Geospatial Analyst

Andrew Garcia
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➔ **Objectives/Bio**
➔ **Credentials**
➔ **Competencies & Skills**
➔ **Summary**

Purpose:

To utilize GIS technologies and tools to solve complex sustainable system problems.

To leverage the full range of GIS capabilities such as analyze social, economic,

and environmental factors involved and to model sustainable solutions at all scales.

What does that mean?

In short - spatial analysis studies and solves (geo)locations problems using math in maps by blending geography with modern technology to measure, quantify, and understand the world or even a small fragment of the world we know as environmental and urban planning; i.e Sustainable Development.

What can I do for you?

By using GIS (Geographic Information Systems) to spatially analyze, I can quantify, find patterns, and predict outcomes. I then interpret the data to help you make informed decisions in the form of a full comprehensive report. My work consists of a repertoire of cartography created with real world spatial data including some of my favorites such as: 3D spatial renderings, data visualizations, surface prediction, space-time cubes, hexagonal binning, point-density, and various cartograms.

The following contents illustrates my experience in road network transportation, municipal solid waste; & case studies that demonstrate a sustainable planning framework.

*****Due to specifications for this application my personal website, video presentations, full comprehensive reports, and recorded live demos have been redacted or truncated to fit this formatt*

Professional Work Experience

GIS Analyst
2018 - present

- Navigation & street cam ground surveying
- Regression analysis - Realize geographic model deficiencies in global road network transportation system
- Drove data quality mapping improvement with less than 2% error

- Contributed over 250k map changes in first 12 months to the Open Street Map community and client ready ingestion
- Created and lead mentoring program - Training and development for 30 new employees to energize team and facilitate greater employee engagement, nurture, and develop skills and talent

Municipal Solid Waste Consultant
2014 - 1017

- Set operational sustainability goals for clients such as Amazon & Microsoft to meet and exceed city of Seattle and King county regulations by conducting comprehensive waste assessment evaluations
- Spokesperson for Republic Services at sponsorship events, trade shows, Chamber of Commerce, City of Seattle, and King County monthly meetings

- Exceeded company annual sustainability goals and revenue goals by over 150% in 2015 and 2016
- Nominated and selected as the highest performer of entire company nationwide for landfill by-product diversion-zero waste initiatives

Sustainability Coordinator
2010 - 2013

- Developed and implemented business continuity plans i.e. carbon reduction, energy efficiency, solid waste impact, and cost-benefit analysis
- Expert on zero-waste innovative solutions for 1000+ employees and community members

- Developed and managed environmental educational awareness outreach programs and created PayPal/Ebay's first Green Team in AZ
- Outstanding Achievement Award from both Director and VP of PayPal for developing and leading "The Power of Introversion, Creativity, and Education", for over 450 employees

Sustainability Liaison
2008 - 2010

- Led company-wide process driving environmental stewardship via waste reduction and water conservation while achieving cost benefits
- Sustainability and environmental awareness events coordinator for local region call centers (2000+ employees)

- Author and gatekeeper of sustainability articles, tips, guidelines, and best practices for State Farm Employee Education and Green Space Blog

Education and Skills

Master of Science | Geographic Information System for Sustainable Management
University of Washington - Department of Geography

Frame a sustainable systems problem; plan and approach geodesign workflow; geodatabase development; complex system interrelationship analysis; and report/propose spatial-temporal systems recommendations.

Context includes but not limited to data management, map visualization, geospatial analysis, Python programming, and GIS Workshop including; geospatial descriptive and inferential spatial statistics-pattern analysis and spatial auto correlations; global and local spatial measures; regression analysis; and geographically weighted regression.

Bachelor of Arts | Sustainability
Arizona State University - Global Institute of Sustainability

Concepts and methods to developing sustainable institutions for water, land, air, and urban management at the local to global level.

Study Abroad | Chinese Linguistics
Sichuan University, Chengdu

Chinese language and Chinese Cultural Studies - International exchange student
中文和中国文化学国际留学生

Geospatial Analytics

From left to right: ArcGIS/ArcPy, Python, JOSM/OSM, QGIS, Tableau, R Studio

Software

From left to right: ArcGIS Pro (2D & 3D), Story Map, ArcMaps Online, CityEngine, Web App Builder, G Suite, MacOS, Microsoft Office Suite
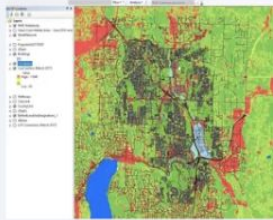
Case Studies

Sea level Rise | Everett, WA

Sea level rise prediction to determine area landcover in Everett, WA that would be impacted by 1 meter (SLR), 5 meter (SLR) & 10 meter storm surge and how that would impact structures, transportation network, and wetlands.

## GSI (Green Stormwater Infrastructure) City of Bothell, WA

This study intersects the City of Bothell map of Intact Habitats Cores and highly developed zones with layers of water flow, hazard areas, and other types of land use. It considers complex sustainable system interactions amongst surface water, natural habitats, and flood management issues.

My Open Street Map Contribution

Dot density (Heat Map) visualizing my **contribution** to the Open Street Map community for large scale client satisfaction including turn by turn navigation in select countries.

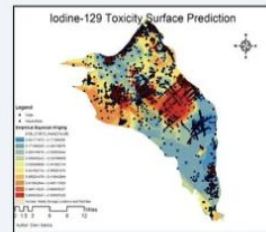## Viewshed Analysis | City of North Bend
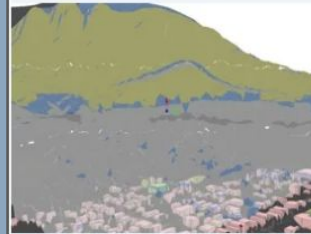
Explore data in 3D - simulate different viewpoints and gain insight to visibility conditions by identifying suitable locations to assess the visual impact of potential new buildings on the wider cityscape; investigate sight lines between buildings from the city to mountain views.

Priorities for Topo-bathymetric Lidar Data Collection | Alaska

Determine the top priority areas for topo-bathymetric data collection (hexagonal binning) given the background of scarce modern topo-bathy data and limited funding available for data collection.

Surface Map Prediction Hanford Nuclear Site

Custom script tool aims to demonstrate impacted study areas from nuclear waste to visualize hazardous waste permeation & provide knowledgeable visual information regarding past, present, and future costs to the environment, economy, and human wellness.
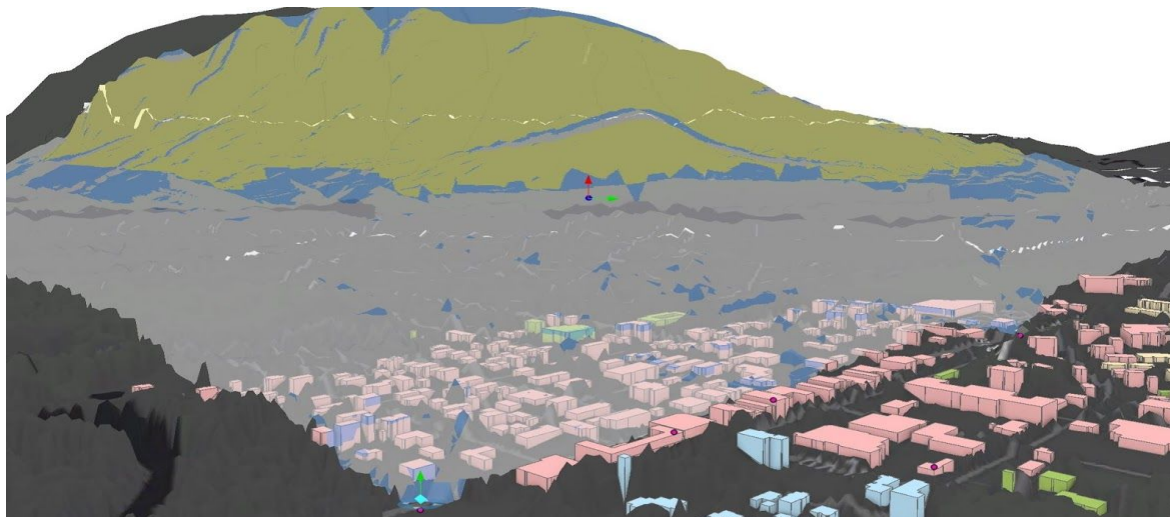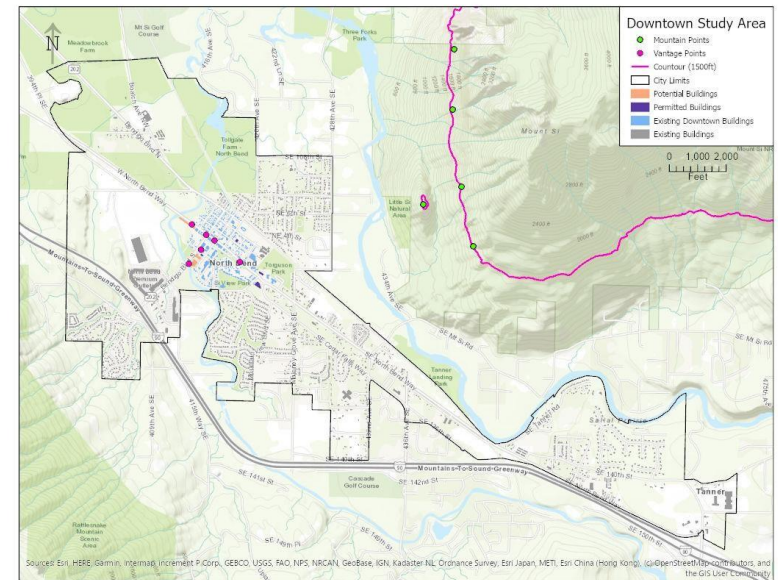
Viewshed Analysis - City of North Bend, WA

Problem Statement: How can North Bend increase density in its downtown while limiting the obstruction of mountain views?

Abstract

Explore data in 3D - simulate different viewpoints and gain insight to visibility conditions by identifying suitable locations to assess the visual impact of potential new buildings on the wider cityscape; investigate sight line between buildings, and from city to mountain views.

The analysis includes three downtown vantage points and four mountain points. The mountain points are situated on the 1500 ft contour (approximately the elevation of Little Si). This analysis considered two scenarios: existing buildings at their current heights and existing buildings at the maximum zoned height (35 ft). For each scenario three 3D scenes were examined: existing buildings only, and then adding the potential buildings, modeled with generic footprints at heights of 35 ft and again at 50 ft.

Overview of North Bend Study Area

The figure visualizes the process and outputs for the analysis in three dimensions based on extruded building heights derived from lidar data.

Exploratory viewshed analysis using the four vantage points along North Bend Way. Grey area cannot be seen from any vantage point, blue can be seen from one vantage point, while green can be seen from multiple vantage points.

Visibility analysis from the mountain points into downtown. Lidar Highest Hit Surface Elevation (left) & Esri 3D Ground Terrain (right) illustrates the visibility (teal) and obstruction (grey) from mountain point locations towards downtown vantage point locations.
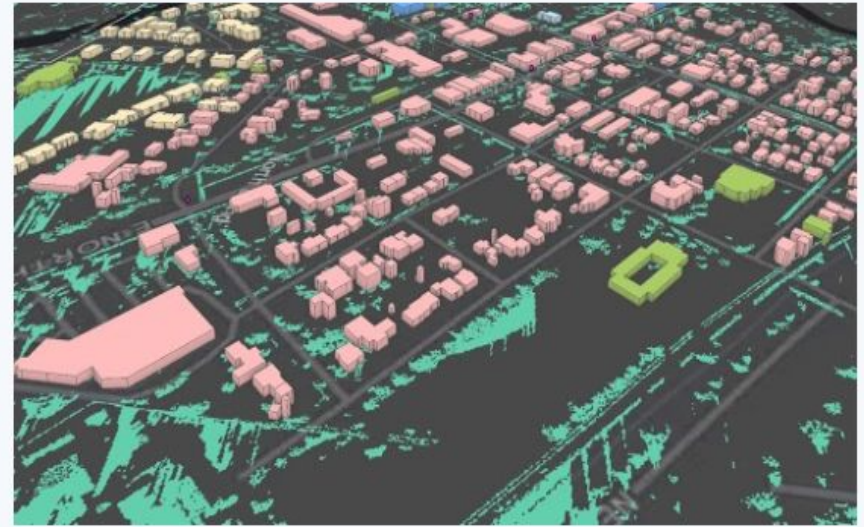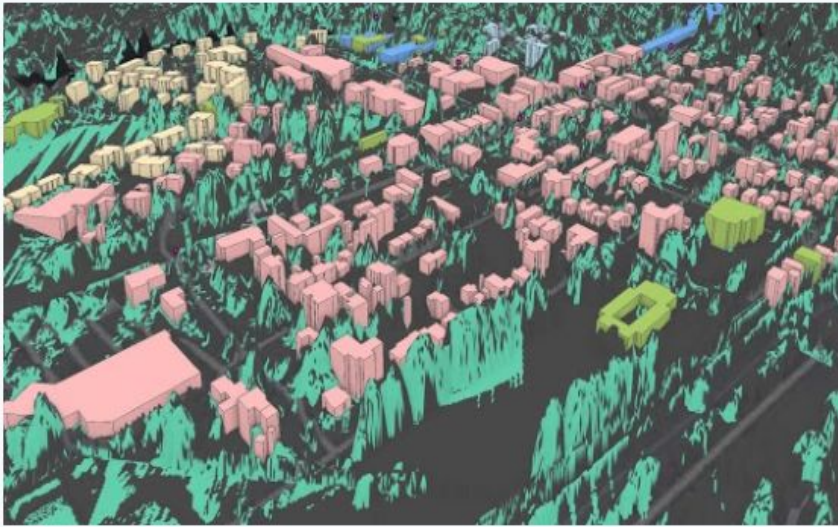
Lidar- Highest Hit Surface Elevation

ESRI - 3D Ground

Line of Site visibility Analysis from visitor center vantage point to 1500 ft contour line. Observation distance in meters with a vertical offset of 2 meters. The image on the left Illustrates line of site visibility from the visitor center with existing structures; no obstruction. The image on the right illustrates existing structures with max zone heights; ¾ partial obstruction of Mt Si.

Exhibit D2:

Newly proposed construction

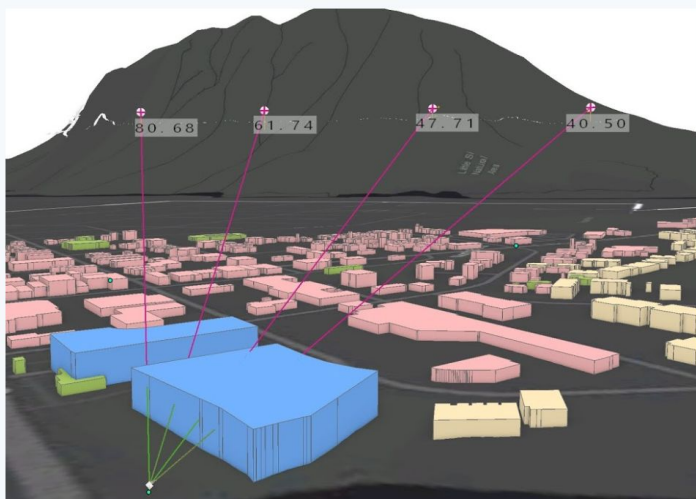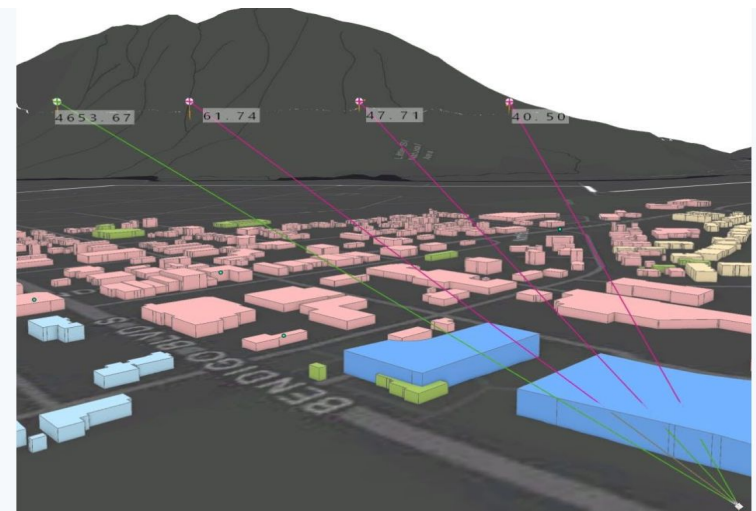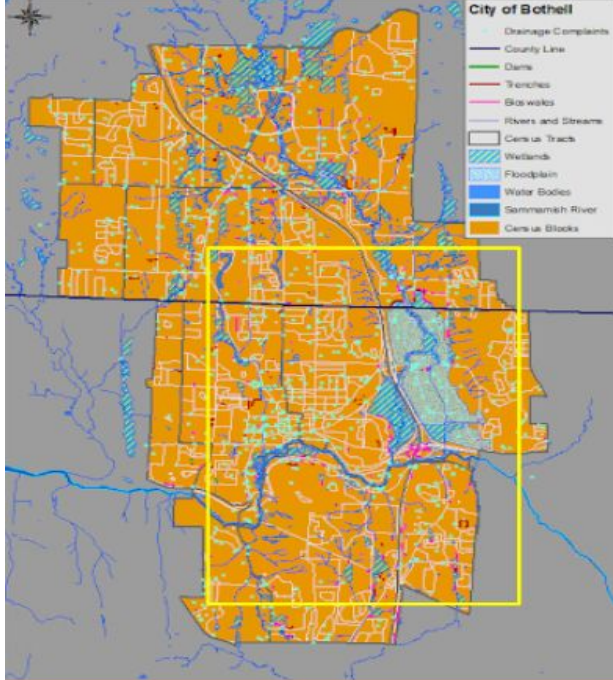- 50 ft potential zone height
- Fully Obstructed

80.68 61.74 47.71 40.50

Exhibit D1:
Riverfront Park

Newly Proposed Construction

- 35 ft standard zoning
- 3/4 partial obstruction

4653.67 61.74 47.71 40.50

Demographics and HydroNetwork Feature Datasets

Problem Statement: Manage stormwater runoff and pollutants by implementing a GSI plan for the City of Bothell.

Abstract

The information gathered intersects the City of Bothell map of Intact Habitat Cores and highly developed zones with layers of water flow, hazard areas, and other types of land use. It considers complex sustainable system interactions amongst surface water, natural habitats, and flood management issues.

The purpose of this project is to create a geodatabase to use for future geodesign work to locate and identify geo-spaces within the Bothell Municipality that should be protected, restored, or designed to avoid hazards, protect water quality, and connect people with nature. Additionally, connecting urban areas with the surrounding landscapes to promote and implement green stormwater infrastructure that fosters ecological, economic, and social benefits that help maintain an area's natural form with little to zero regressive impact and disturbances. The results produced illustrate the connectivity between humans and nature by generating a set of information products that shape the contents of the archydro framework data model. The data model is organized around hydrographic features, drainage features, network elements, and land use features to create thematic layers that follow a logical design.

Green infrastructure provides city/county planners, ecologist, decision makers, and also citizens of Bothell benefits addressing crucial aspects of the triple bottom line in sustainable development. Environment, which enhances biodiversity and natural systems; flooding mitigation, combat carbon emissions and climate change. Economic aspects including boosting property values both urban and rural, energy efficiency/cost, and sustained increase in local jobs. Furthermore, social equity by establishing and creating a sense of community that connects people with nature, clean natural resources such as water and air, and overall improved vitality of life within the geographical region.

WA Green Info Cost Surface Dataset

This data represents a cost surface for use in connectivity modeling. It reflects the relative ease of movement for terrestrial species taking into account several factors including: NLCD landcover classes, slope, proximity to water, and habitat core score. Generally speaking, natural land cover classes and areas proximal to water are parametrized to exhibit lower costs to species movement while developed areas and areas proximal to built infrastructure are parameterized to exhibit higher costs to species movement. These layers help visualize the higher impacted spaces within the city where GSI could be implemented e.g rooftop gardens, living walls, urban farming etc.

Landscape variables were categorized into three themed classes based on their expected influence on the cost surface. The first class, impedance, represents the expected cost of species movement as it relates to land cover. The second class, bonuses, represents reductions in cost resulting from being within an existing core, fragment or proximal to surface water; these conditions are assumed to enhance movement. The third class, penalties, represents increases in cost resulting from steeply sloping terrain and road infrastructure; these conditions are assumed to discourage movement
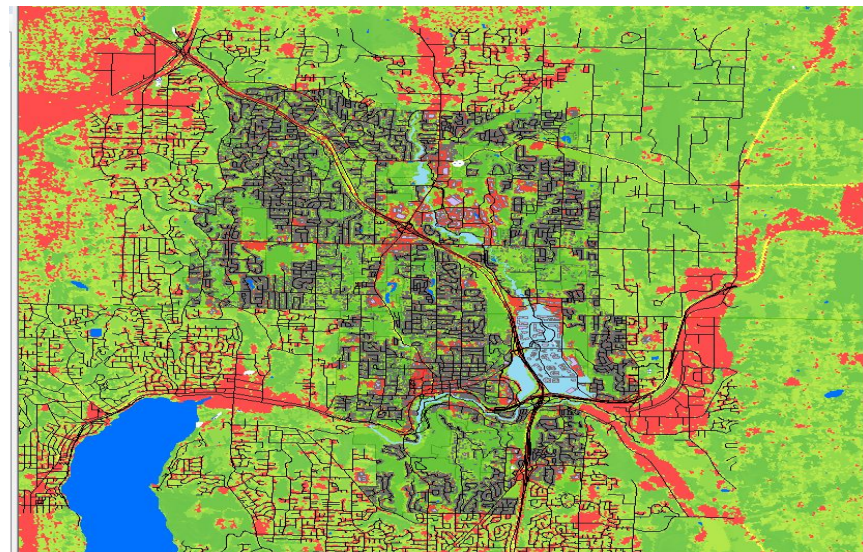
Everette, WA | Sea Level Rise Vulnerability

Problem Statement: *Sea level rise prediction to determine area landcover in Everett, WA that would be impacted by 1 meter (SLR), 5 meter (SLR) & 10 meter storm surge and how that would impact structures, transportation network, and wetlands.*
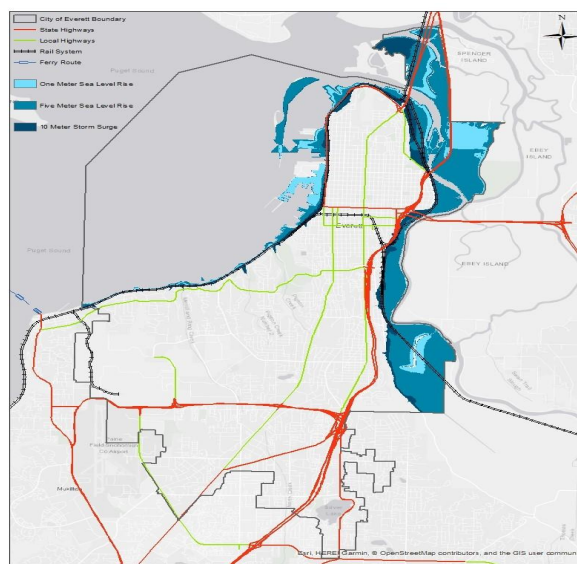
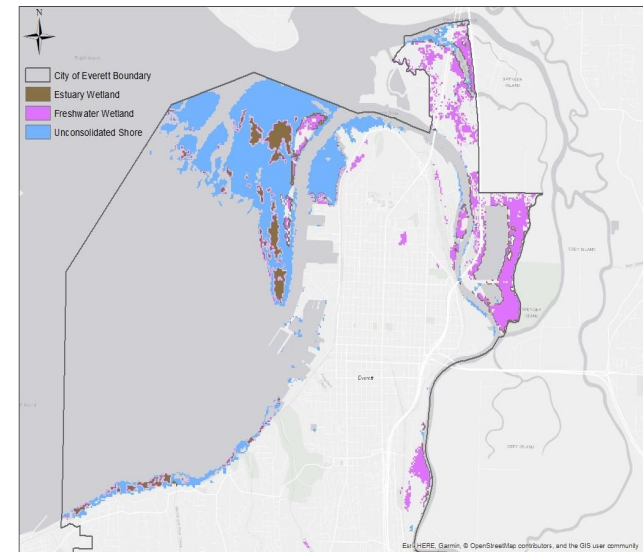| Description	Cell Count	Square Kilometers	Percent of Total Land
Water	416600	374.94	N/A
Above Water	730488	657.4392	80%
Best Case (1m)	31447	28.3023	4.30%
Worst Case (5m)	173499	156.1491	23.75%
Storm Surge (10m)	178417	160.5753	24.42%
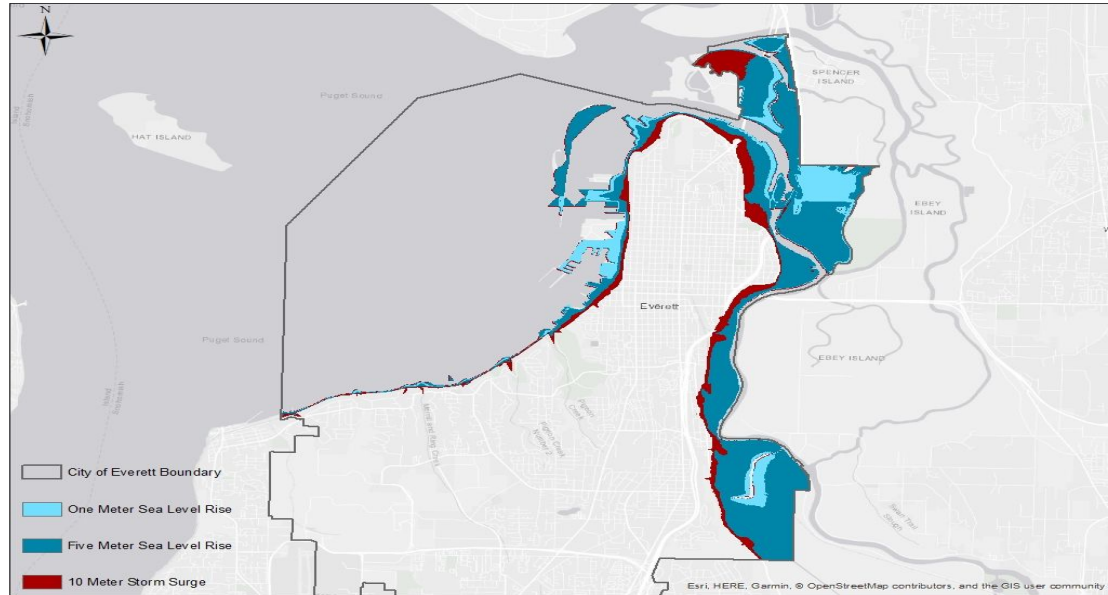
Structures
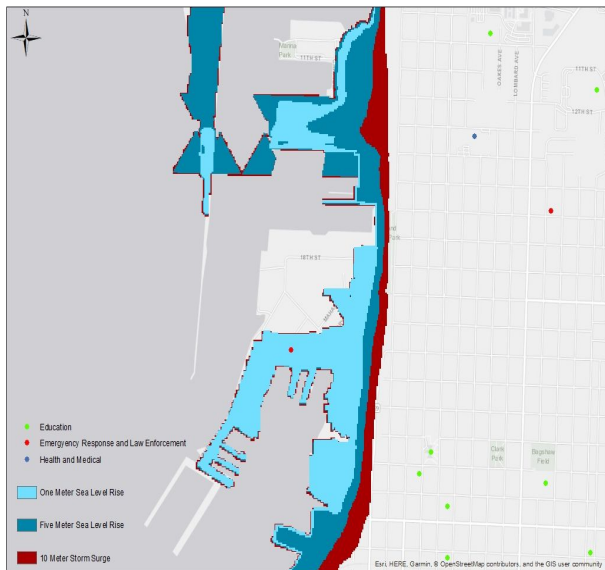
Transportation Network

Wetlands

Summary

My curious mind and spirit have taken me from growing up in Wyoming to living abroad in China and learning the local language and culture. These experiences have expanded my perspective in both personal development and in terms of society-infrastructural development. I've had the privilege of working with government entities, large corporations, and the public community to showcase my comprehensive analysis of environmental and urban development/planning. My intention is to implement a strategy to build a better world and to enhance the overall vitality of humans and nature.

I am confident my combined experiences over the last decade leading teams, mentoring, and taking highly concentrated comprehensive studies in the temporal-spatial realm would complement and supplement your team.

Thank you,

Andrew Garcia
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