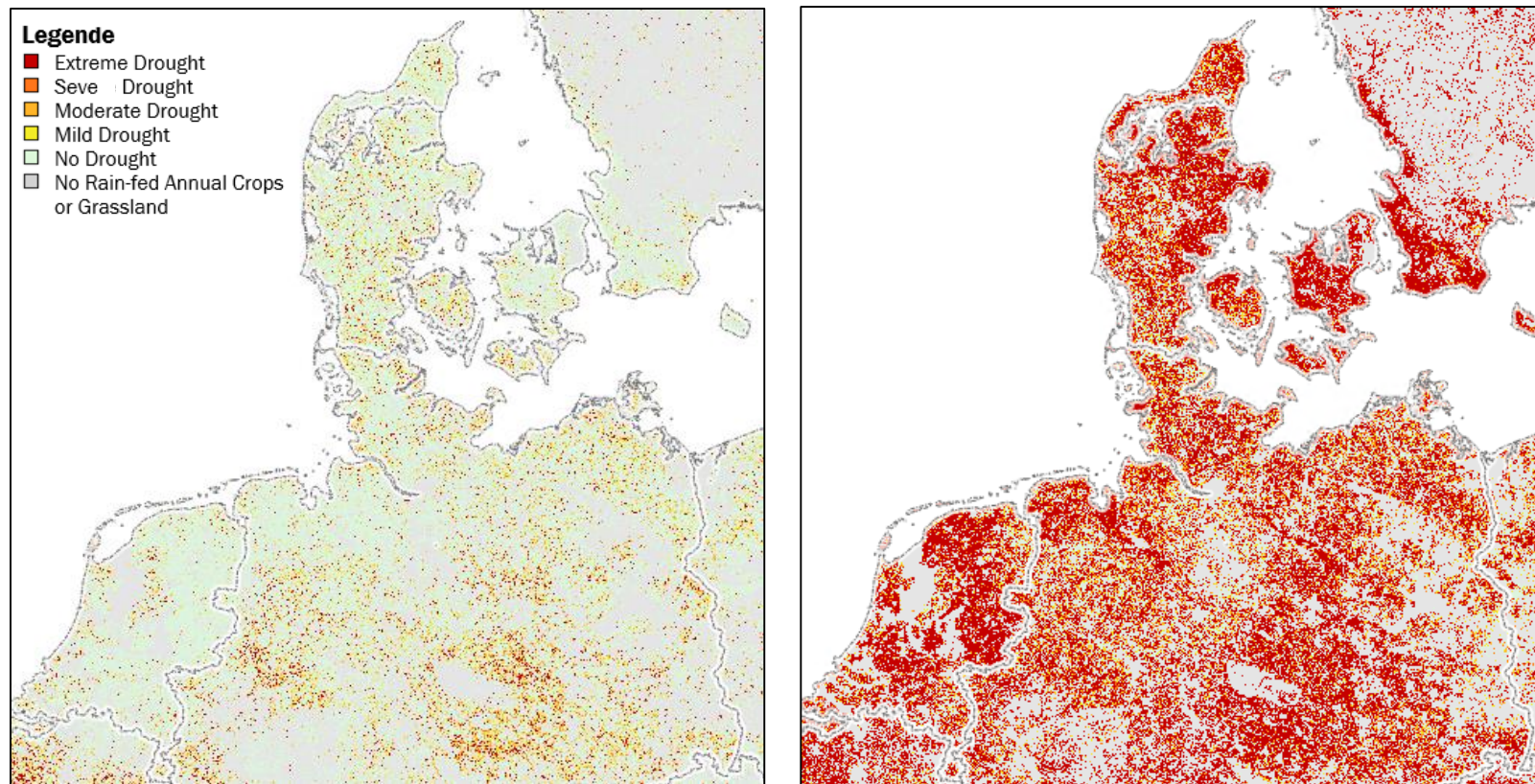
High-Resolution Elevation Models for Flood Modelling



Euro-Maps 3D DSM Northern Iraq © 2017, GAF AG, includes Antrix material

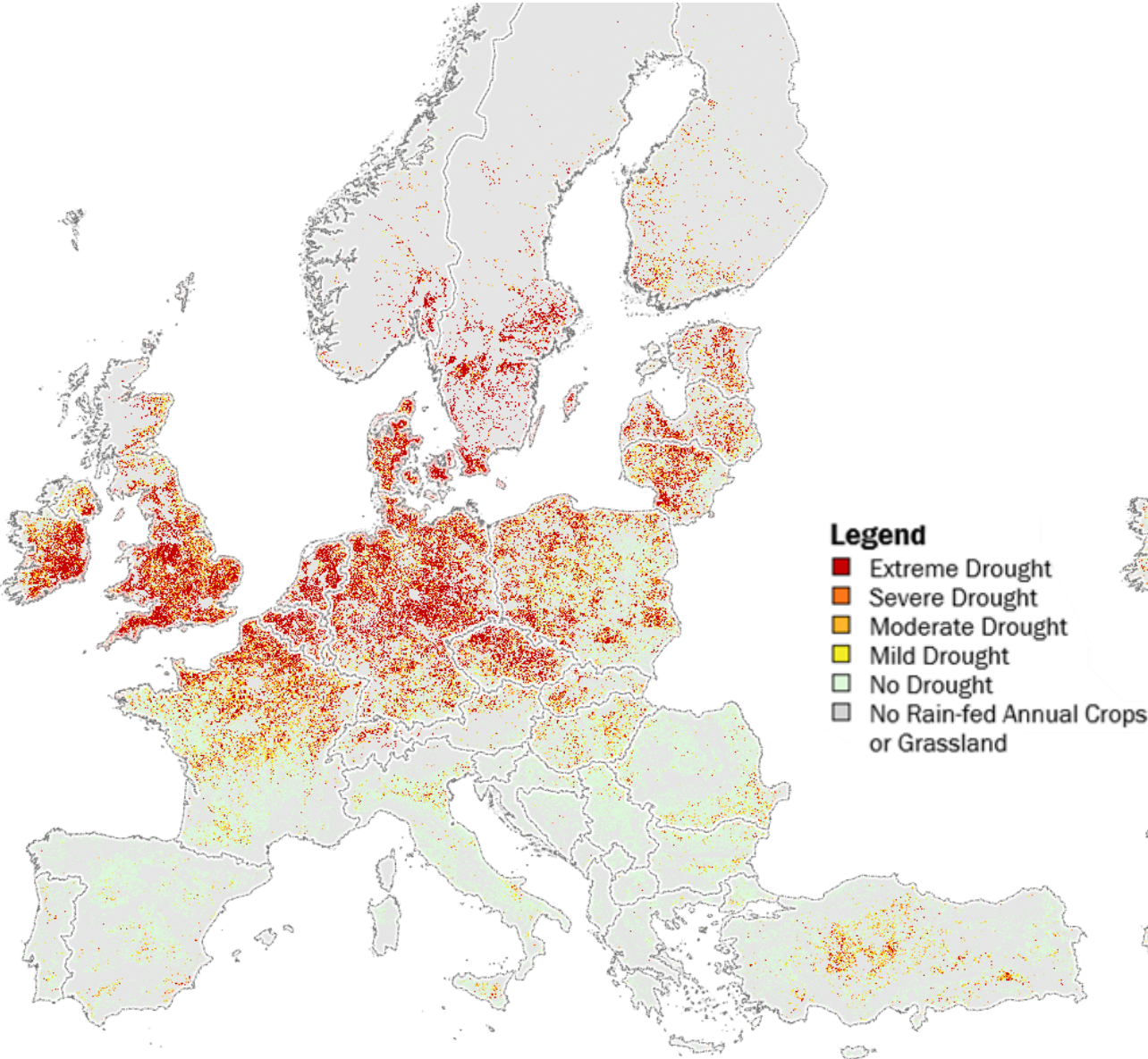
Observing the Effects of Water Stress on Vegetation

- Observing green plant biomass through satellite data
- Using historical values as a benchmark

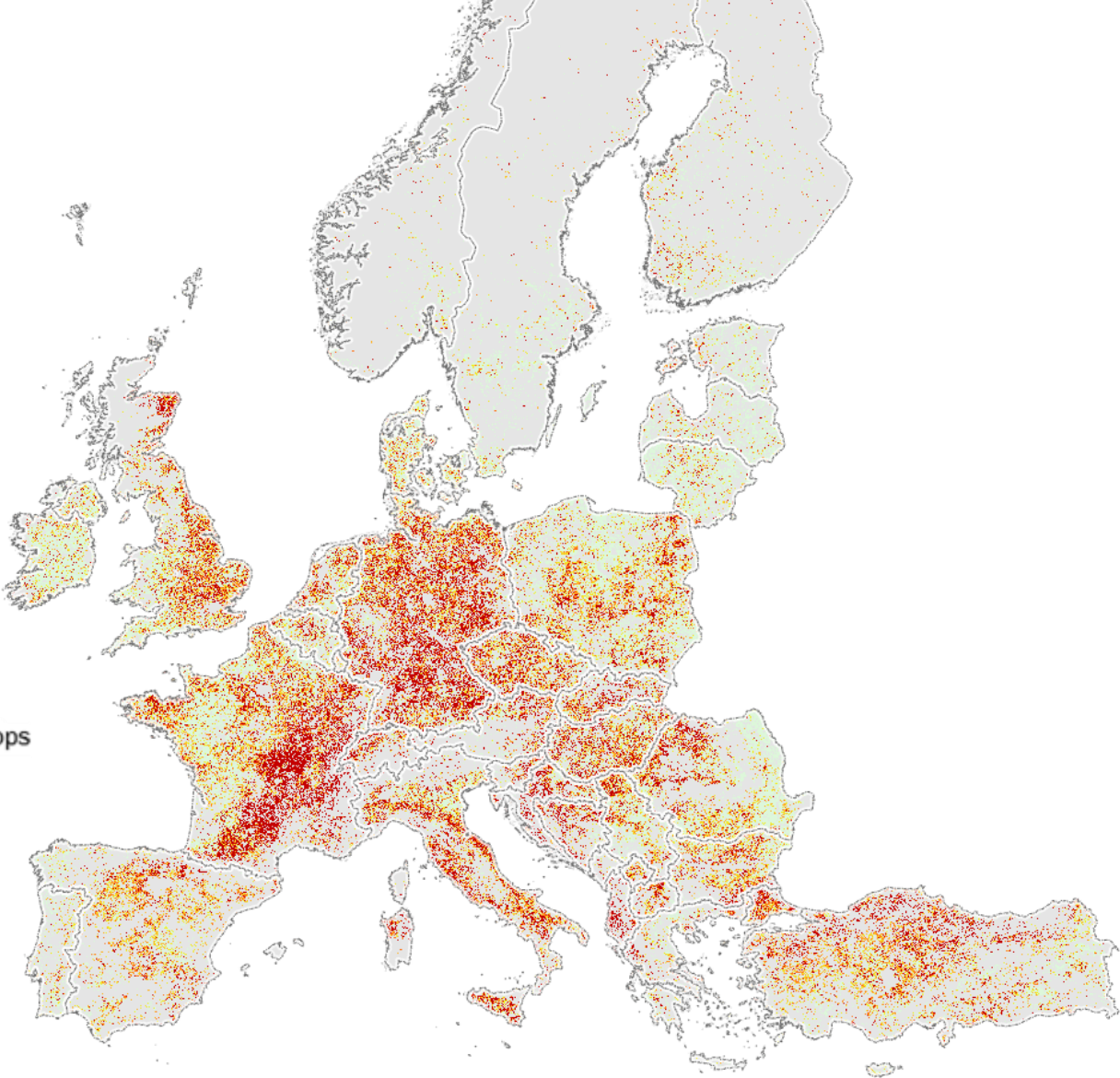


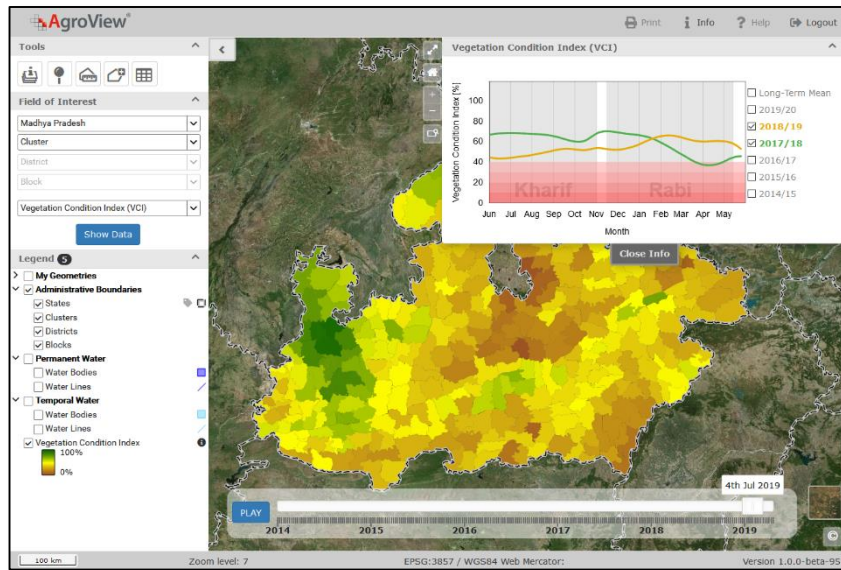
Drought index on 20.07.2017 (left) and 20.07.2018 (right)

Status on July 20th, 2018



Status on July 20th, 2003



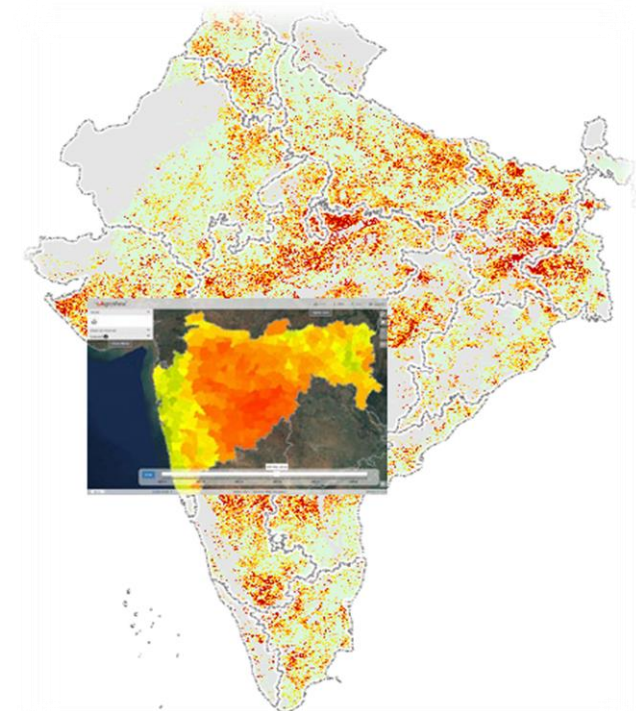


Solution

- Web-Based Drought Information System (AgroView®) for user-friendly analysis and interaction
- Extensive drought database covering recent as well as >15 years historical data
- Specifically designed drought-related indicators derived from satellite datasets

Business Benefits

- Drought Information on entire continents (Europe with > 5.8m km² and India with 3.3m km²) with multiple spatial and temporal monitoring dimensions
- Dense data time-series with updates every 8–14 days, covering a time-span of more than 15 years
- Cost-efficient information portal supporting drought risk management tasks
- Damage assessment



Thank you for your attention!



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