

# Preliminary Analysis of Dam Break of the Puerto Rico Guajataca Dam

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***Disclaimer:***

***Neither JRC nor any JRC employee takes responsibility on the correctness of this research activity. The results should not be used for crisis management purposes but for deriving possible scenarios.***

# Objectives

- To perform a Dam Break Analysis on the Guajataca area and to verify the extent of the possible inundation area
- Code employed: HyFlux2.0, already used for the Mosul discharge analysis in 2016 and the Castreccione Lake Analysis in 2017
  - Extent of the analysis : 10 h
  - Resolution: 30m

## **Limitations to remember**

- The resolution of the analysis: 30 m SRTM, it should be 5 or maximum 10m instead
- The absence of a detailed bathymetry of the lake (i.e. the topography before the dam construction)
- The uncertainty on the current real lake level
- The assumption of instantaneous overall rupture of the dam, to maximize the potential effect



Erosion of the soil forming the dam

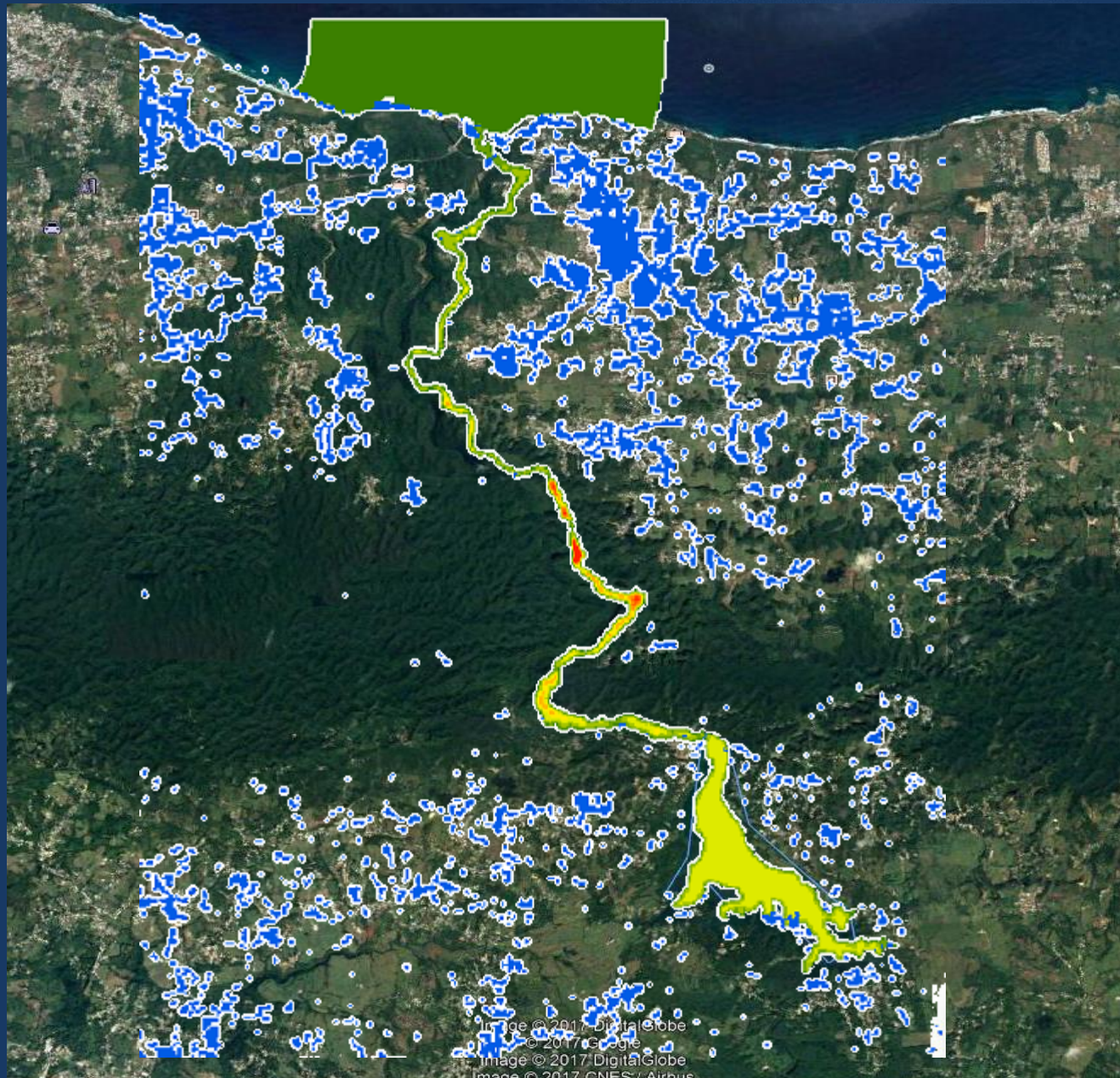


Overspilling due to high inflow from Hurricane rainfall

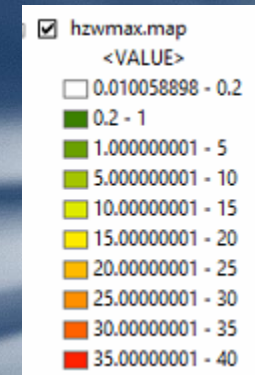
Formation of an alternative path for the water,, close to the dam

# Analysis

- Simple geometry:
  - Digitized the lake contour from GE
  - Transformed in lake surface (2.72 km<sup>2</sup> – some data from USGS report 3.42 km<sup>2</sup>)
  - Assigned a height of 198.5 m and a constant depth of 10.5 m, so total volume is 28.6 km<sup>3</sup> – data from USGS report 42.28 km<sup>3</sup> )
  - Size of the break: 60 m for the whole height of the lake (10.5 m)

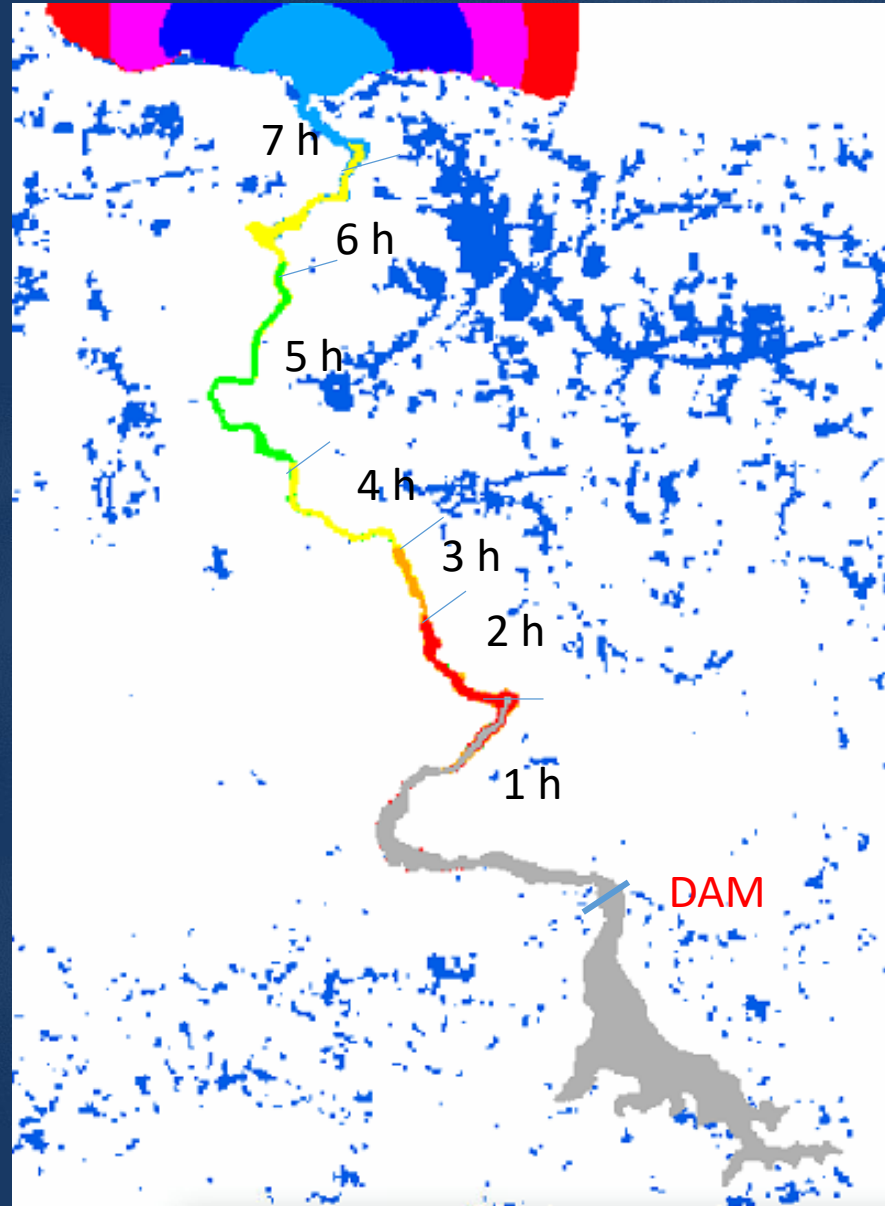


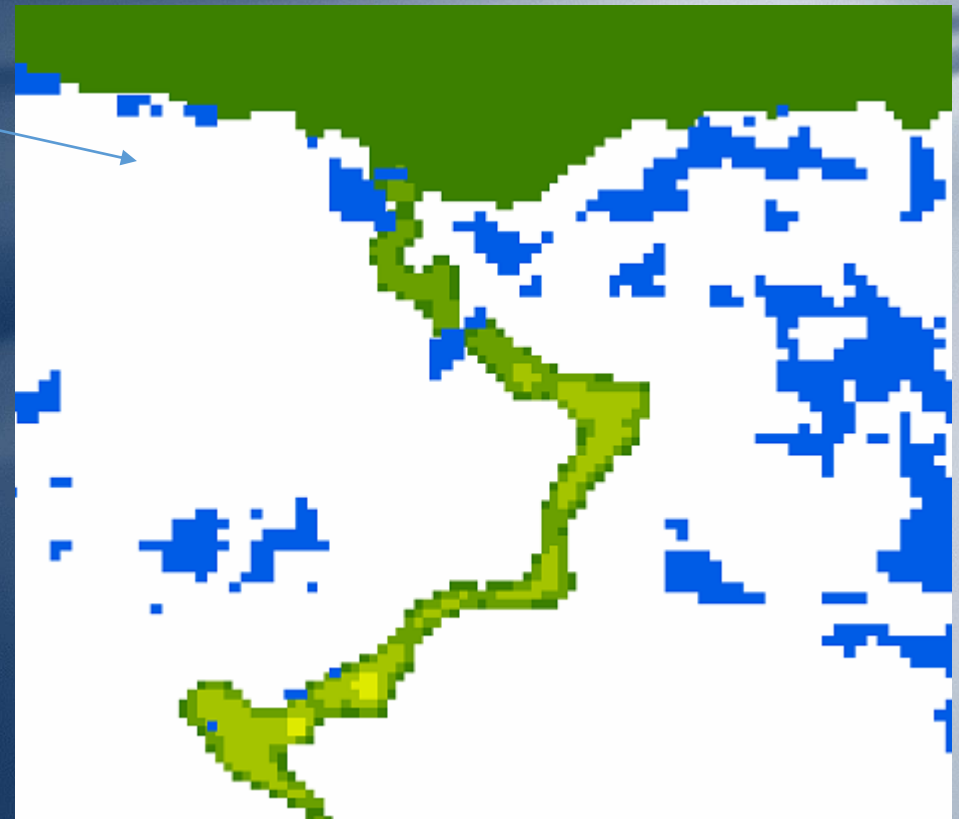
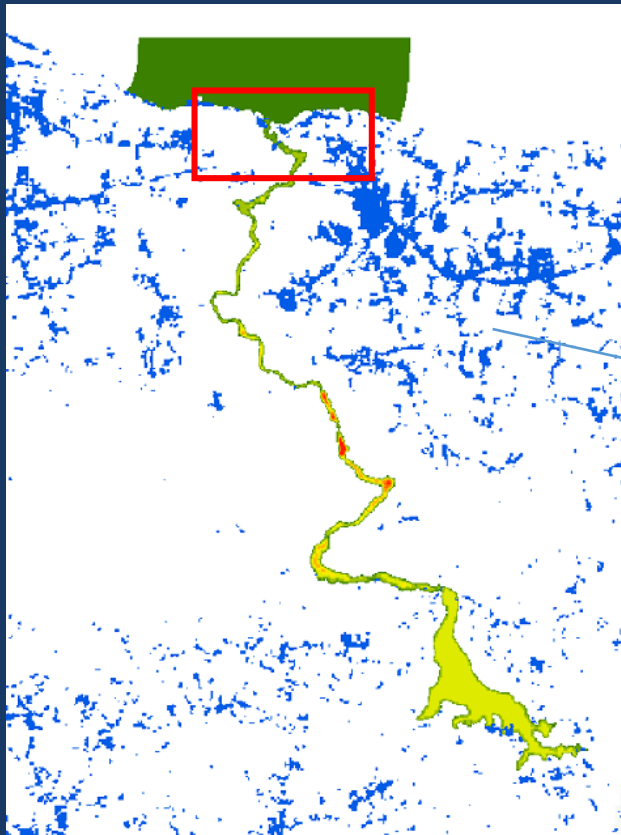
Water height (m)

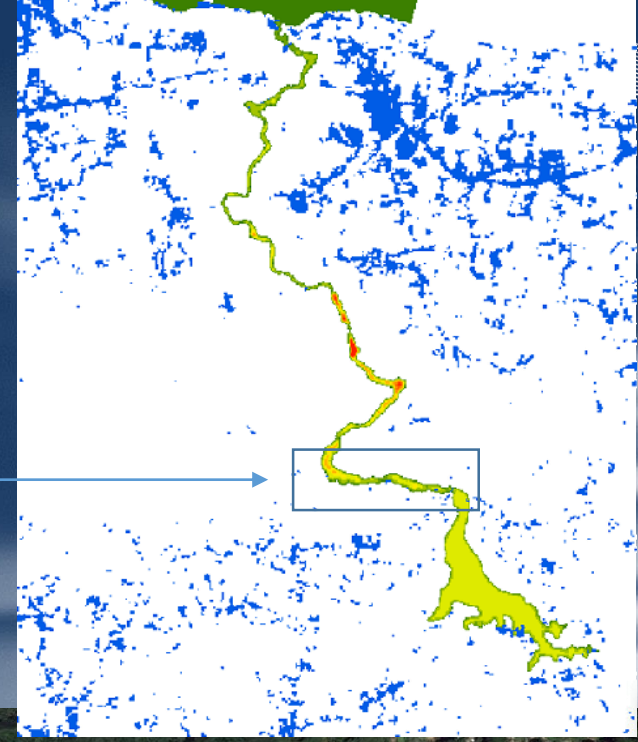
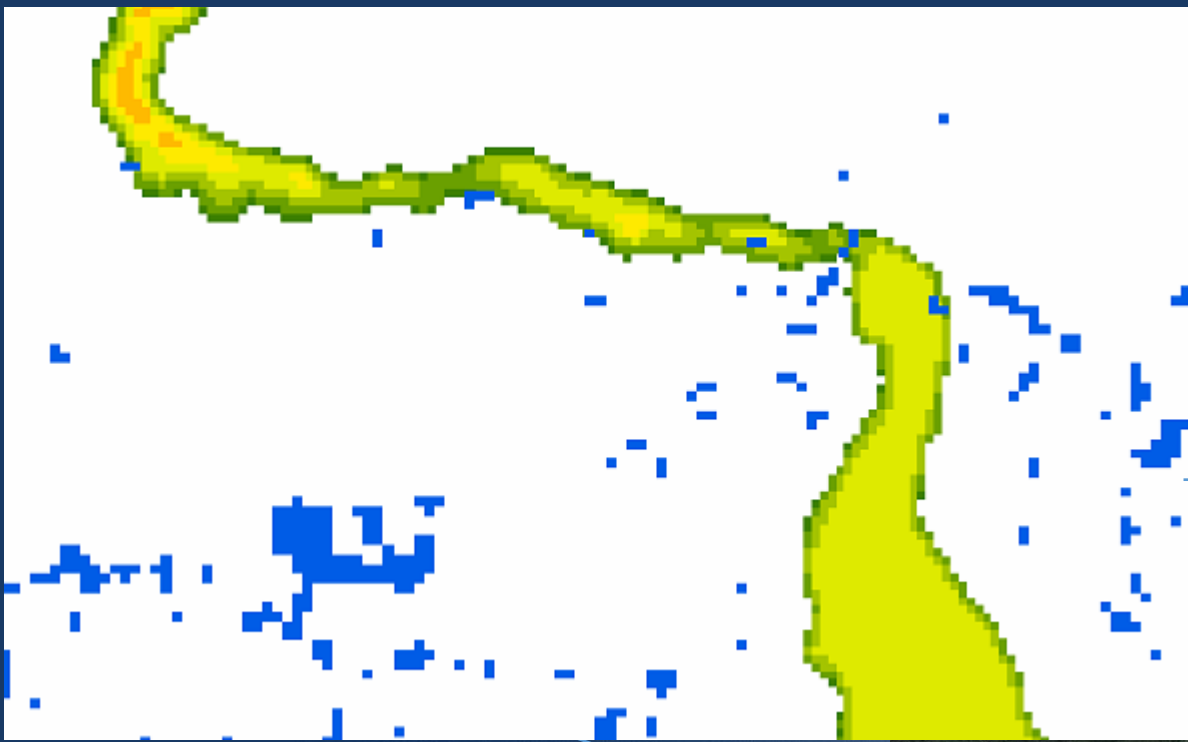


 Builtup layer (JRC)

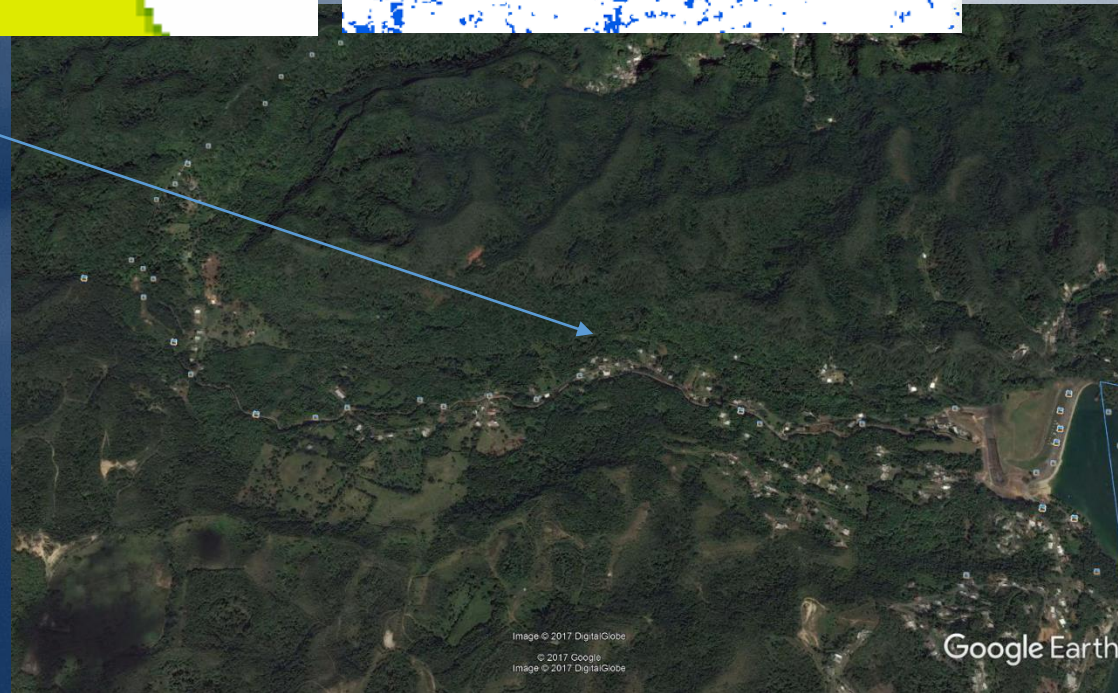
# Arrival time of wave



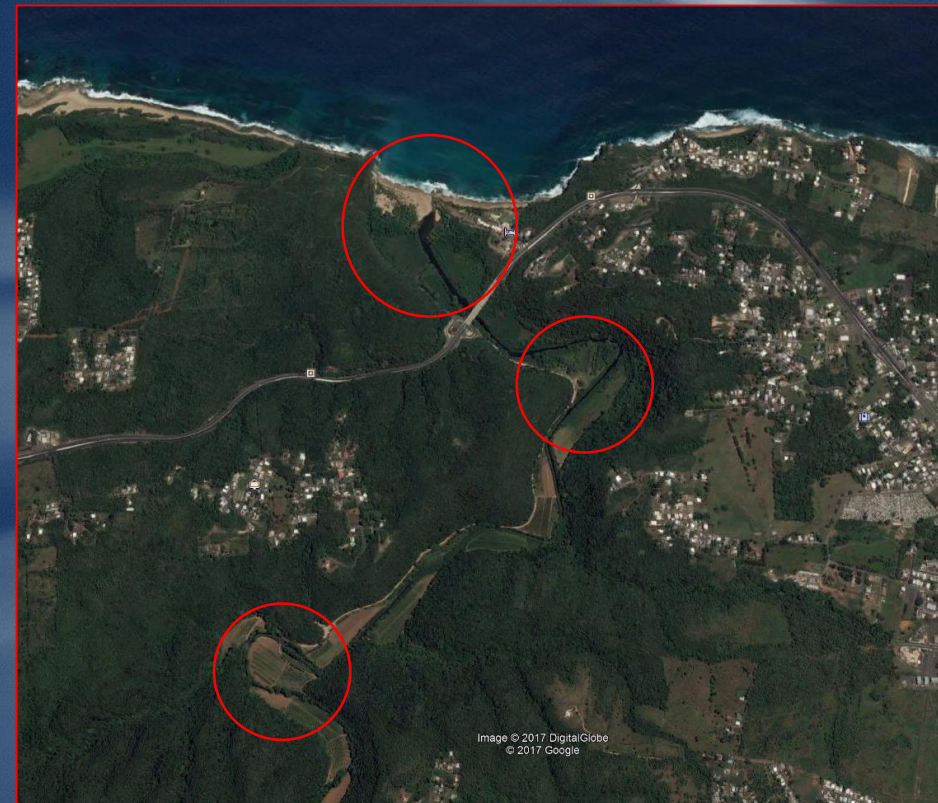
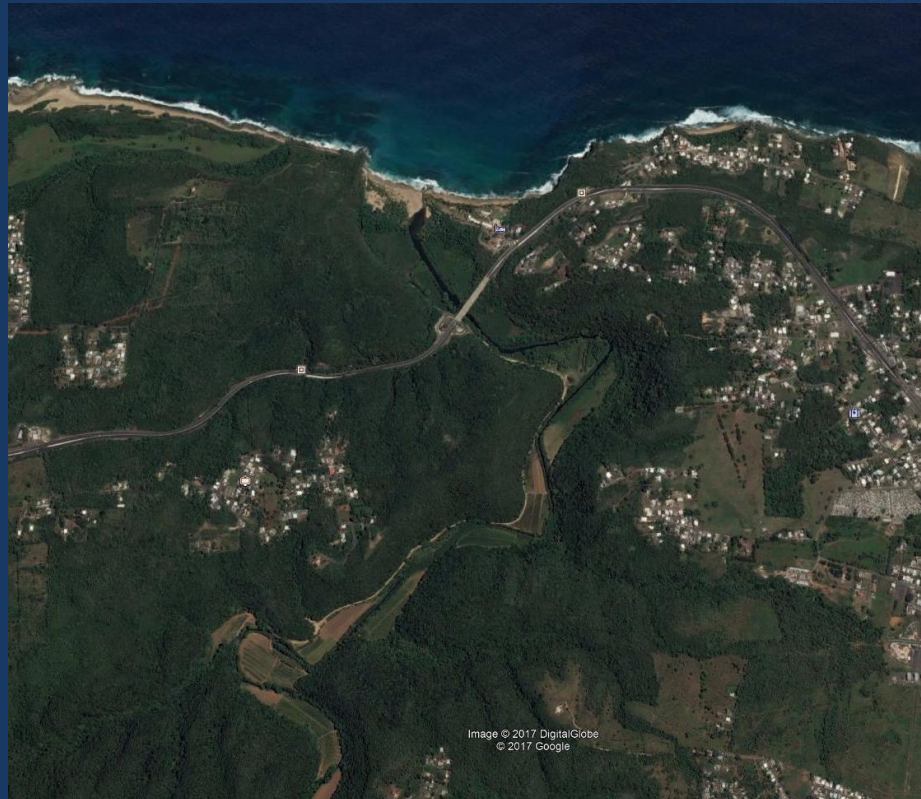




Sparse settlement at less than 1h







Locations most affected

## Conclusions

Within the limitations of the present analysis:

- Limited flooding due to steep river banks
- Time available more than 6 h to reach the low laying areas, but some areas with sparse settlements, at less than 1h from the dam
- Highest water depth about 25 m in the closer locations, less than 5 m in the low laying areas
- In some parts the inundation is about 200 -250 m
- Evacuation of population living 300 m from the river should be sufficient to prevent damage

It would be important to repeat the calculations with better resolution and more details on Volume and height (current is STRM 30 m)