



A GIS-Model to Identify Flood Affected Zones Using Landsat Images

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Outline

General Overview

Model Description

Results

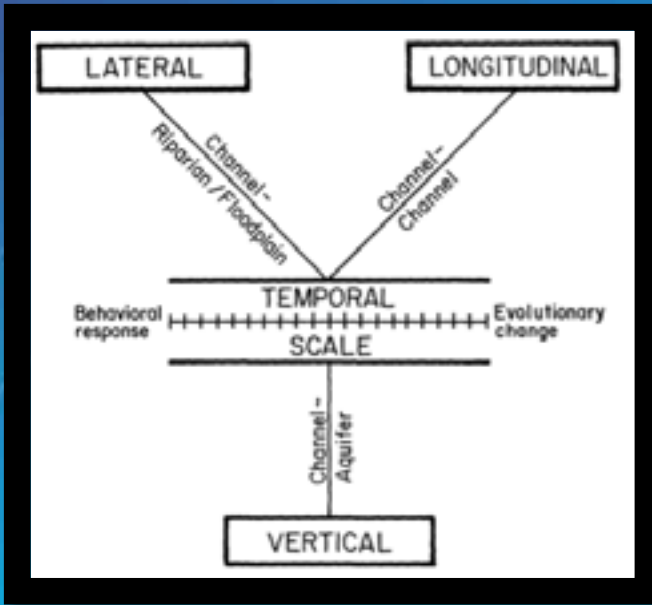
Advantages

Limitations

Other Applications

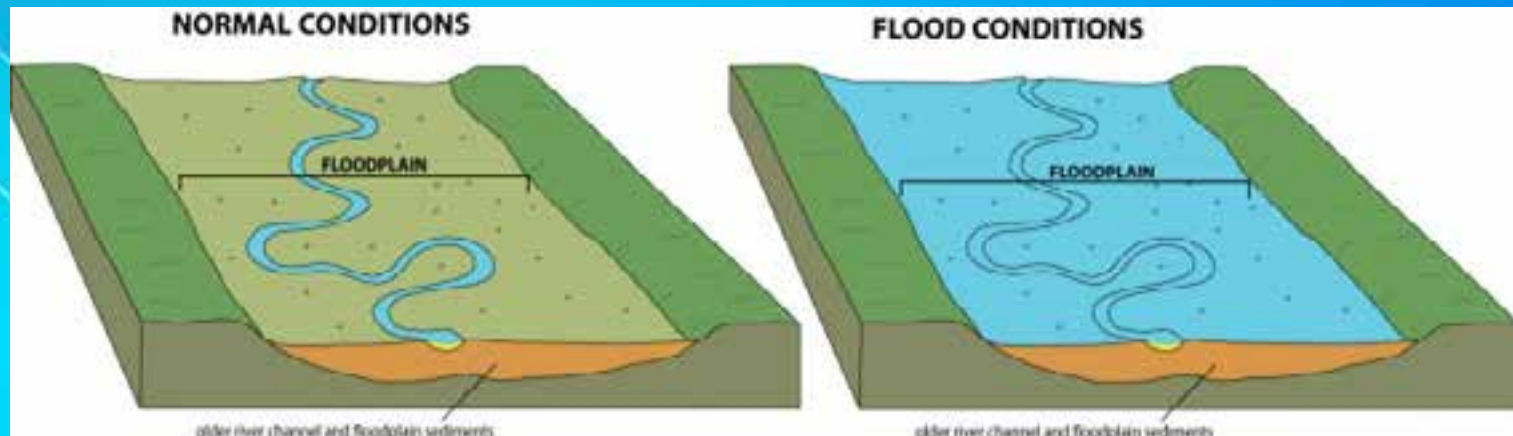
Your Questions

River Dynamics



Not considering flood history in rural and urban planning could cause serious problems.

Lateral + Temporal Dimension = FLOOD



GENERAL OVERVIEW



Colombia is one of the richest countries in terms of water resources.

- About 1,900 swamps and wetlands covering more than 7,800 km².
- Thousands of rivers drain into five basins:
 - Caribbean
 - Pacific
 - Orinoco
 - Amazonian
 - Catacumbo

Lack of knowledge of river dynamics and management.

- Less than 15% of river data has been published.
- Of this, less than 1% contains long-term data.

**What was the
motive to develop
a GIS model to
assess the flood
risk in Colombia?**

What was the motive to develop a GIS model to assess the flood risk in Colombia?

Colombia Lacks 4 Things:

Knowledge of Flood History

Good Urban Planning

High-Resolution Satellite Images

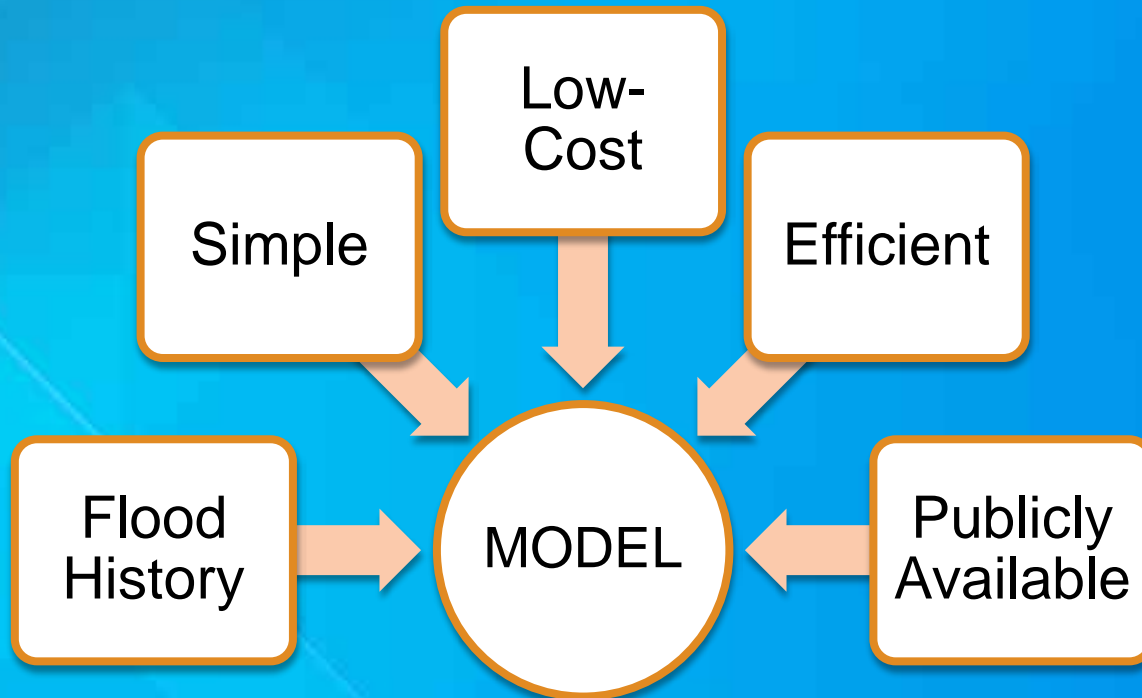
Public Data and Published Info



ArcGIS 10.1



**IT WAS NECESSARY
TO DEVELOP
A MODEL WITH 5
REQUIREMENTS:**



MODEL CHARACTERISTICS

Flood
History

- Flood Return Period.

Simple

- Real Past Flood Events.
 - Most of them related to “La Niña”.

Low-
Cost

- Multitemporal Data:
 - Satellite Images from LANDSAT 5 – 8.
 - Years 1984 to 2015.

Efficient

Publicly
Available

MODEL CHARACTERISTICS

Flood
History

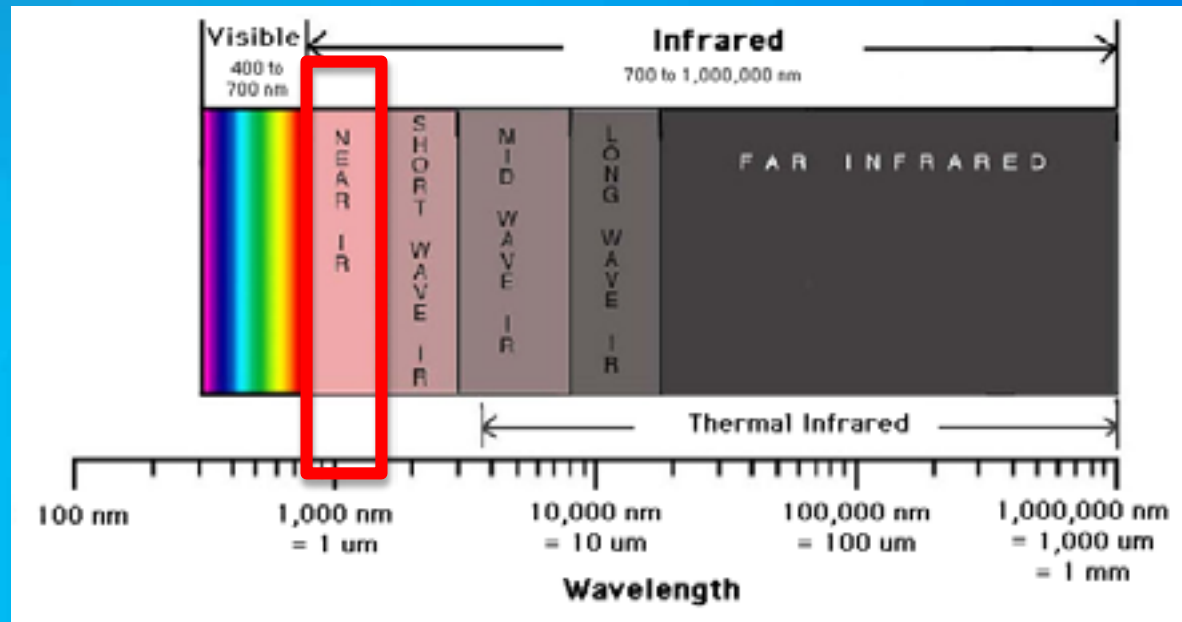
Simple

Low-
Cost

Efficient

Publicly
Available

- Only band 5 was used:
 - Near-Infrared (1.55 – 1.75)
 - Pixel Resolution 30m.



Band 5 has proven to be very useful in water bodies delimitation (Frazier & Page, 2000)

MODEL CHARACTERISTICS

Flood
History

Simple

Low-
Cost

Efficient

Publicly
Available

- Landsat Images from the USGS Repository.
- No Field Validation Necessary.

MODEL CHARACTERISTICS

Flood
History

Simple

Low-
Cost

Efficient

Publicly
Available

- Only Asks for Repository or Folder where the Images are Located.
- Doesn't need any Parameter Specification.
- Runs in less than 10 minutes
(Depending of the number of images)

MODEL CHARACTERISTICS

Flood
History

Simple

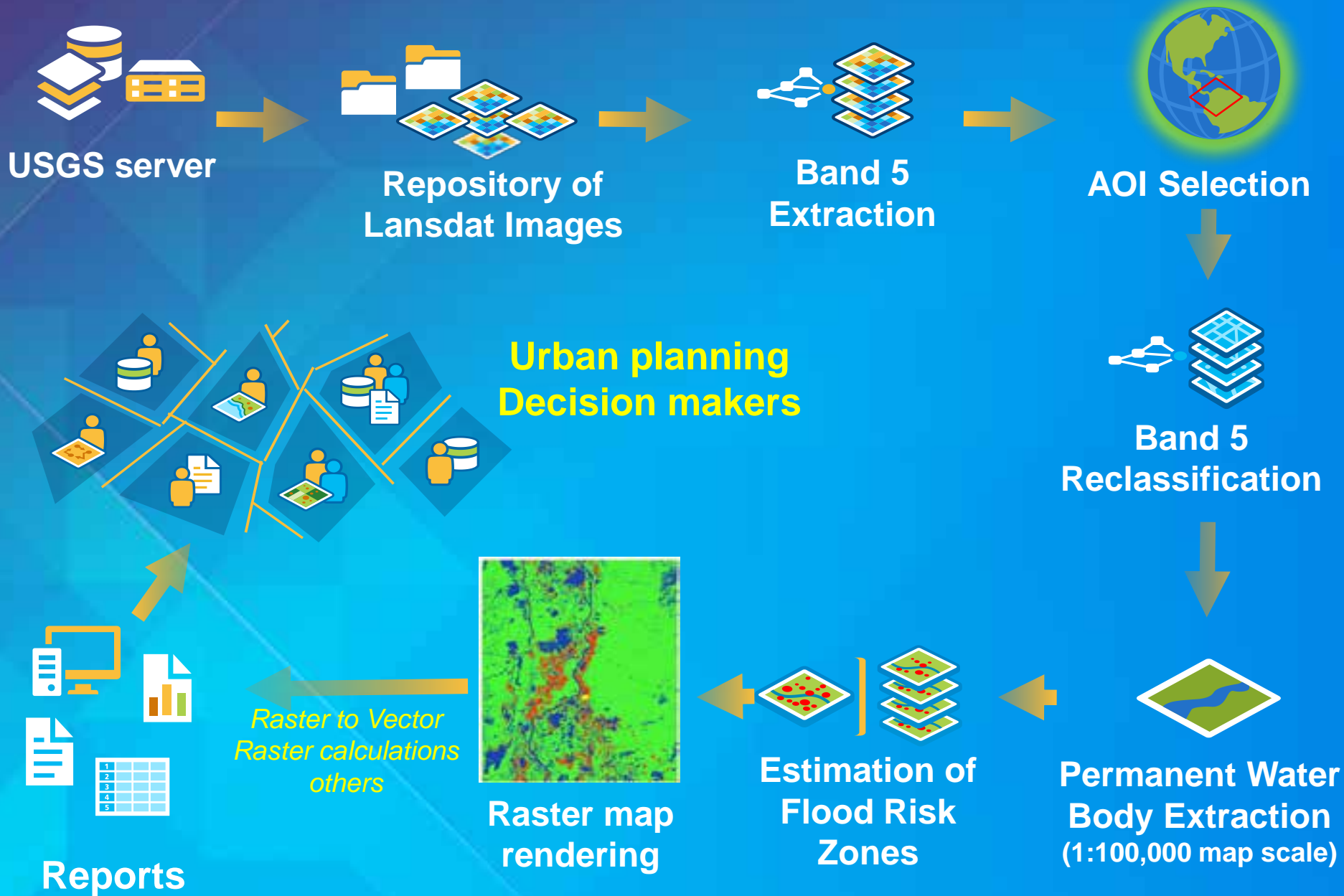
Low-
Cost

Efficient

Publicly
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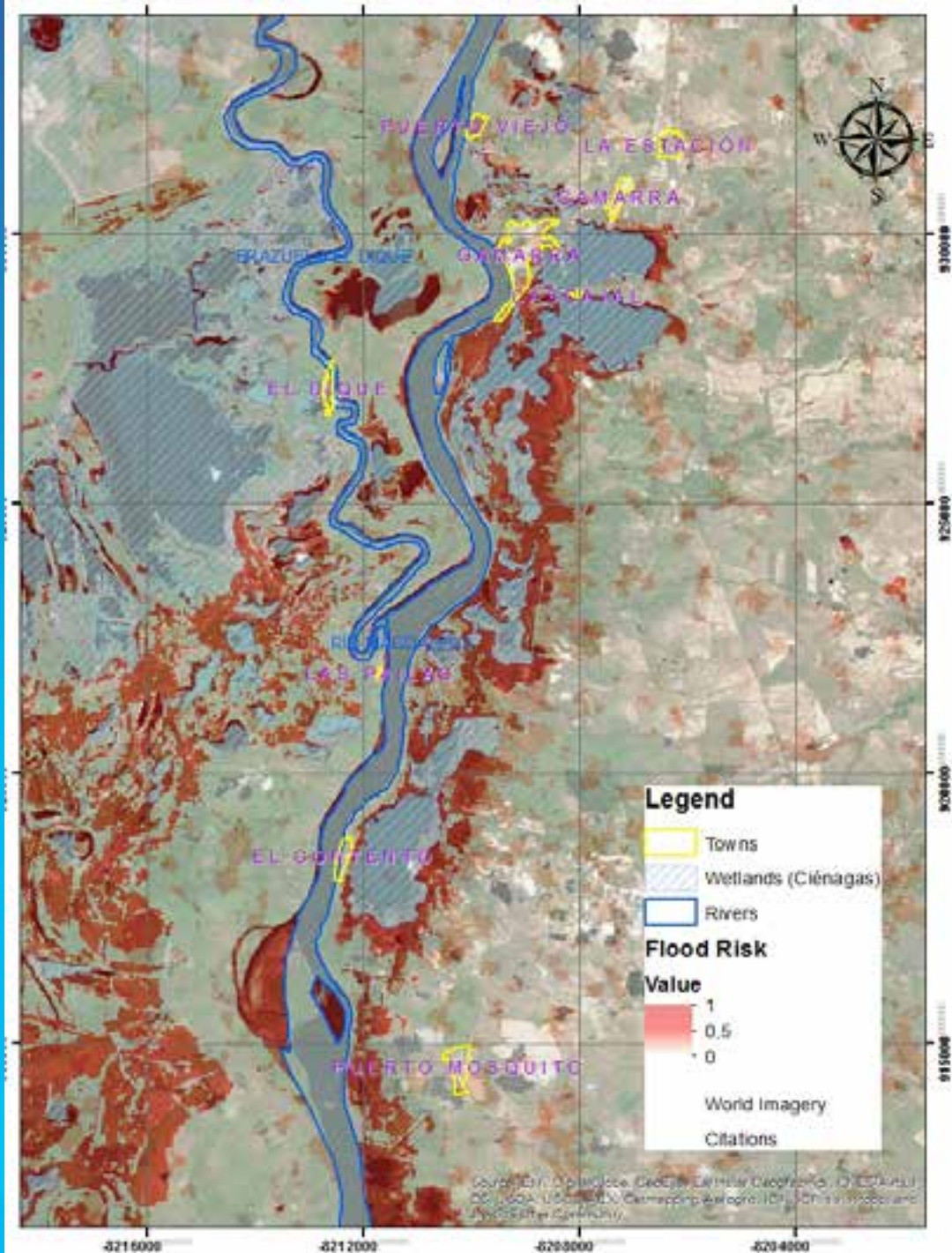
- After some adjustments, the model will be uploaded onto the Web.
- Every person with ArcGIS can download the model and use it.

A BRIEF SCHEME OF THE MODEL



RESULTS

Gamarra, César
Temporal Range
1990 - 2014

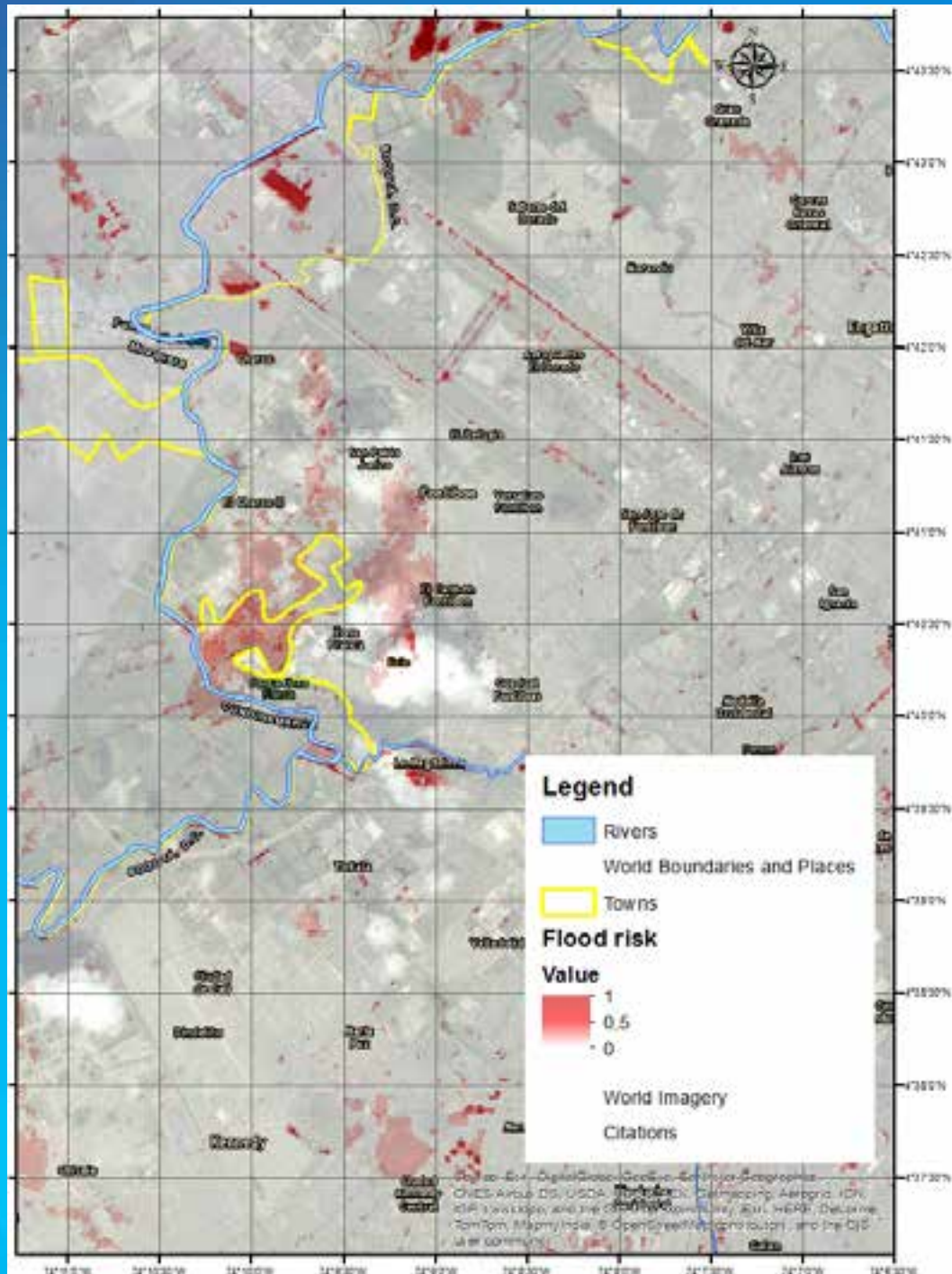


RESULTS

Fontibón, Bogotá D.C.

Temporal Range

2000 - 2014

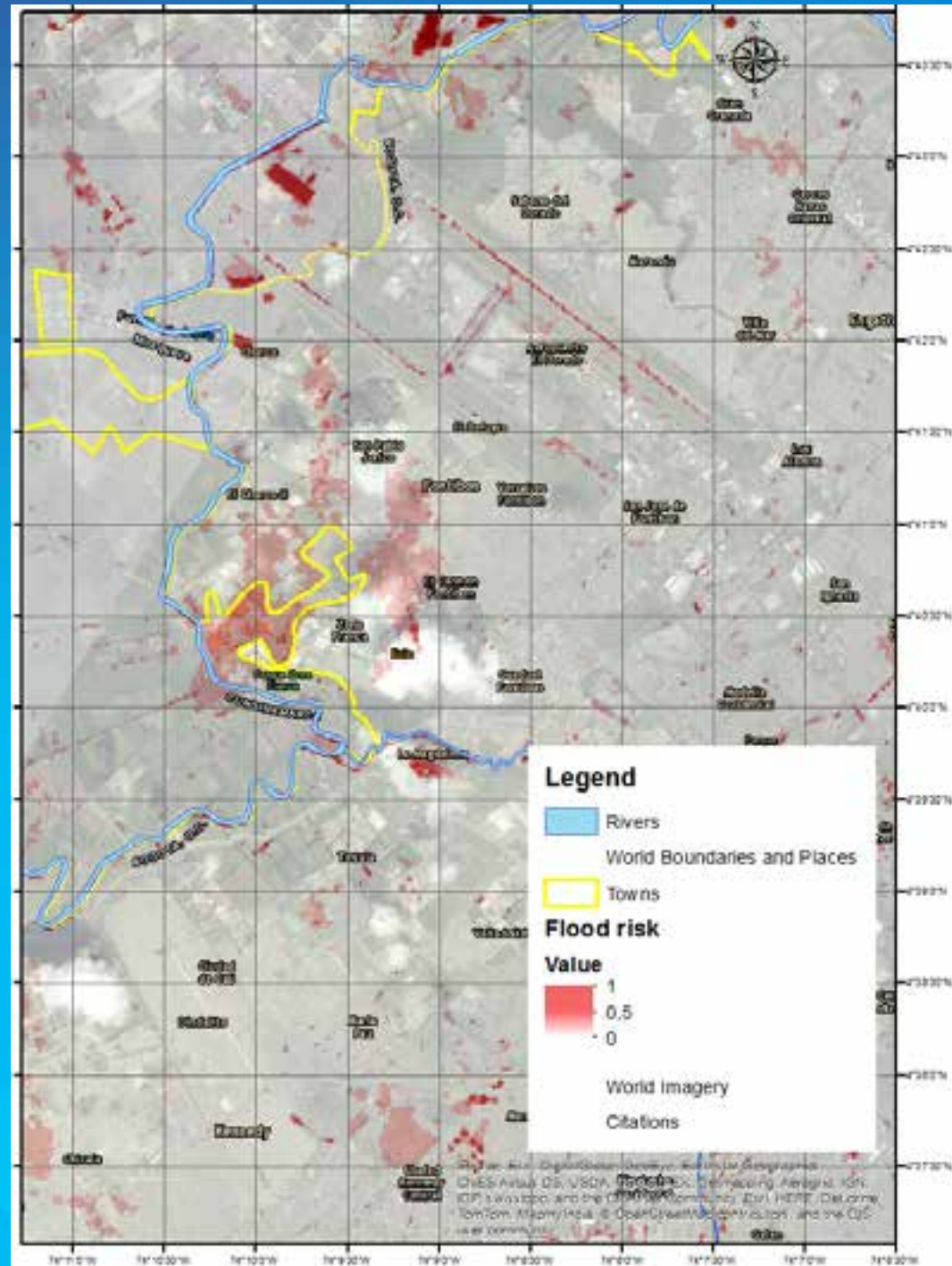


RESULTS

Cajicá, Cundinamarca

Temporal Range

2000 - 2014



Model Advantages

- Produces a simple, understandable map useful for urban planning.
- Gives data essential to understanding the flood dynamics of Colombian rivers.
- With some adjustments, the model can produce real-time flood risk data.
- Will work with Near-Infrared Images.

Model Limitations

- **Model Accuracy depends on the Number of Images.**
Only accurate in zones with many Images over a long period of time.
- **Low Image Resolution (30 m²).**
- **Damaged Landsat 7 Images.**
- **High cloud cover.**

Other Applications

- Can be used to identify Riverscape and Floodscape.
- Can help with River and Wetland Management.

The background features a vibrant blue gradient. On the left side, there are several overlapping geometric shapes: a purple triangle pointing up, a yellow triangle pointing down, and a purple triangle pointing left. These shapes are layered, creating a sense of depth. The word "THANKS!" is centered on the right side of the image in a bold, white, sans-serif font with a subtle drop shadow.

THANKS!