Urban Area Change Detection Report

Study Area: Mesthri Palya, Karnataka 560077
Total Area: 2.433 sq. km
Analysis Period:

Pre-Image: 01 Dec 2023 – 31 Jan 2024

Post-Image: 01 Dec 2024 – 31 Jan 2025

1. Introduction

This report presents urban area change detection for the region of **Mesthri Palya, Karnataka 560077**, using Sentinel-2 satellite data.
The analysis compares imagery from two time periods to evaluate physical surface changes over one year.

2. Satellite Data Overview

Sentinel-2 (Optical):

Cloud masked using SCL bands

Median composite used

Bands used: B2, B3, B4, B8, B11, B12

Sentinel-1 (SAR – VV Polarization):

GRD collection

Descending orbit

Lee filter applied to reduce speckle

dB → linear conversion → filtered → dB

3. Change Detection Workflow

Optical Change (NDBI Difference):-

NDBI = (SWIR – NIR) / (SWIR + NIR)

Change = NDBI_post – NDBI_pre

SAR Change (dB Difference):-

Change if |dB_post – dB_pre| > 2 dB

Fusion Approach (Final Change Map):-

Weights:

Optical: **0.6**

SAR: **0.4**

fused_conf = 0.6 * optical_conf + 0.4 * sar_conf

fused_mask = fused_conf > 0.6

4. Area Calculations

Using raster metadata:

Pixel size → **10m × 10m = 100 m²**

1 sq. km = 1,000,000 m²

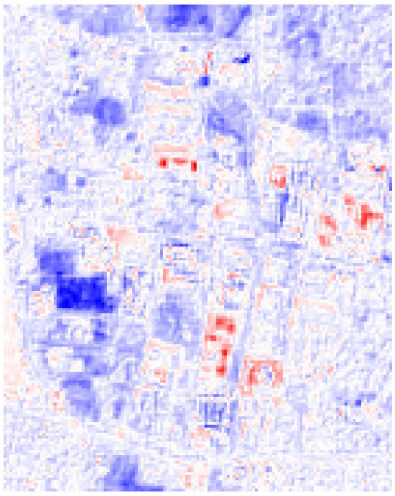
Metric	Value
Total Area Analyzed	2.433 sq. km
Detected Change Area	0.186 sq. km
Change (%)	7.65% of total area

5. Maps & Visualizations

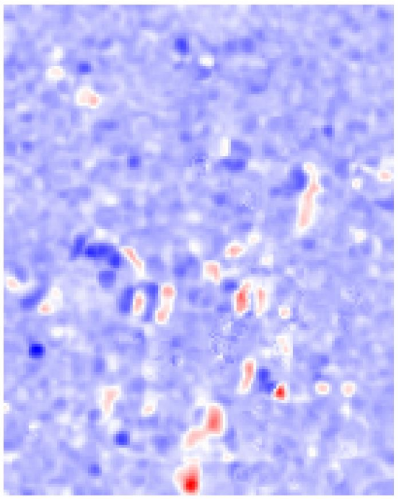
5.1 Pre-Event Sentinel-2 RGB

Post-Event Sentinel-2 RGB

NDBI Difference (pre & post)

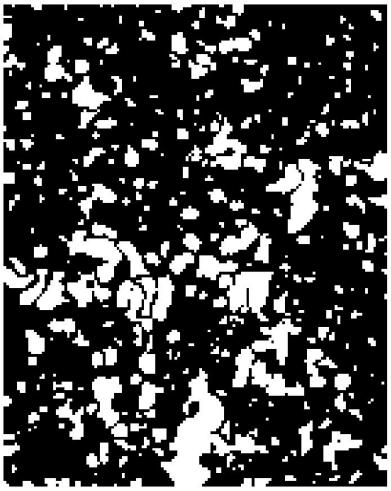


Semtinel-1 difference db

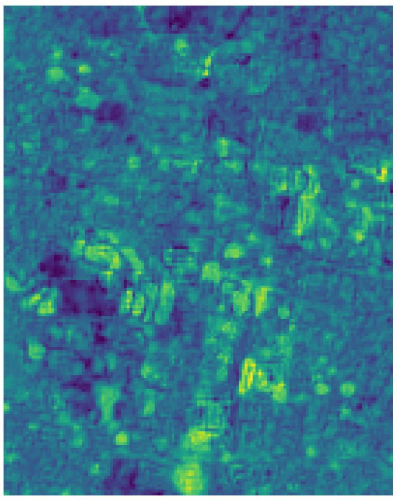


Optical change mask

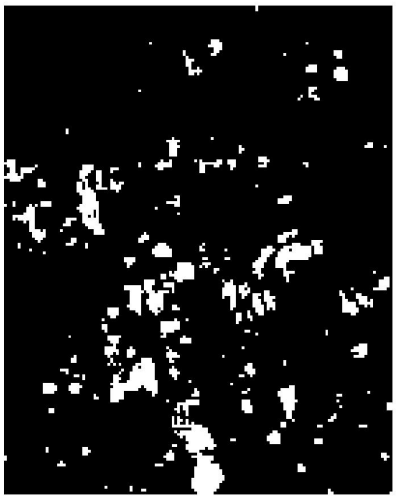
Semtinel-1 change mask



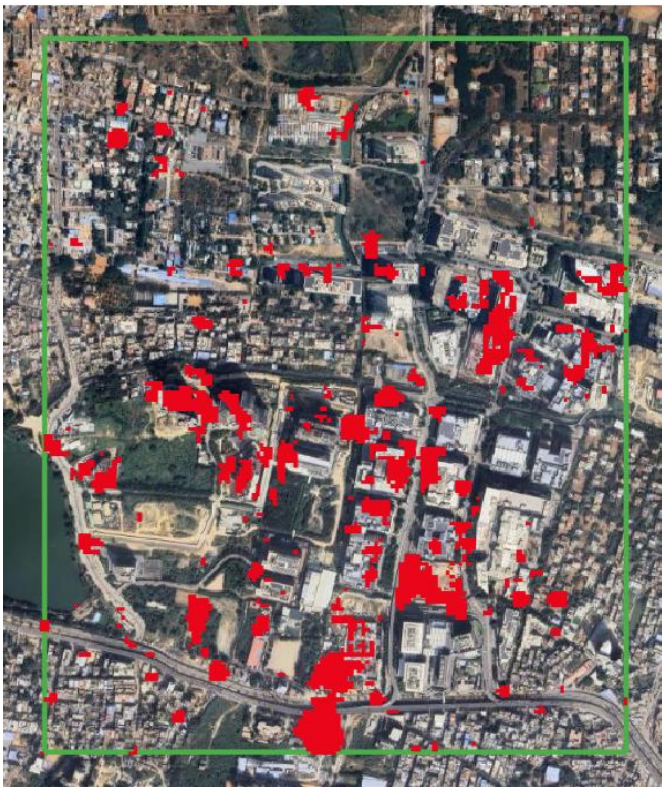
Fused Confidence Heatmap



Final Fused Change Map



Fused change mask overlay with base map



6. Interpretation

Change area (~0.186 sq km) likely consists of:

New built-up areas

Construction

Land conversion

- SAR confirms structural change
- Optical confirms reflectance change
- Fusion avoids false positives from clouds