



CVIc: A Web Platform for Automated Coastal Vulnerability Index-based Assessment

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The Urgent Need

Boost and advance scientific research on Coastal Hazards Risk

The Problem

Absence of Coastal Vulnerability Index (CVI) automation tools

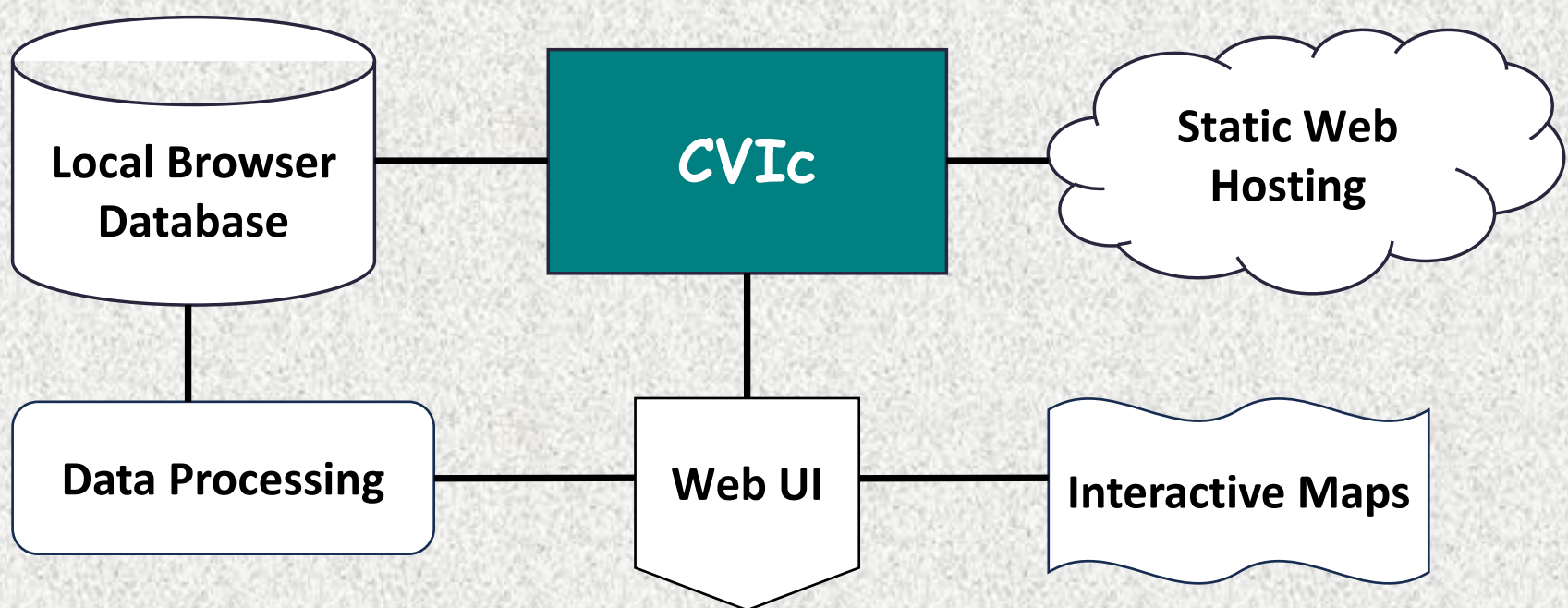
Our Solution

CVIc: A web app that streamlines the entire CVI assessment into a single user-friendly workflow.

CVI Assessments

A Coastal Vulnerability Index (CVI)-based Assessment is a quantitative or semi-quantitative method used to evaluate and map the relative susceptibility of a coastal area to harm from various hazards, particularly those associated with climate change like sea-level rise, storm surge, and erosion.

System Design



Technology Stack

Architecture	Serverless Single Page Application (SPA)
Framework	React 18 + TypeScript
Data Storage	IndexedDB + idb
Build Tool	Vite + SWC
Deployment	GitHub Pages
Geoprocessing	Turf.js
File processing	GeoTIFF.js + Shapefile.js
Mapping	Leaflet + React-Leaflet
Charts & Graphs	ReCharts + Chart.js

Application Workflow

- 1 Input Data
Upload Shapefile or digitize shoreline from GeoTIFF.
- 2 Define Resolution
Divide shoreline into equal-sized segments.
- 3 Select Index
Choose a standardized method (CVI or ICVI).
- 4 Assign Values
Assign vulnerability scores using map-based tools.
- 5 Calculate & Visualize
Compute index and instantly visualize results and charts.
- 6 Export Results
Download as GeoJSON or save HTML report.

1 Input Data

1. Upload Shoreline Data

Begin by uploading your shoreline data as a zipped Shapefile (.zip).

Drag & drop your zipped shapefile here
or click to browse files

Must be a .zip containing .shp, .shx, and .dbf files. Max 50MB.

Continue to Segmentation

2 Define Resolution

Segmentation Settings

Total Shoreline Length: 6.73 km

Segment Resolution/Length *

Enter resolution (e.g., 10) meters

Enter the desired length for each shoreline segment.

Estimated segments: 0

Preview Segmentation

3 Select Index

Select Coastal Vulnerability Index

Choose a standardized coastal vulnerability index:

CVI - Coastal Vulnerability Index (CVI)

CVI

Coastal Vulnerability Index (CVI)

Physical coastal vulnerability index developed by Thieler et al. (1999) using 6 physical parameters with geometric mean calculation.

- * Uses true geometric mean calculation: $CVI = \sqrt[n]{\prod V_i}$ where $n=6$ parameters.
- * All parameters have equal weights (1/6 each).
- * Focuses on physical vulnerability factors only.
- * Original methodology from Thieler & Hammar-Klose (1999).

Formula: **cvi-geometric** Parameters: **6**

Weights: **equal**

Parameter Categories:

2 × Physical 3 × Hydroclimate 1 × Shoreline

4 Assign Values

Parameter Assignment & CVI Calculation

Select All Clear Selection Use drawing tools (polygon/rectangle) on map to select segments by area.

Map

Parameter Values

673 selected

Select Parameter

Geomorphology

Select Value for Geomorphology

Select a value...

Vulnerability Preview

Value: - Vulnerability: 1

Select a Value First

673 segments selected

5 Calculate & Visualize

Coastal Vulnerability Index Results

Index Used: Coastal Vulnerability Index (CVI)

cvi-geometric 6 parameters equal weights

Vulnerability Map

Shoreline segments colored by calculated CVI score. Click segments for details.

Summary Statistics

Calculated for 673 of 673 segments.

MIN CVI	1.26	AVG CVI	3.25	MAX CVI	5.00
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SEGMENT COUNTS BY CATEGORY

Very Low	177
Low	67
Moderate	111
High	94
Very High	224

6 Export Results

Actions

Back to Parameter Assignment

GeoJSON HTML Report

Start New Vulnerability Analysis

CVI Category Distribution

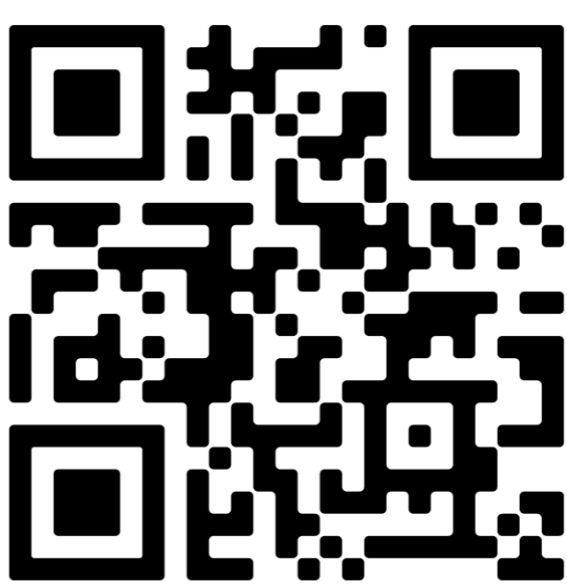
Vulnerability Profile Along Shoreline

Application Requirements

Access	Online Website	ES2020 Browser Support (Chrome 80+, Firefox 72+, Safari 13.1+)
Input Data	Zipped Shapefiles	LineString or MultiLineString geometries of the shoreline
	GeoTIFF Imagery	Image covering the Area of Interest. For manual shoreline digitization
Expertise	User Knowledge	Understanding of the study area coastal vulnerability
	Data Access	Geological, oceanographic, socioeconomic data, etc.

Scan to view

Live Website



Source Code



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