From Flow Forecasts to Flood Impact Maps

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Brigham Young University (BYU)

- ECWMF/JRC - GloFAS
- NOAA/OWP/GEO
- SERVIR/NASA
- BYU Graduate Students and Colleagues
  - Michael, Alan, Nathan, Herman, Spencer, Ryan…

Outline

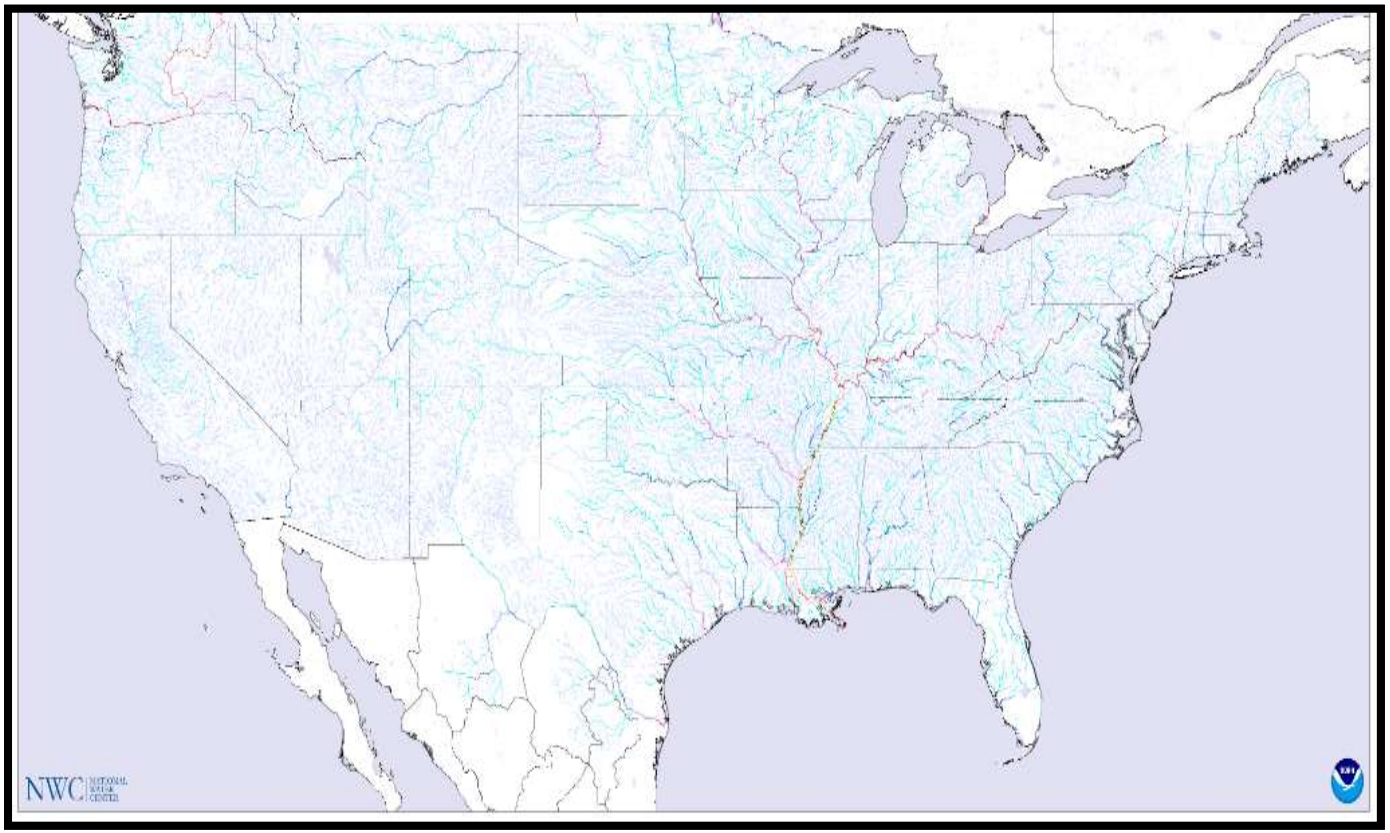
1. Advanced hydrologic models
   - NWM
   - GloFAS
2. Communicating results
   - Accessibility
   - Web apps
   - Tethys framework
3. Our contributions to the accessibility of the NWM and GloFAS
4. Linking streamflow forecasts to flood maps
   - HAND
   - Linking forecasts to flood maps
   - REST API approach
5. Communicating Impacts
   - Letting the locals make the decision
   - Workflow for developing a comprehensive streamflow-flood map system
6. Case studies
   - SERVIR Project in Nepal
   - Dominican Republic

What do you look for in a hydrologic model?

- Accuracy
- Uncertainty
- Coverage
- Resolution
- Frequency
- Accessibility

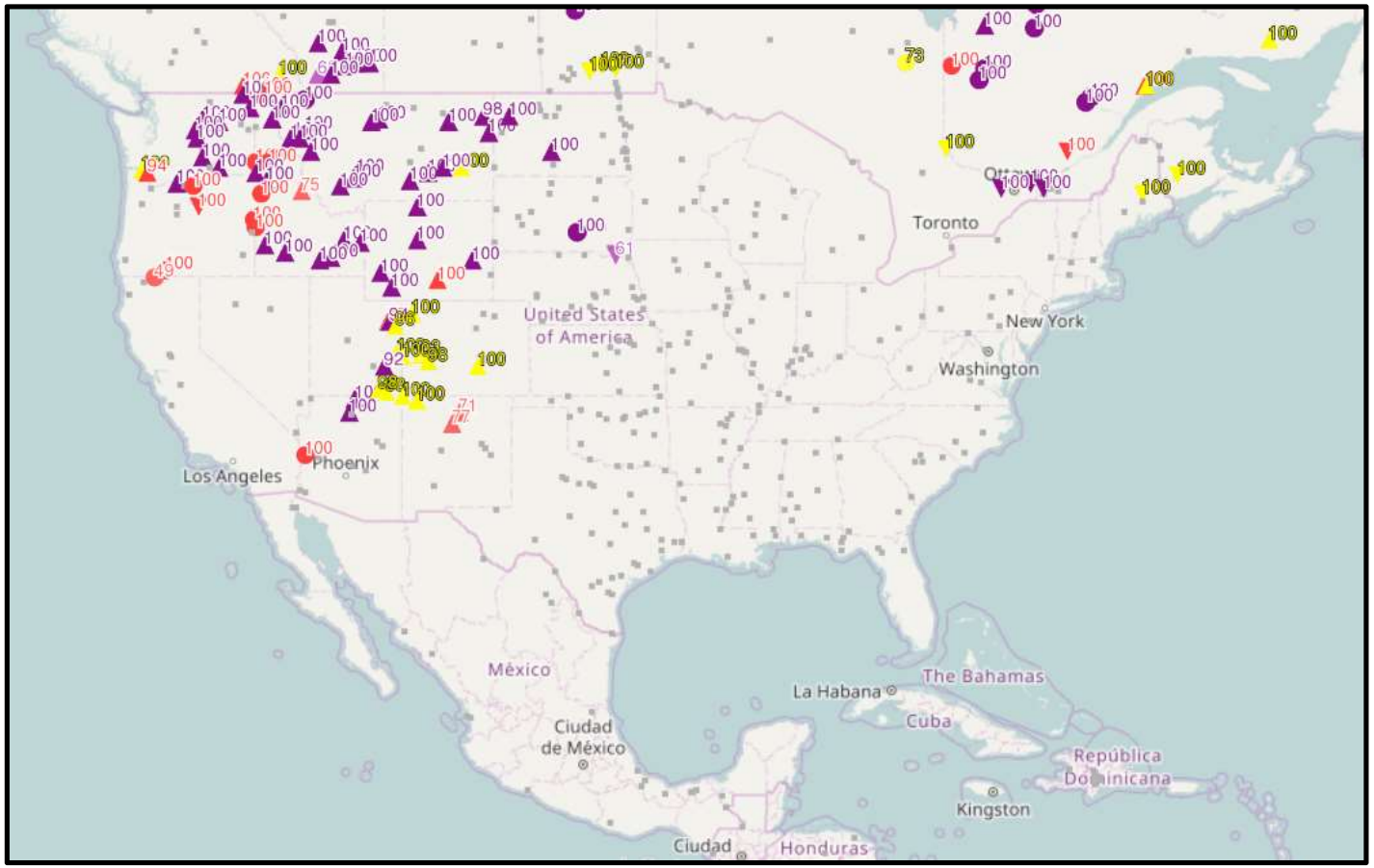
The US National Water Model (NWM)

- High resolution
- Conterminous US cover
- Continuous output
- Assimilates observations
- Accessible online



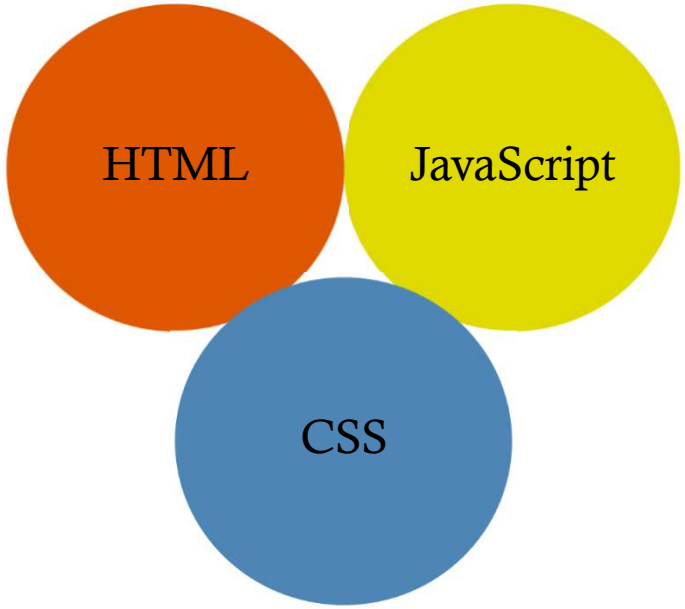
ECMWF's Global Flood Awareness System (GloFAS)

- Global coverage
- Only major rivers
- Fifty-two ensemble
- Continuous output
- Accessible online



Communicating Results: Accessibility

- Web applications provide an ideal way to share content on the internet.

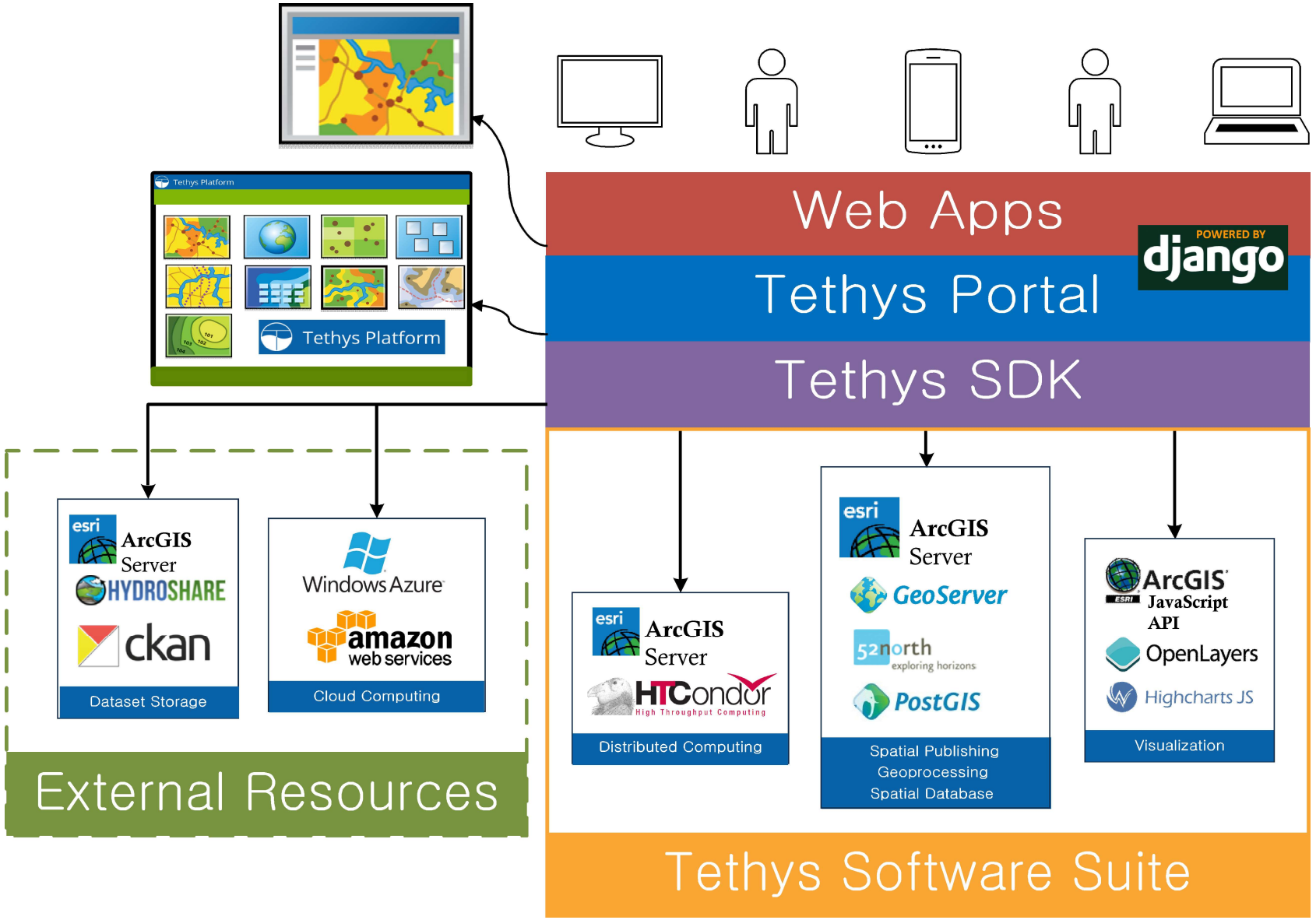


We are not professional web developers!

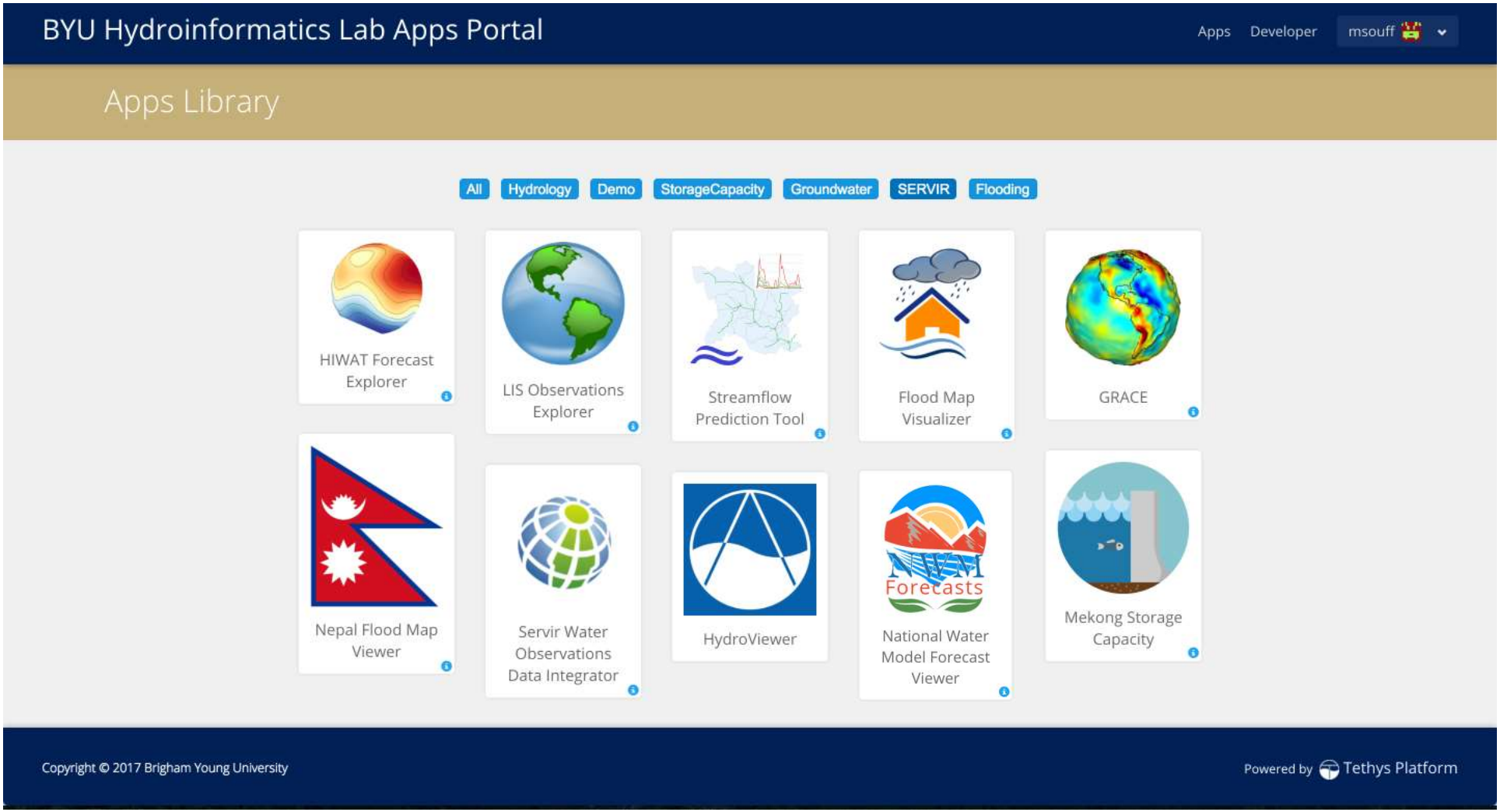
Solution

Tethys Platform

Tethys Platform

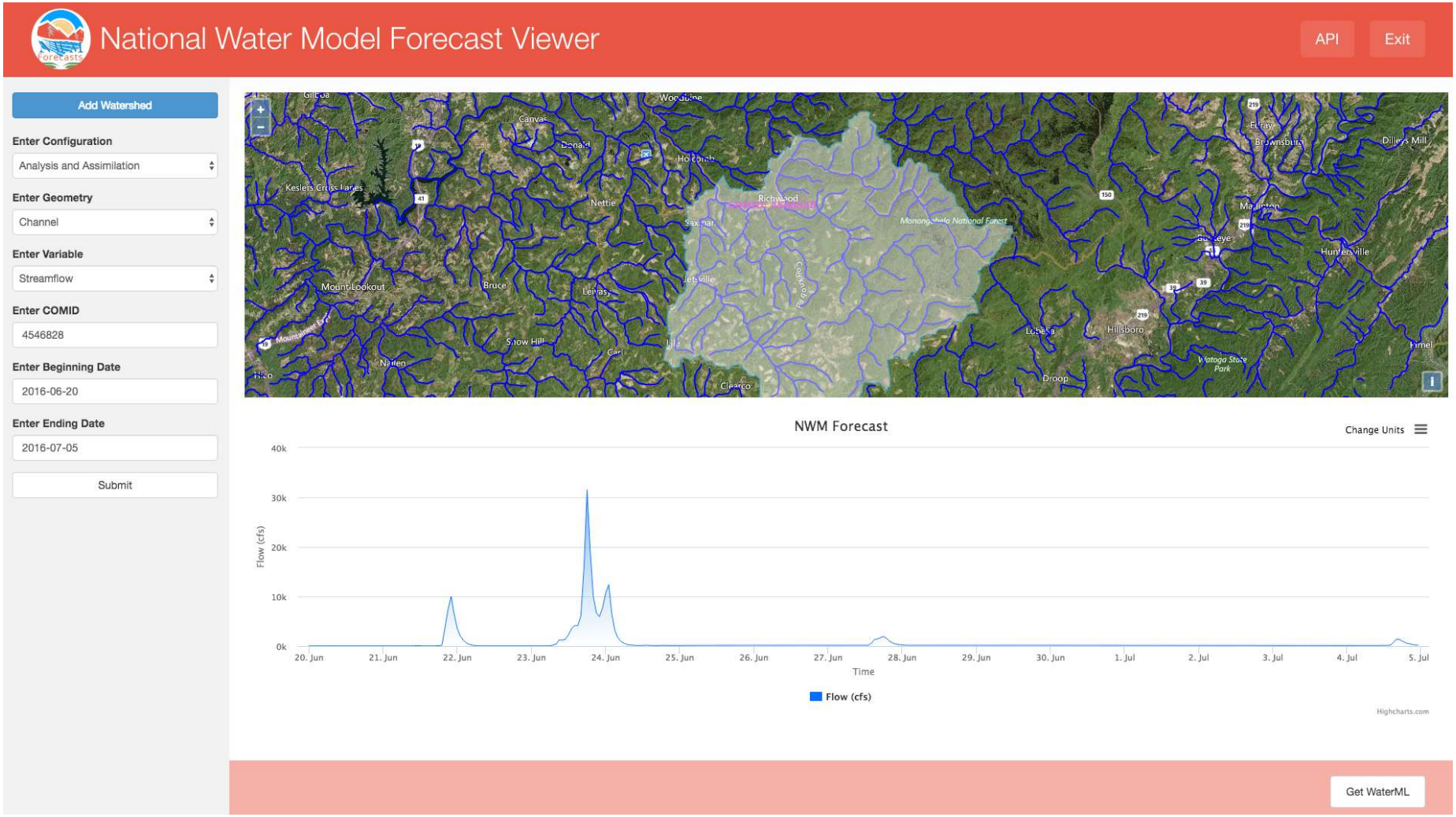


Tethys Portal

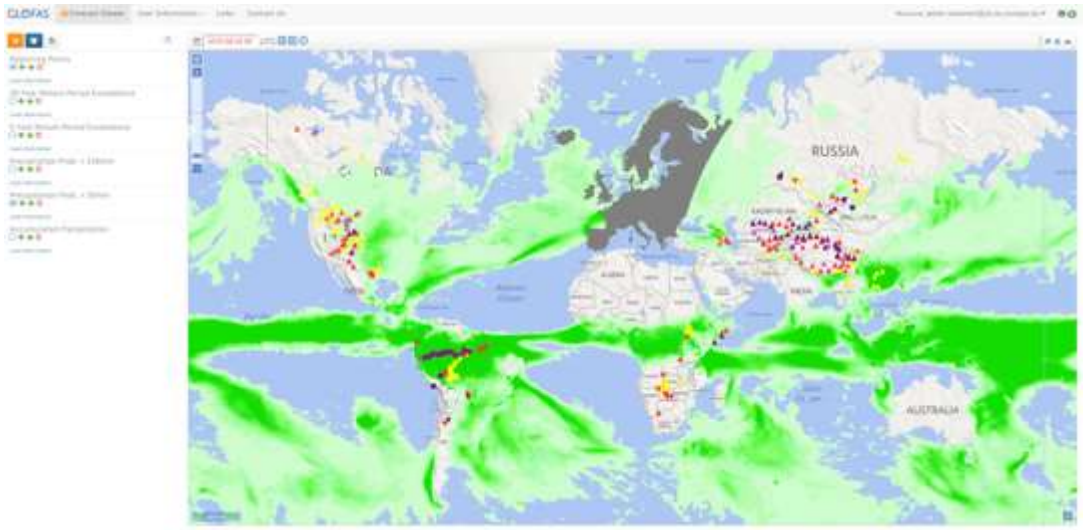


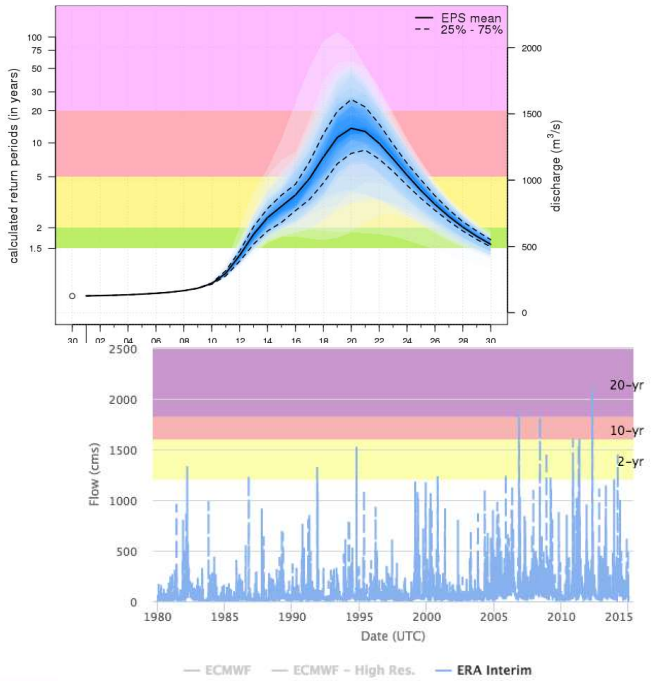
http://www.tethysplatform.org

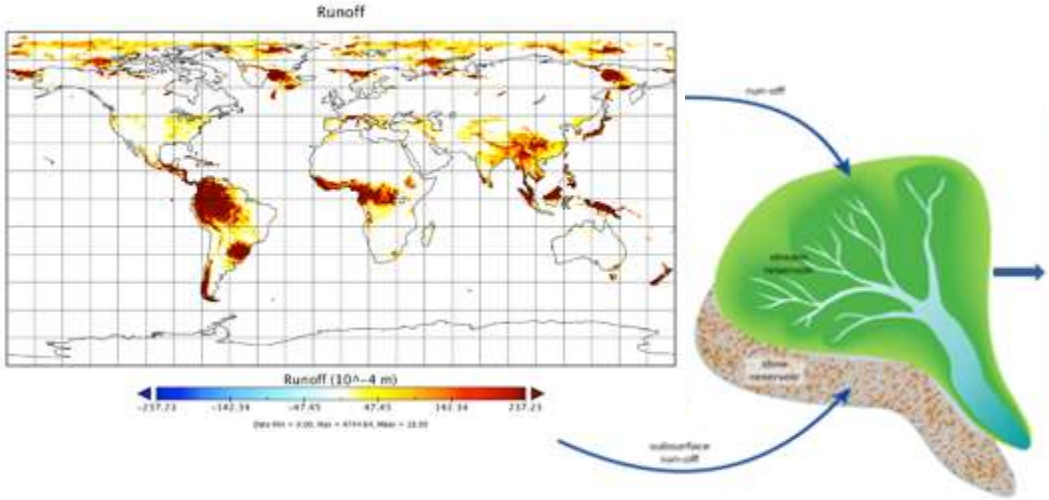
Communicating Results: NWM Forecast Viewer

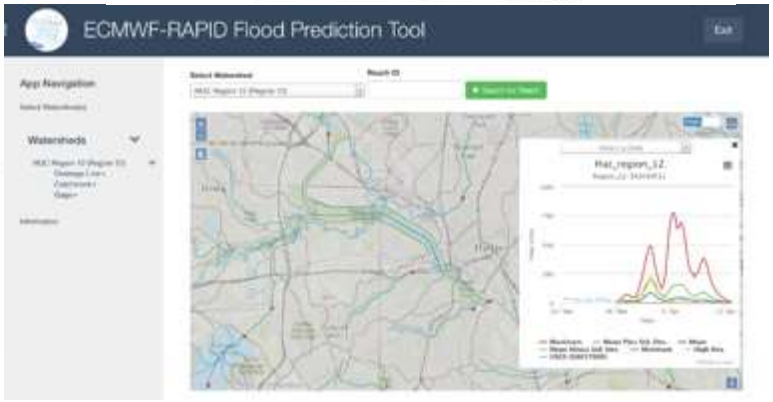


GloFAS-RAPID

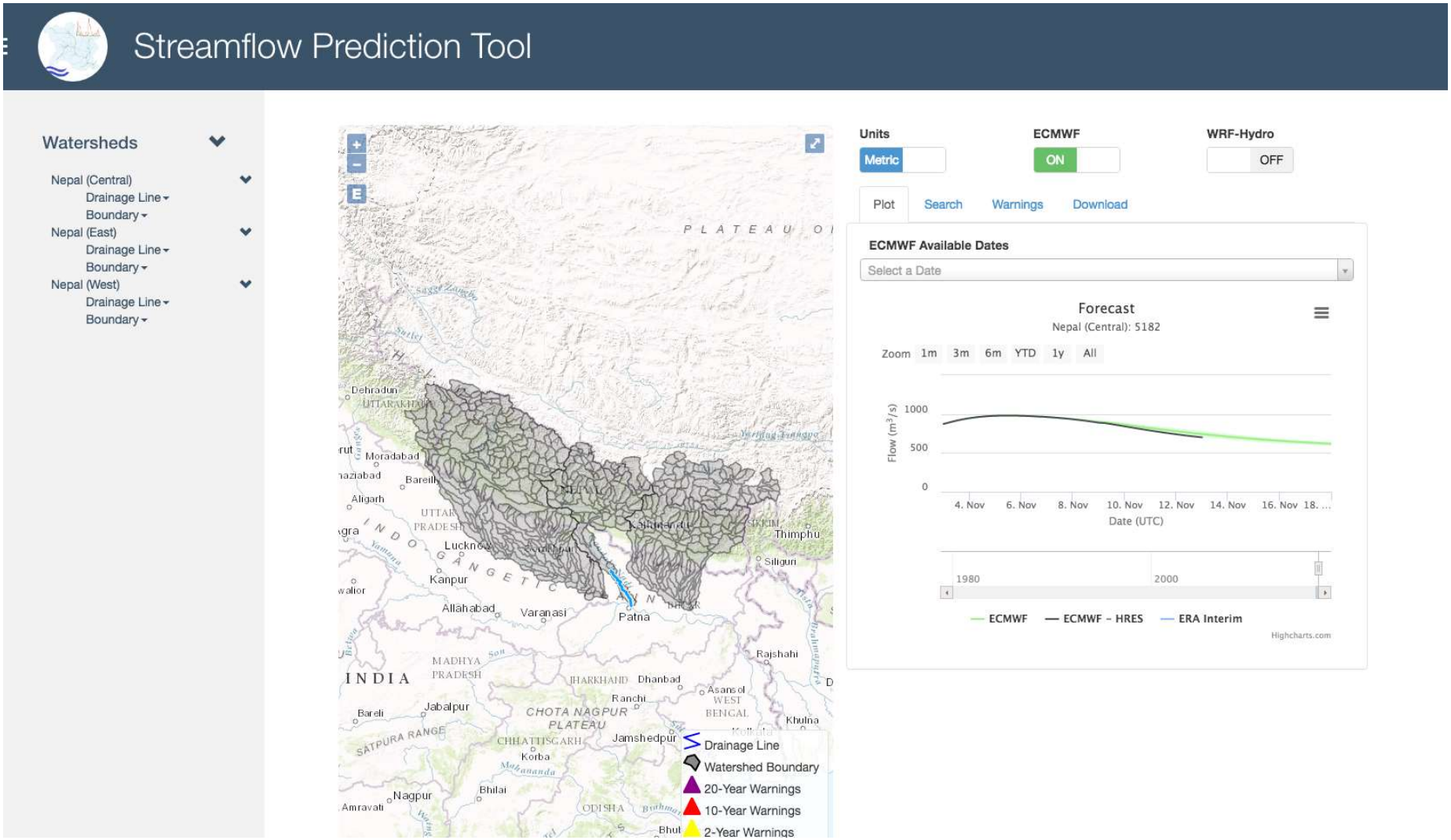




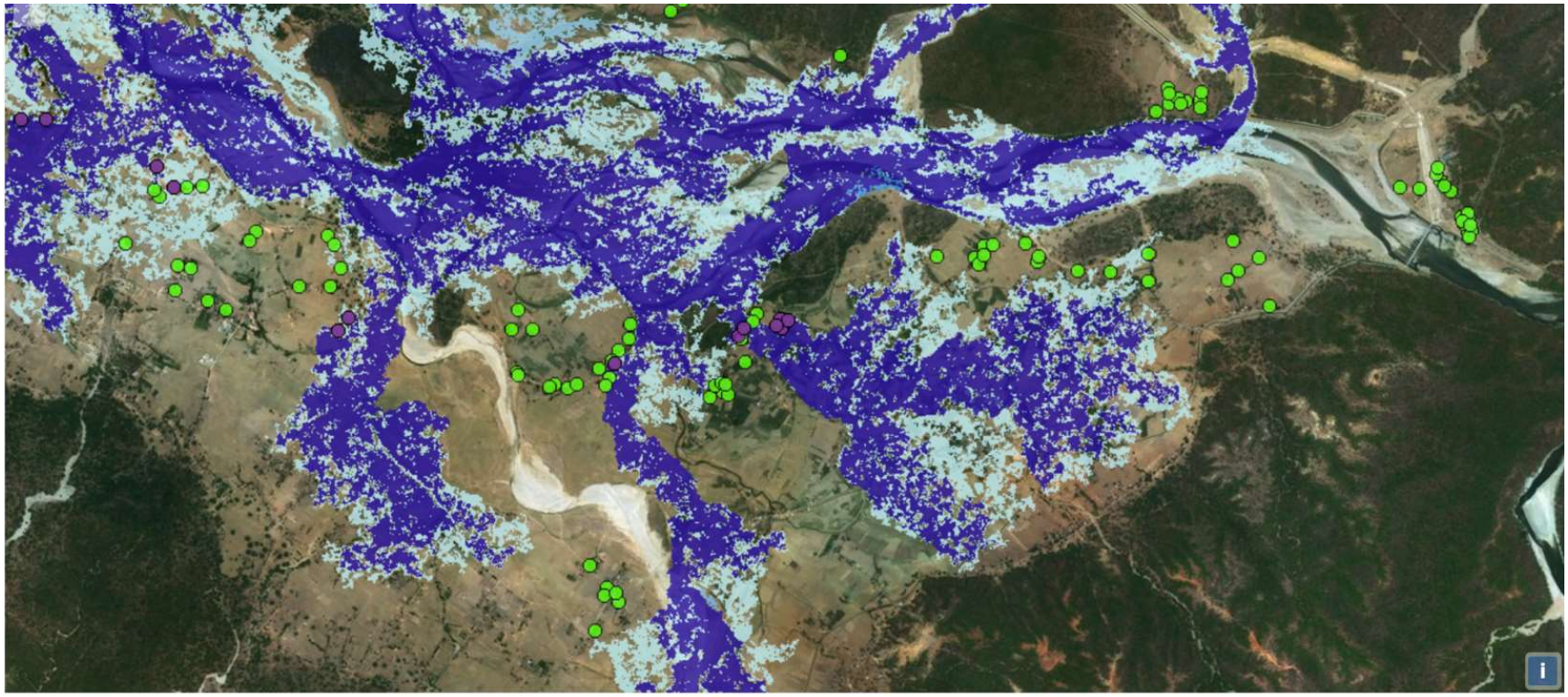


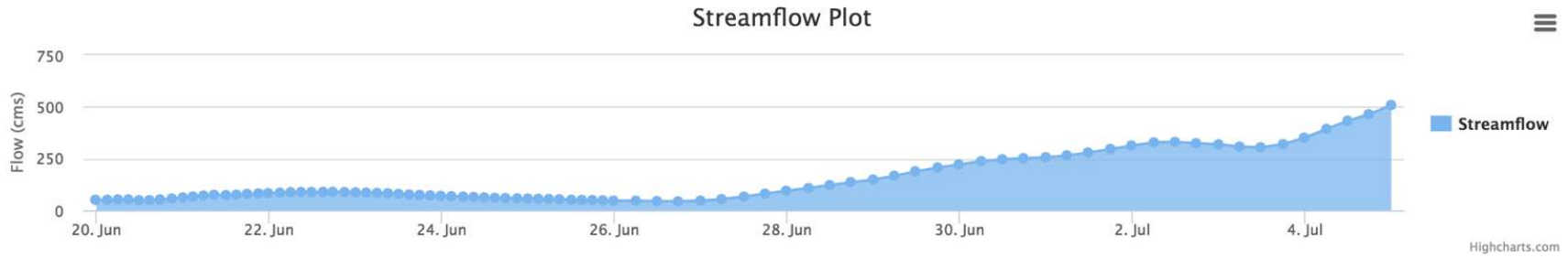


Communicating Results: GloFAS-RAPID Forecast Viewer

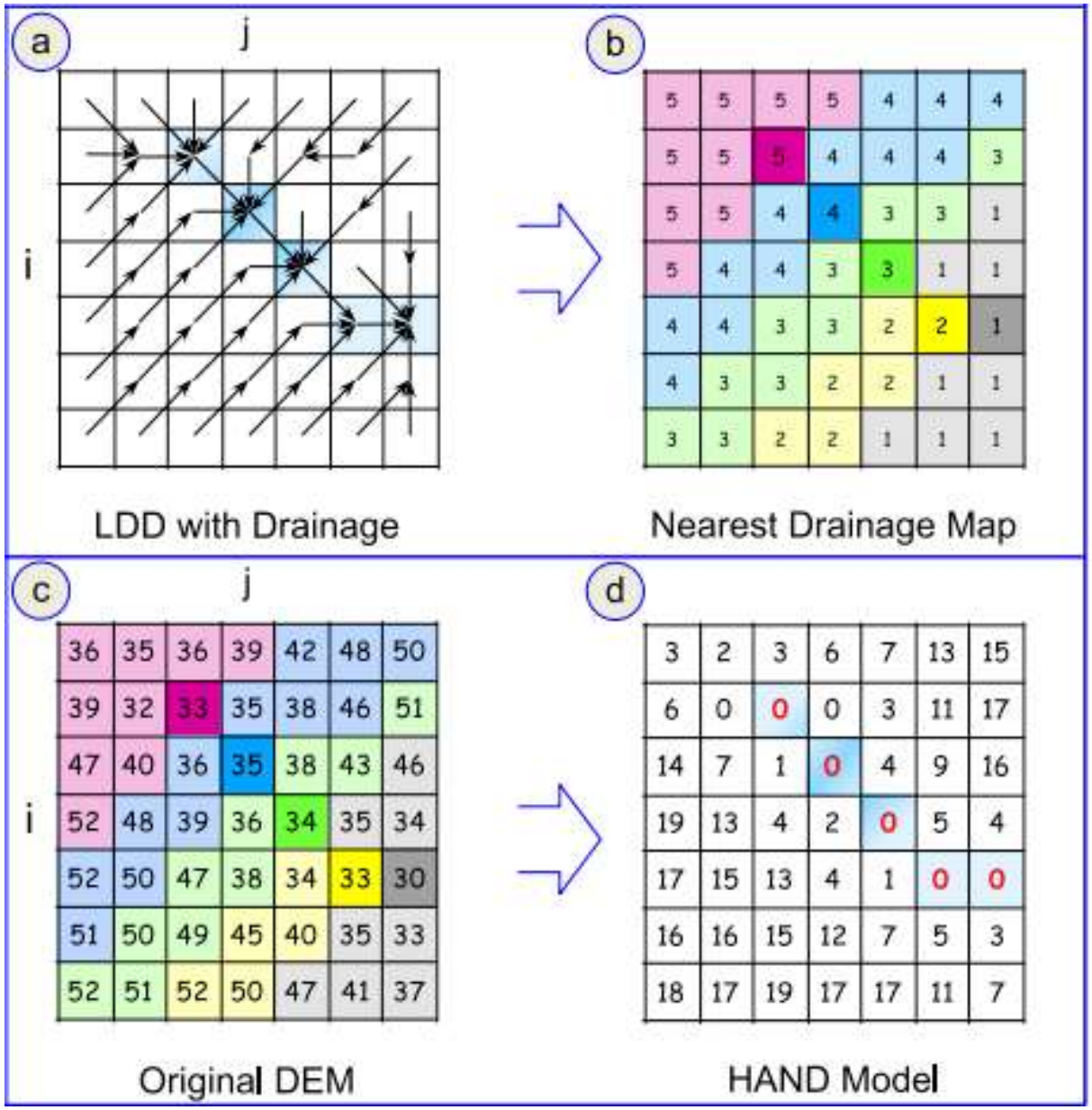


From streamflow to flood map

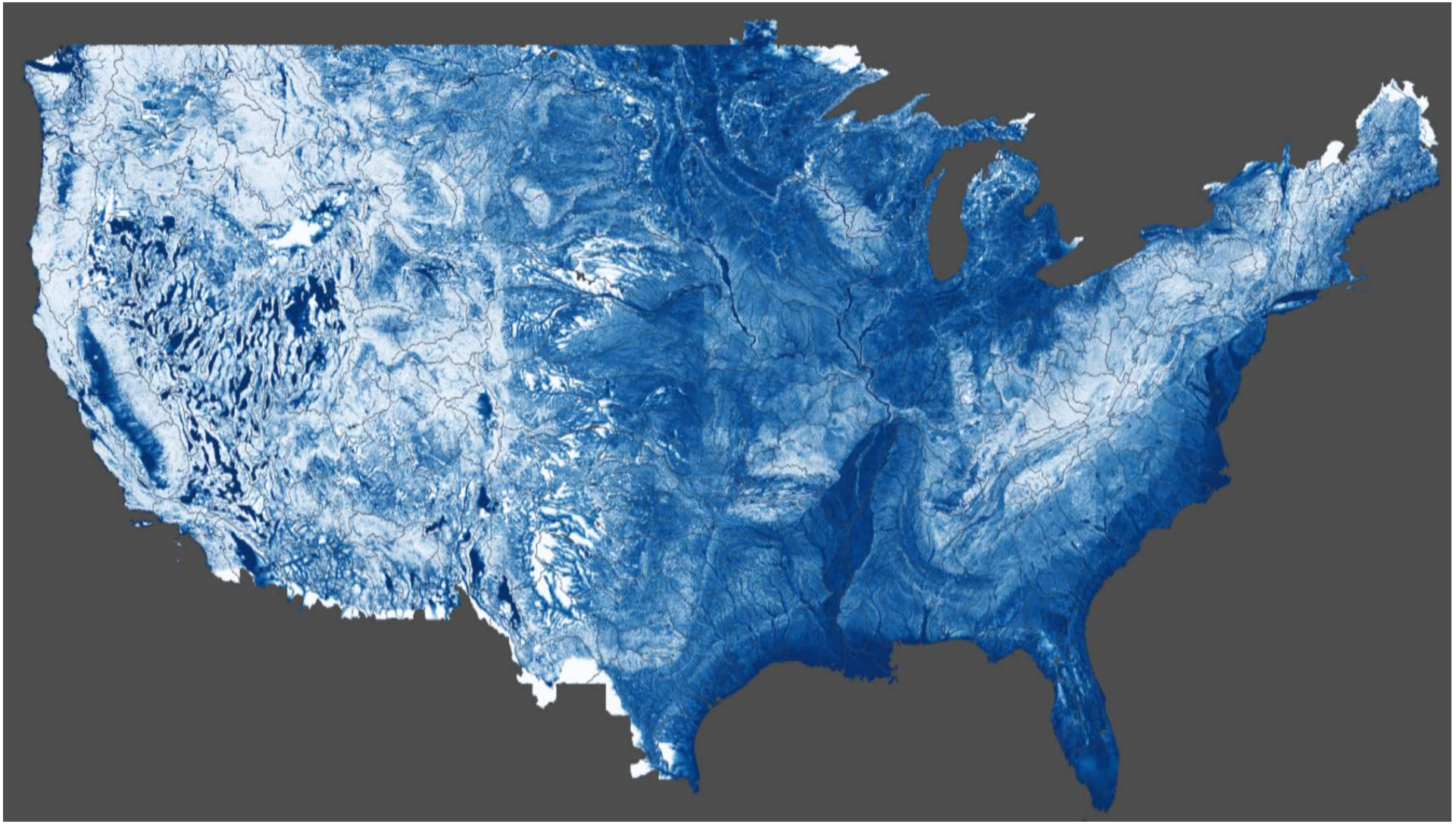




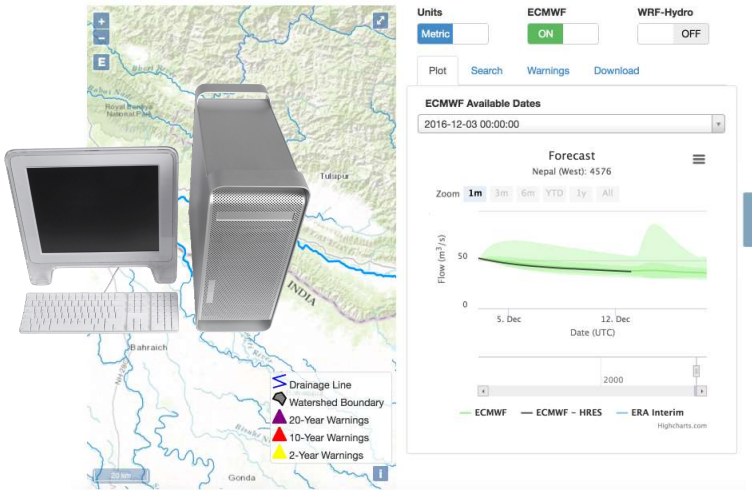
How does HAND work?

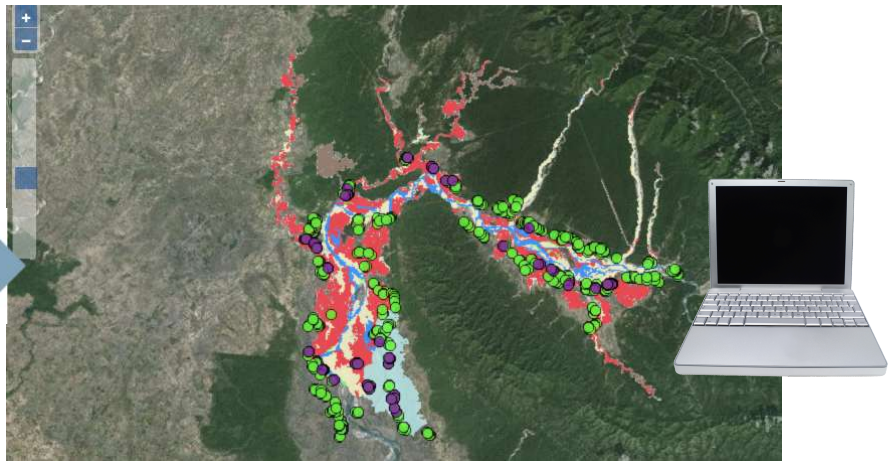


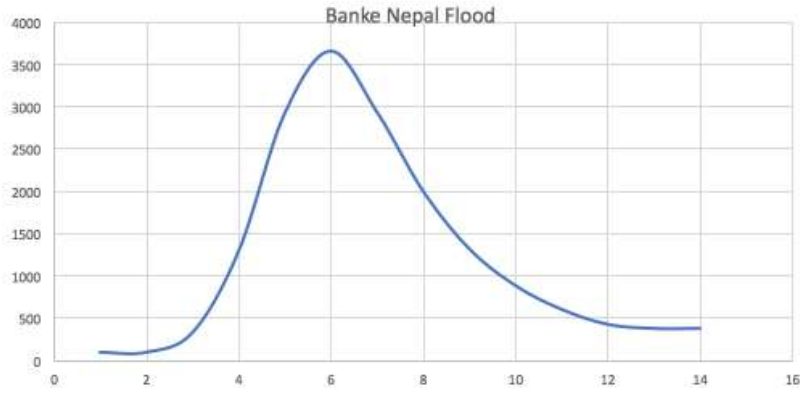
HAND for CONUS

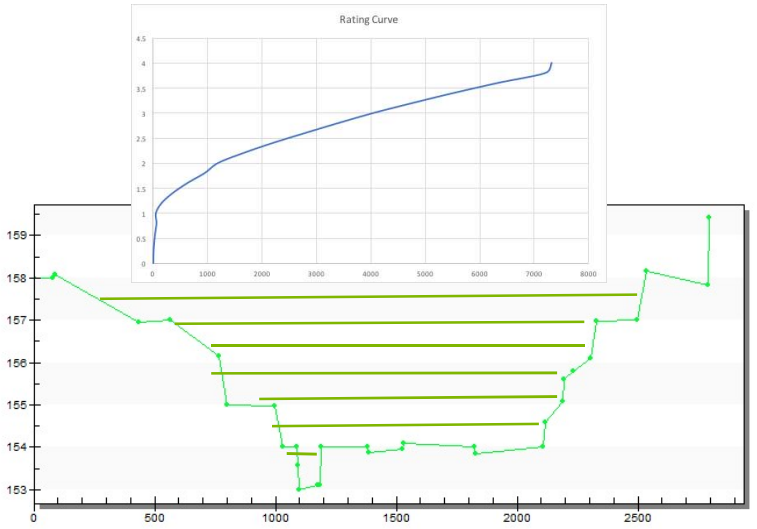


Dynamic Flood Maps for Continuous Hydrologic Models









API Usage Example

- REST API call using Python:

  >>> import requests

  >>> res = requests.get('http://[HOST_Portal]/apps/streamflow-prediction-tool/api/GetStreamflow/?watershed_name=Nepal&subbasin_name=Central&reach_id=5&start_date=most_recent&stat_type=mean', headers={'Authorization': 'Token asdfqwer1234'})

API WaterML Output Example

This XML file does not appear to have any style information associated with it. The document tree is shown below.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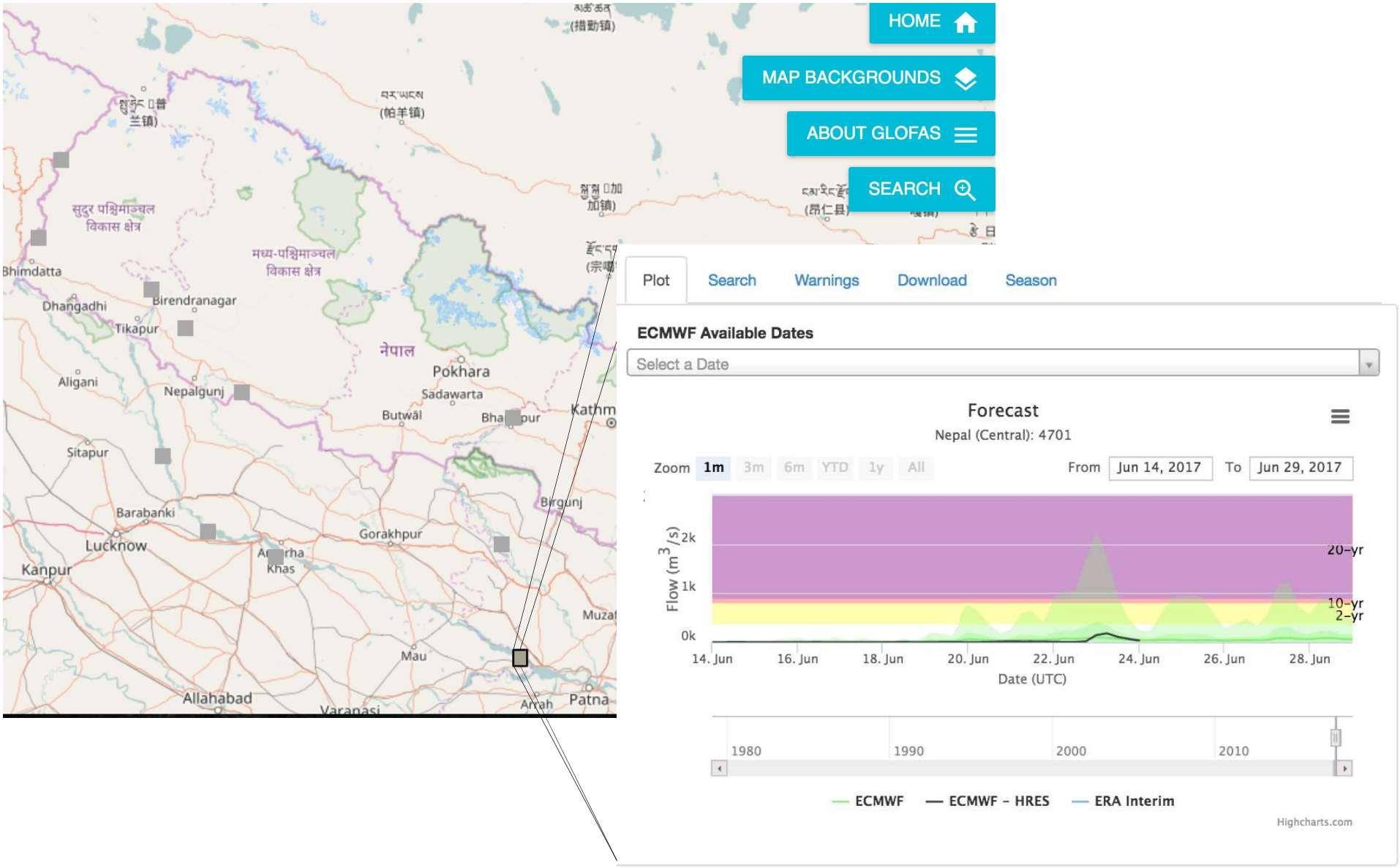
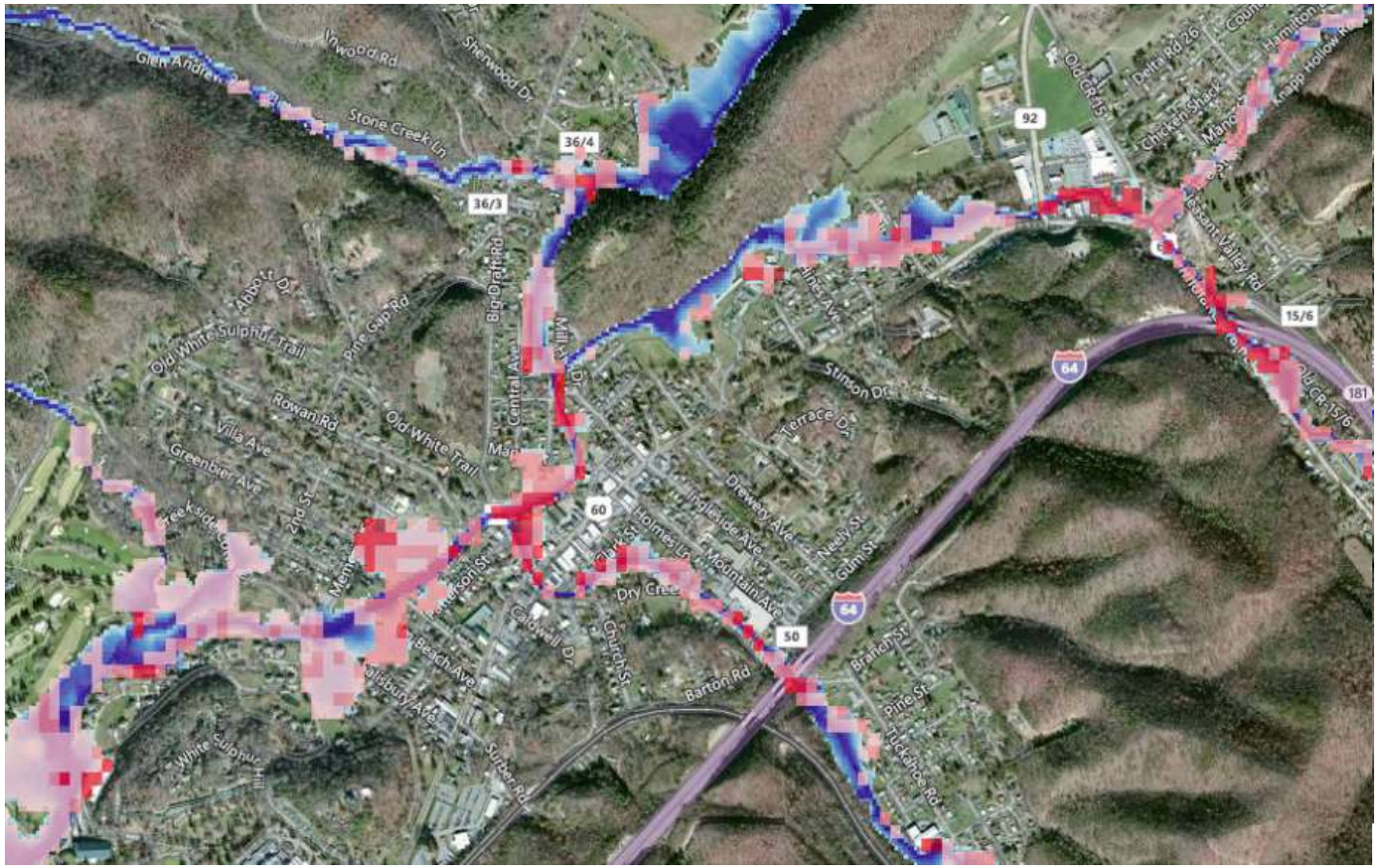
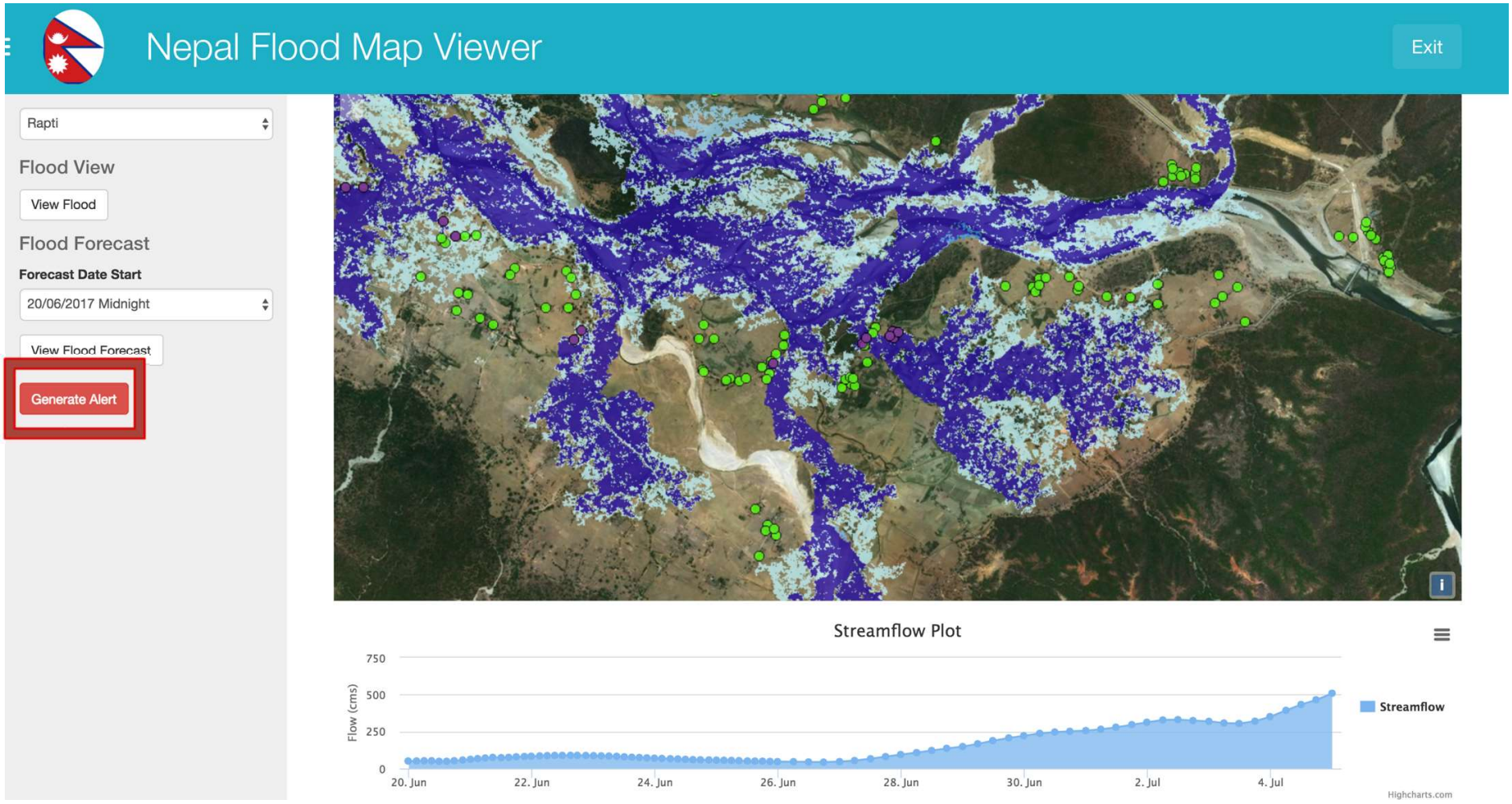
REST API Potential



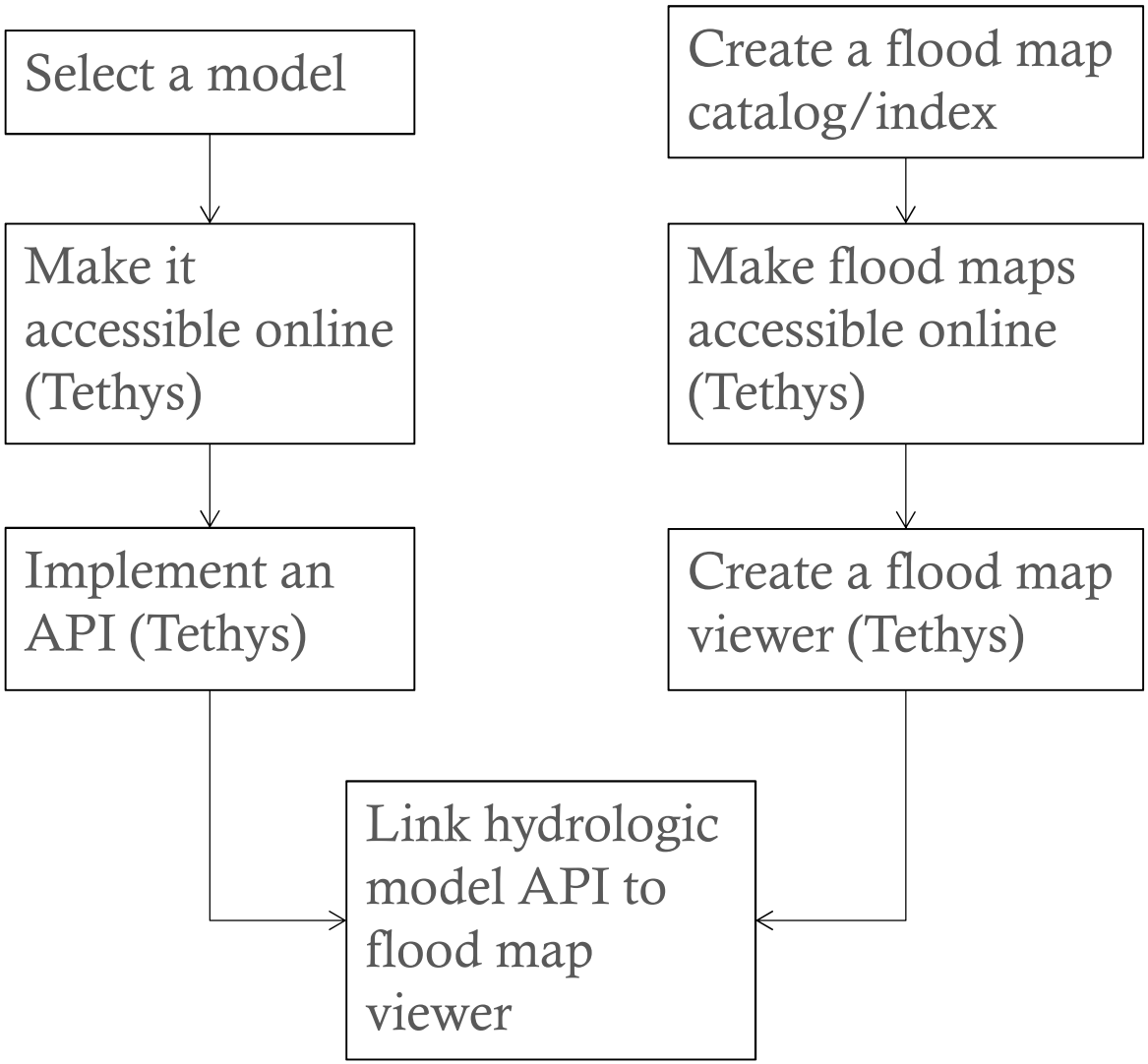
Communicating Impact



Communicating Impact

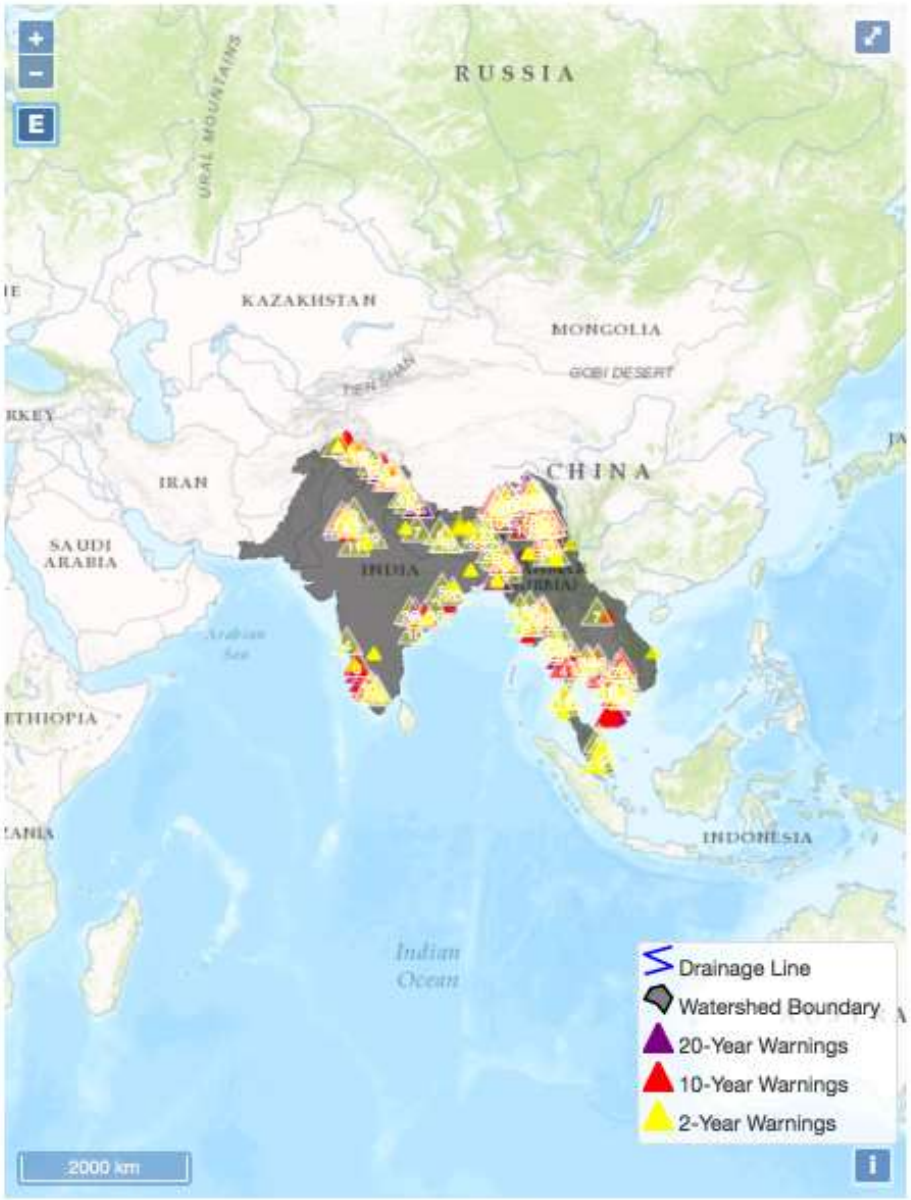


Workflow

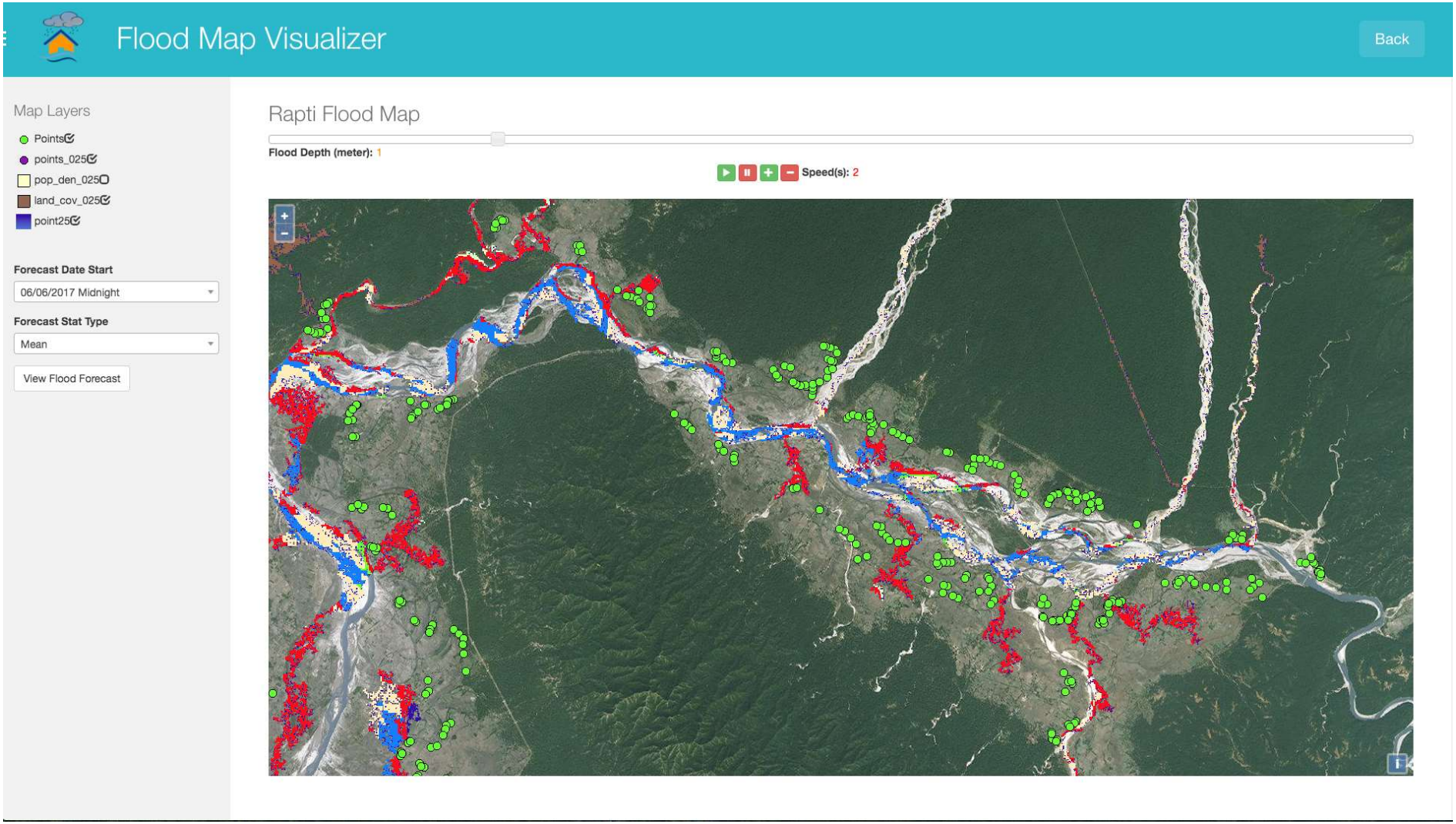

Select a model
Make it accessible online (Tethys)
Implement an API (Tethys)
Create a flood map catalog/index
Make flood maps accessible online (Tethys)
Create a flood map viewer (Tethys)
Link hydrologic model API to flood map viewer

Study Case:
Comprehensive Streamflow Prediction to Support Water Management in Nepal

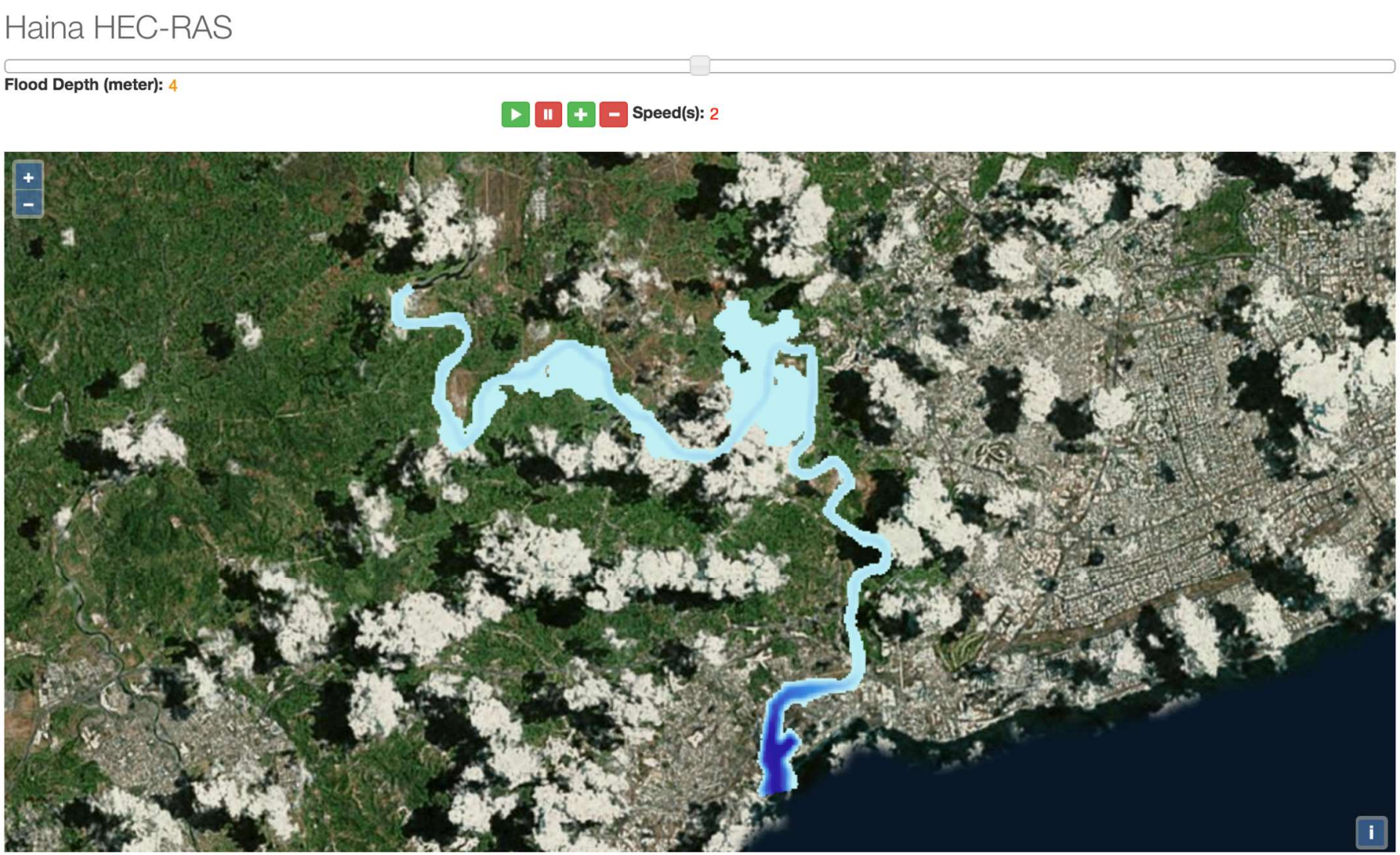
South Asia GloFAS-RAPID



Nepal Flood Impact Viewer



Study Case:
Warning System for Santo Domingo and San Pedro de Macorís Provinces in the Dominican Republic



References

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Questions?