Mapping spatial patterns in vulnerability to climate change-related health hazards

April 2, 2019
Jessica Yu, PhD Candidate

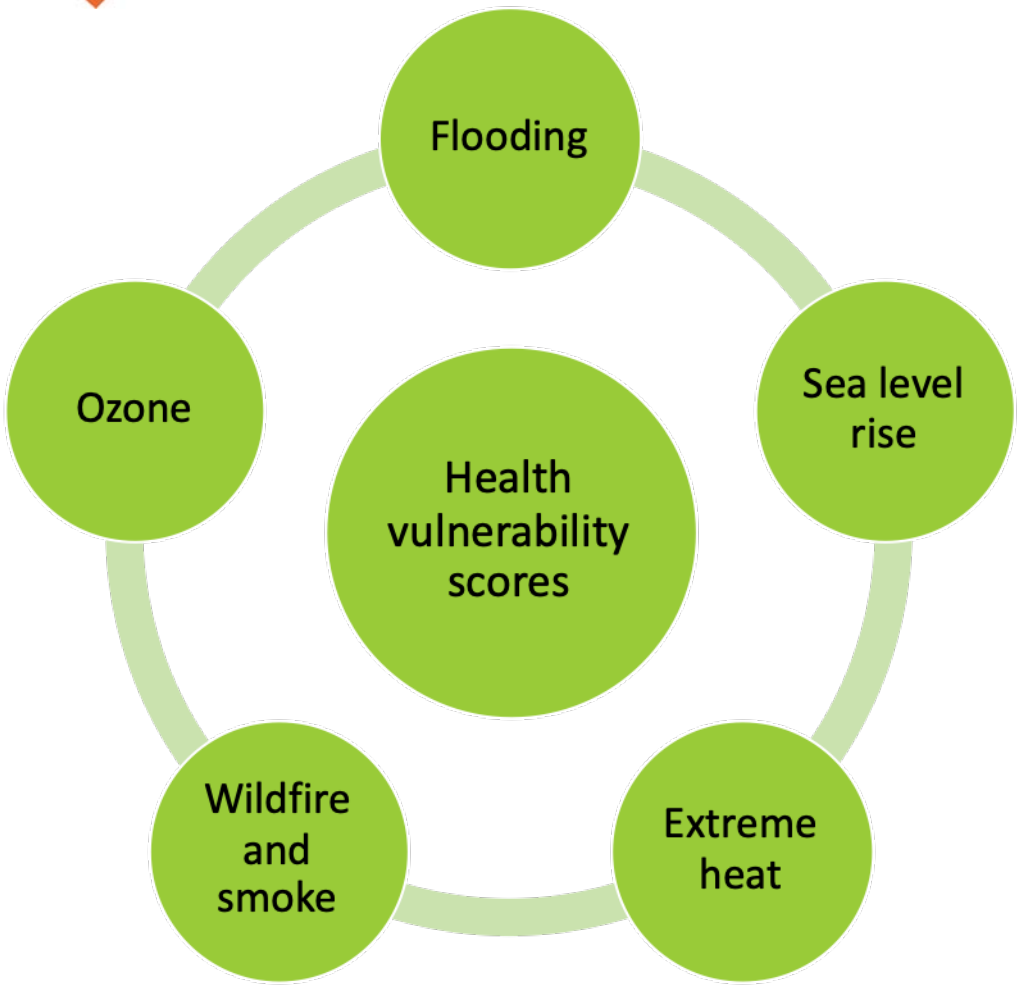
”BC currently has the worst air quality in North America”– August 2018

"Audit says B.C. does not have a clear plan moving forward for reducing emissions or preventing climate change-related risks" – February 2018

“British Columbia has not completed a comprehensive risk assessment” – **Auditor General**

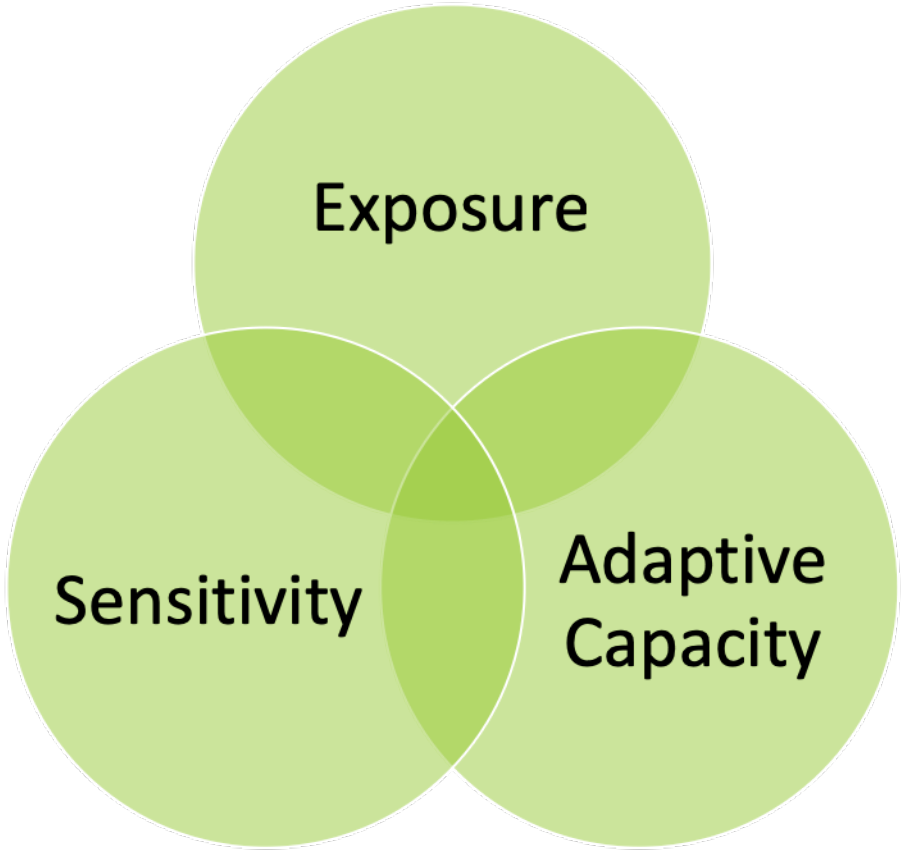
Climate Vulnerability Assessment Project Objectives:

1. Identify climate change-related risk factors at the local community level
   -> Address health equity
2. Create health vulnerability index scores to map these risk factors
   -> Create a tool for KT



Vulnerability assessment

Vulnerability is a function of interactions between climate-related **EXPOSURES** and physiological **SENSITIVITIES**, and the **ADAPTIVE CAPACITIES** of individuals or populations to adjust to changing circumstances.

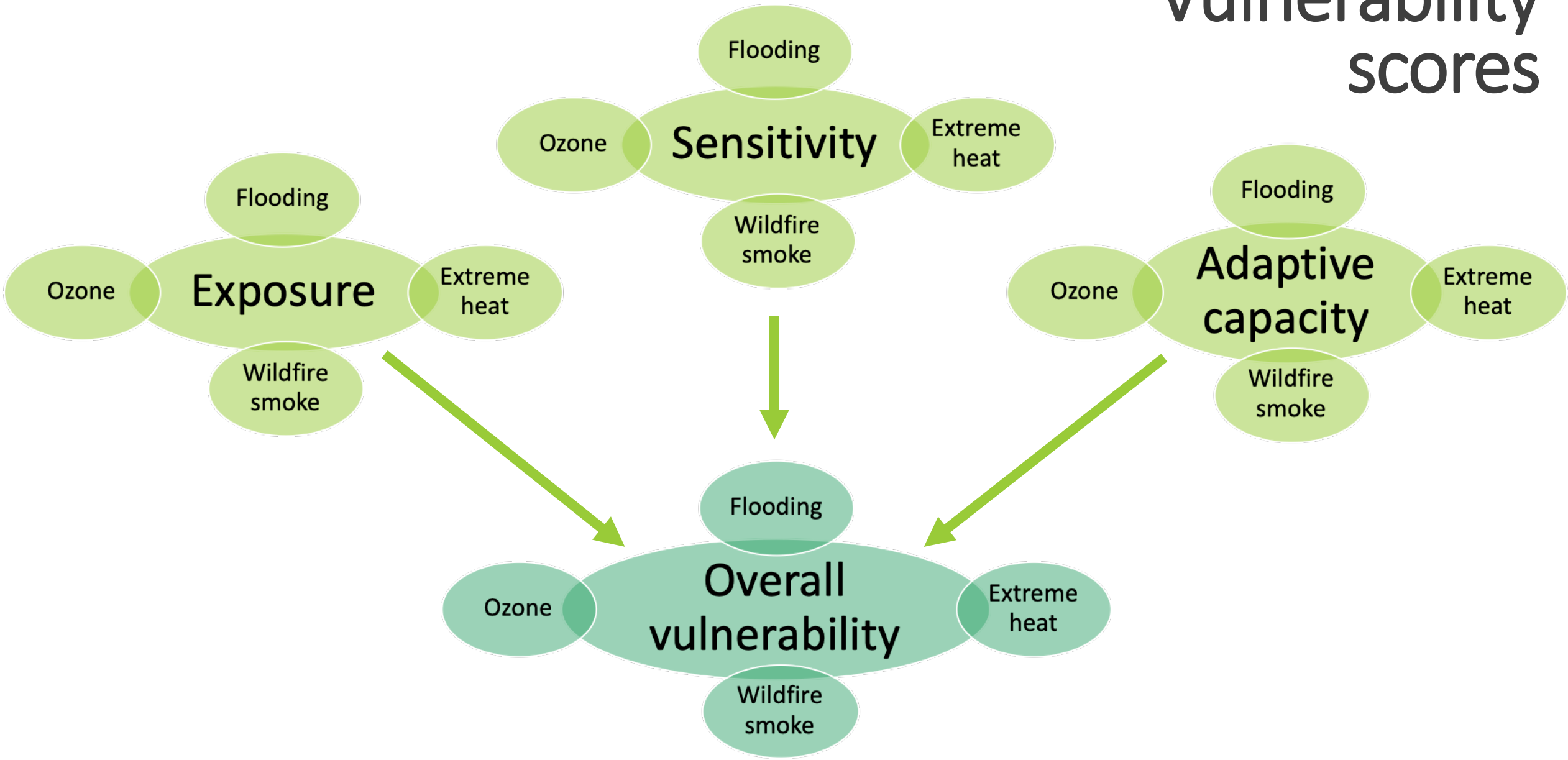


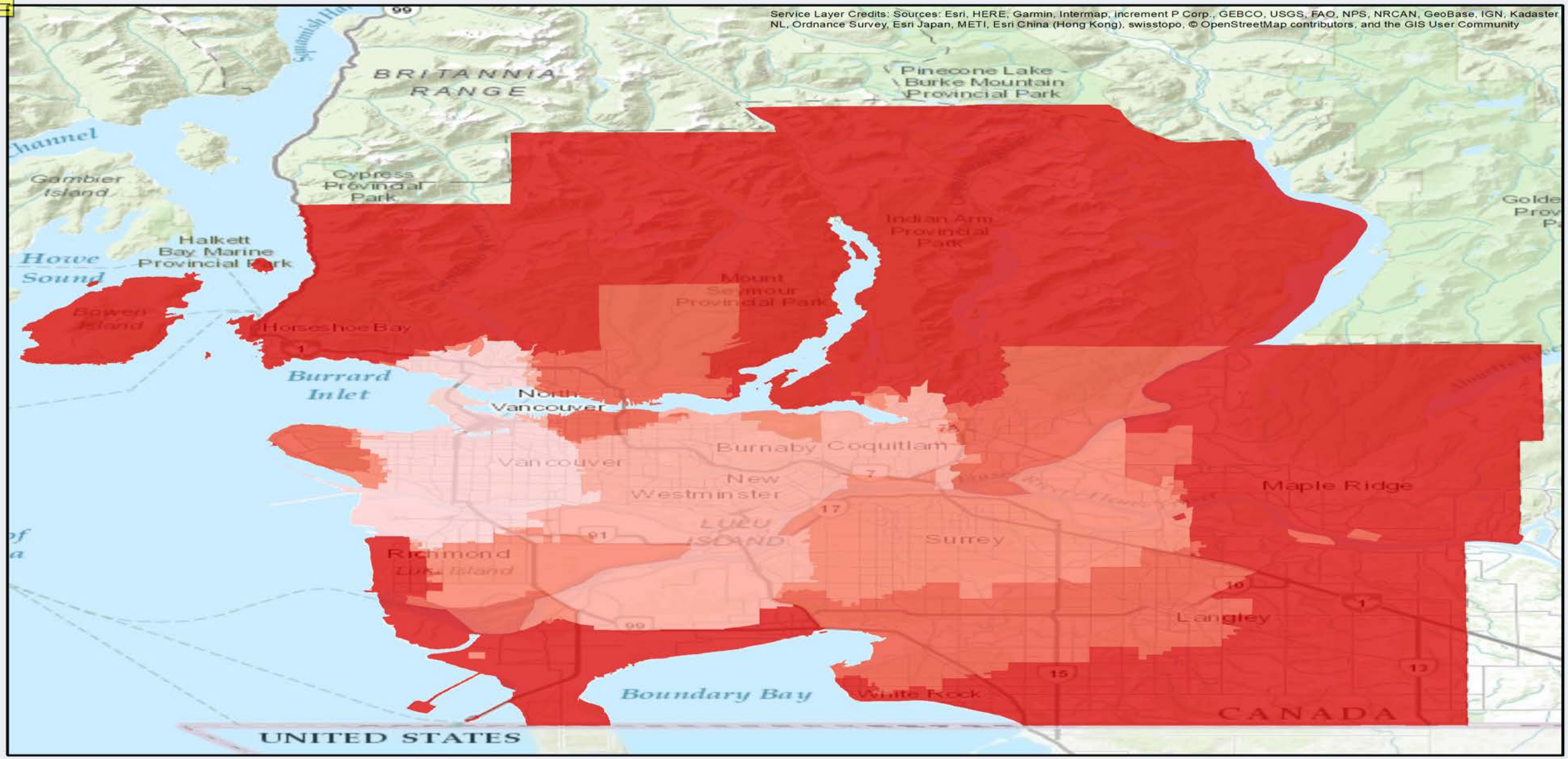
WHO (2016)

Overall method

Systematic literature review	• Identify other sociodemographic, infrastructure/resiliency/adaptation, health determinants and data for each natural hazard
Data collection	• Gather and deposit data into repository
Geospatial analysis	• Aggregate data to consistent geography
Development of vulnerability measures	• Sea level rise/flooding, extreme heat, wildfire smoke/ozone
Mapping	• Use GIS and data visualization tools to create online interactive maps

Vulnerability scores





Exposure (Quintiles)
- Very Low
- Low
- Moderate
- High
- Very High

Ground-level Ozone Exposure
Metro Vancouver

0 4.25 8.5 17 25.5 34 km

Coordinate System: Mercator Auxiliary Sphere
Produced for: Vancouver Coastal Health, Fraser Health
Map production date: 01/08/2019
School of Population and Public Health
University of British Columbia

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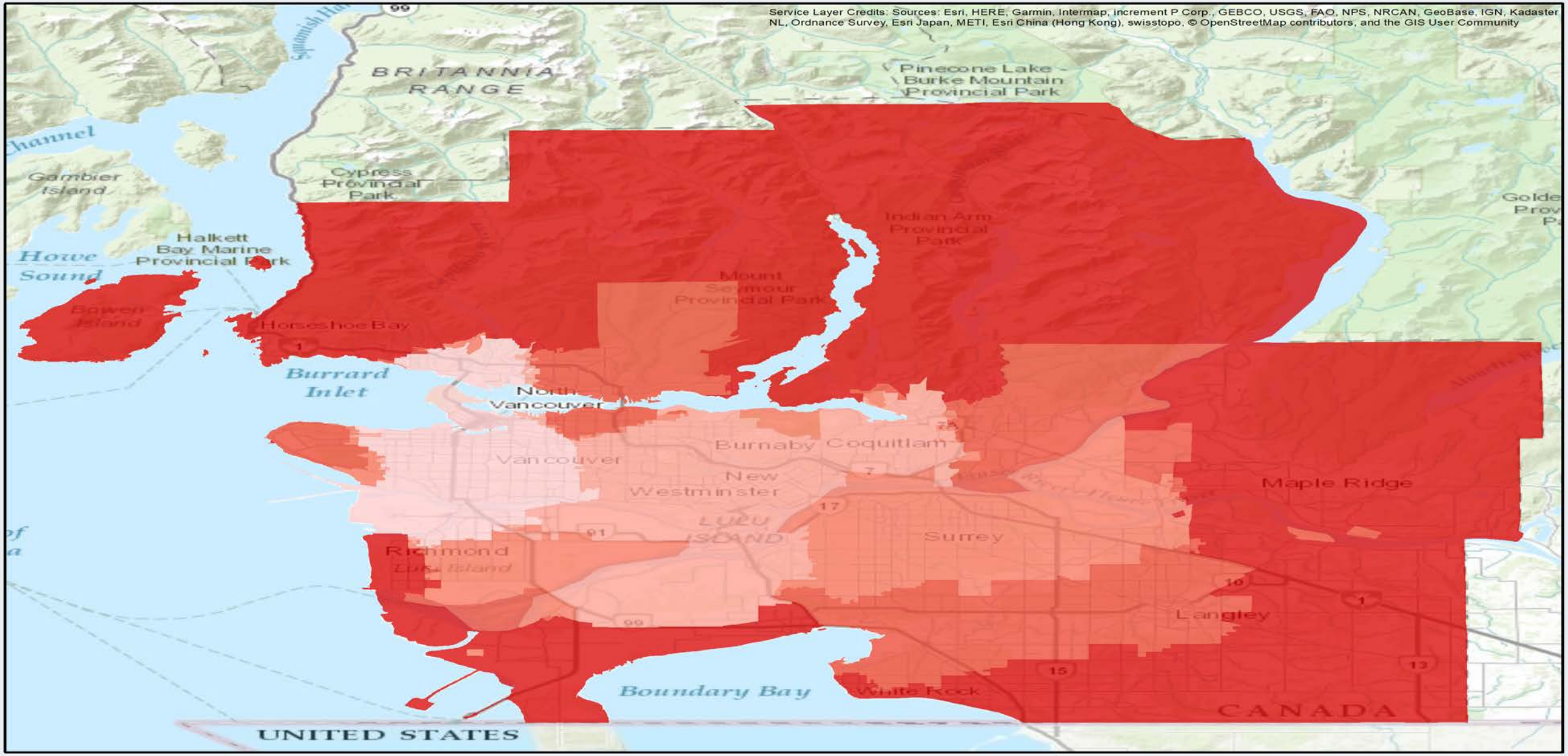
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BRITANNIA RANGE
Pinecone Lake - Burke Mountain Provincial Park
Cypress Provincial Park
Gambier Island
Halkett Bay Marine Provincial Park
Howe Sound
Bowen Island
Indian Arm Provincial Park
Mount Seymour Provincial Park
Horseshoe Bay
Burrard Inlet
North Vancouver
Burnaby
Coquitlam
Vancouver
New Westminster
Maple Ridge
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Richmond
Langley
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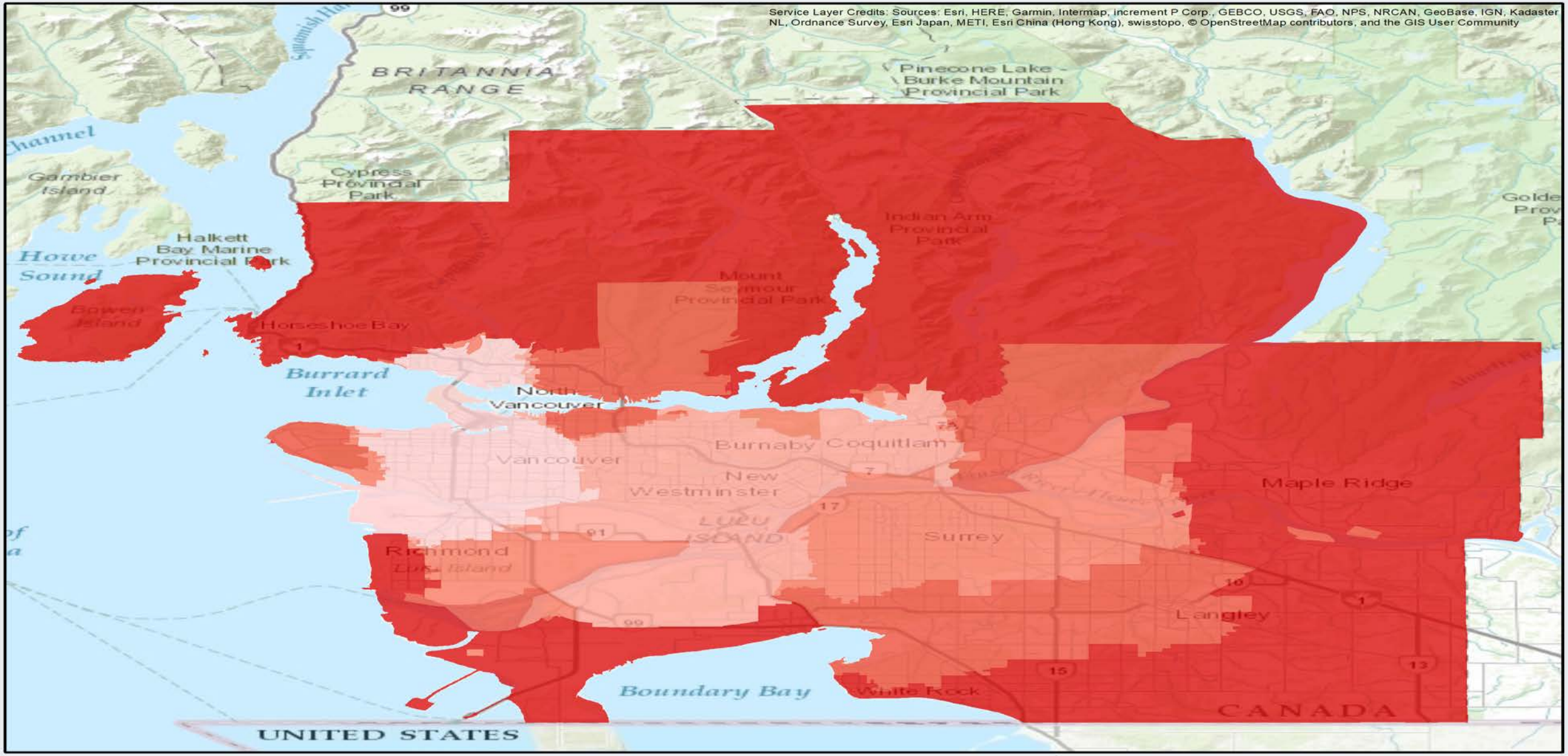
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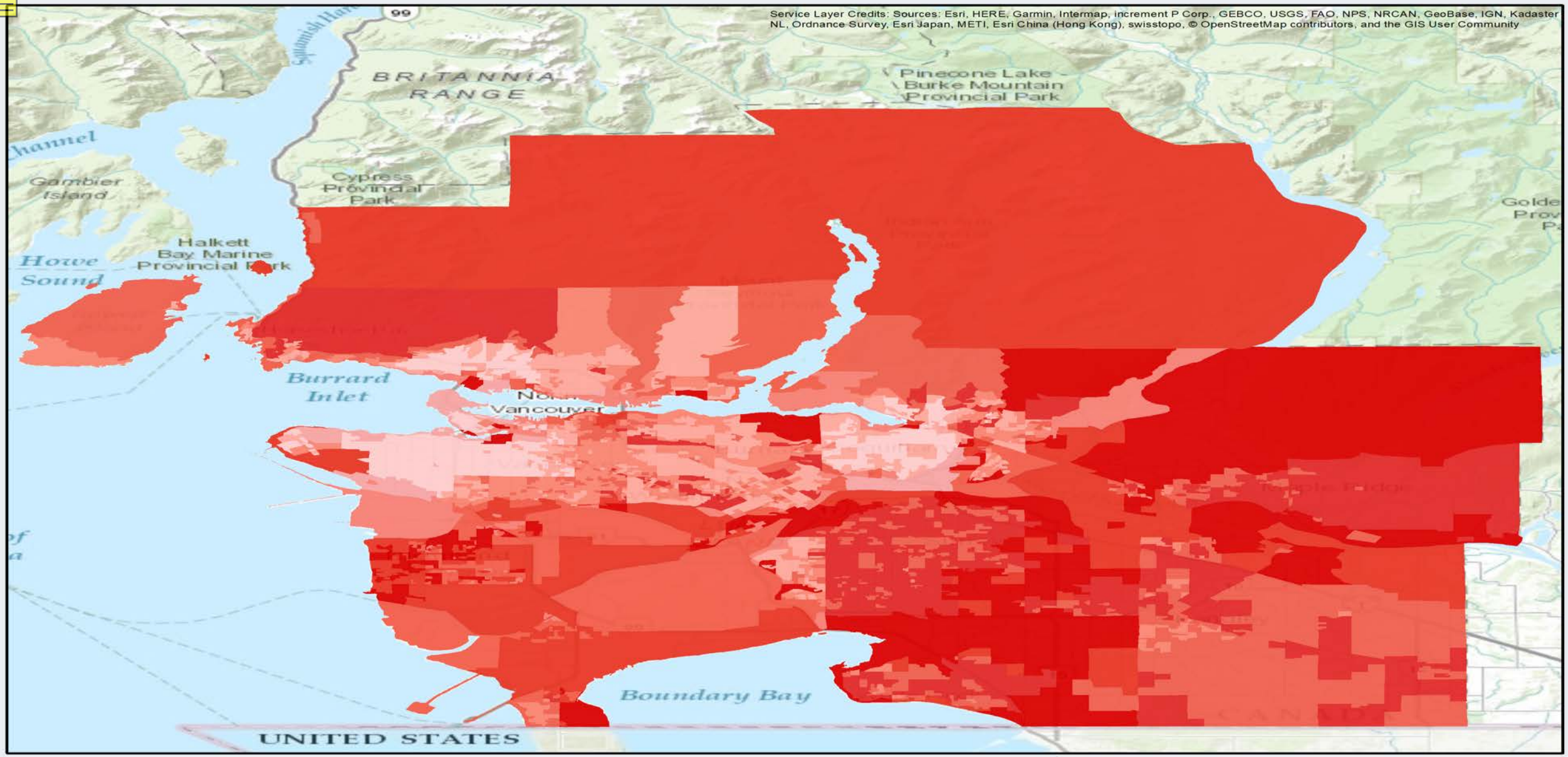
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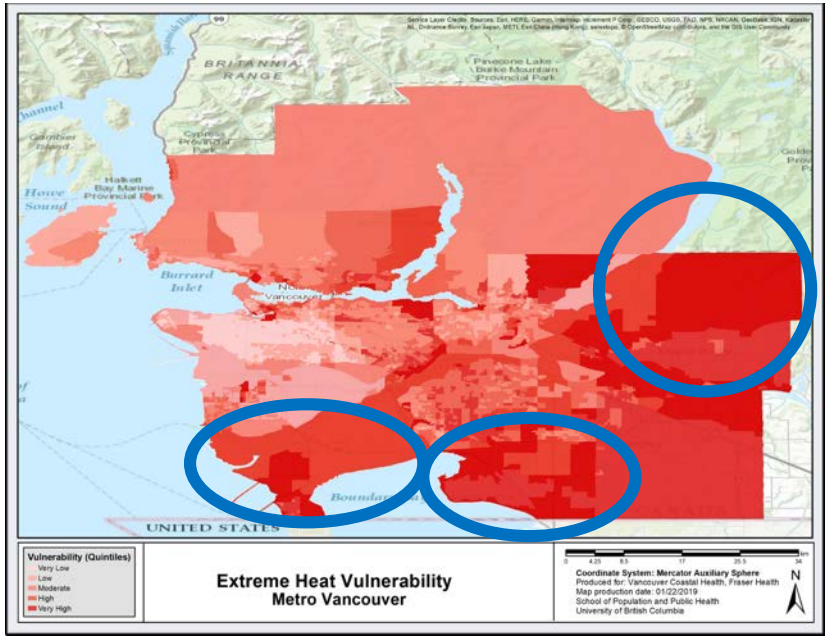
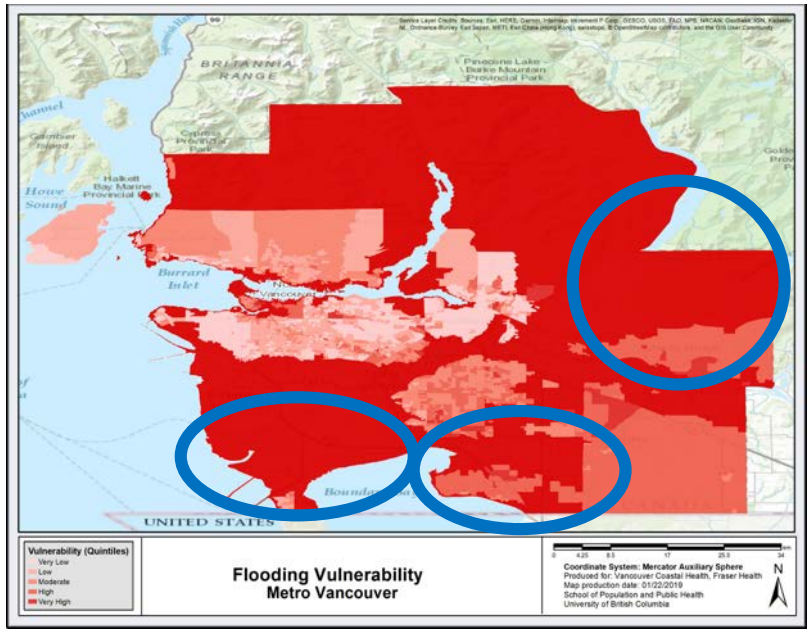
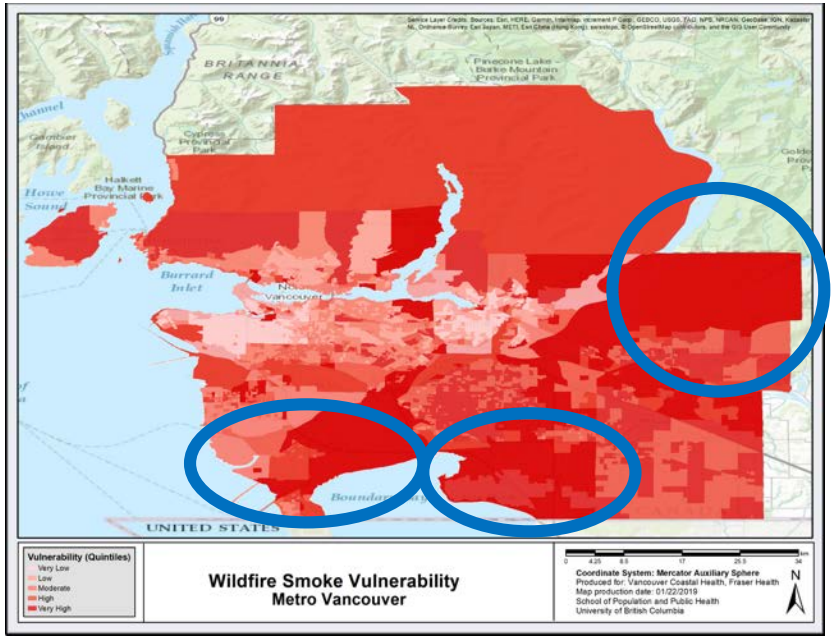
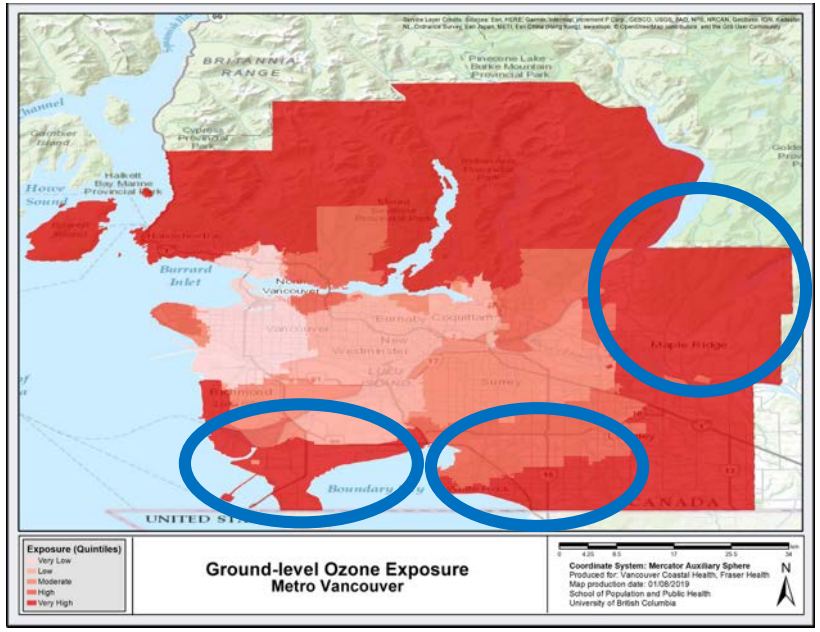


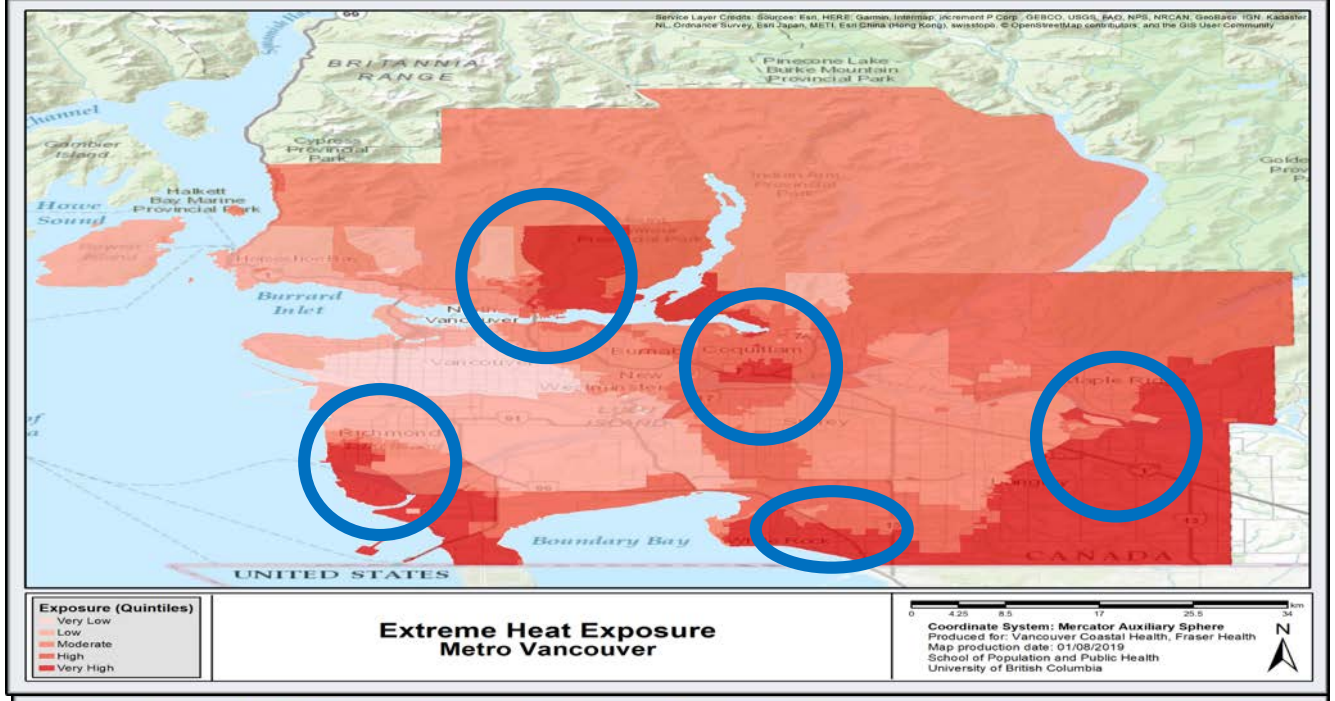


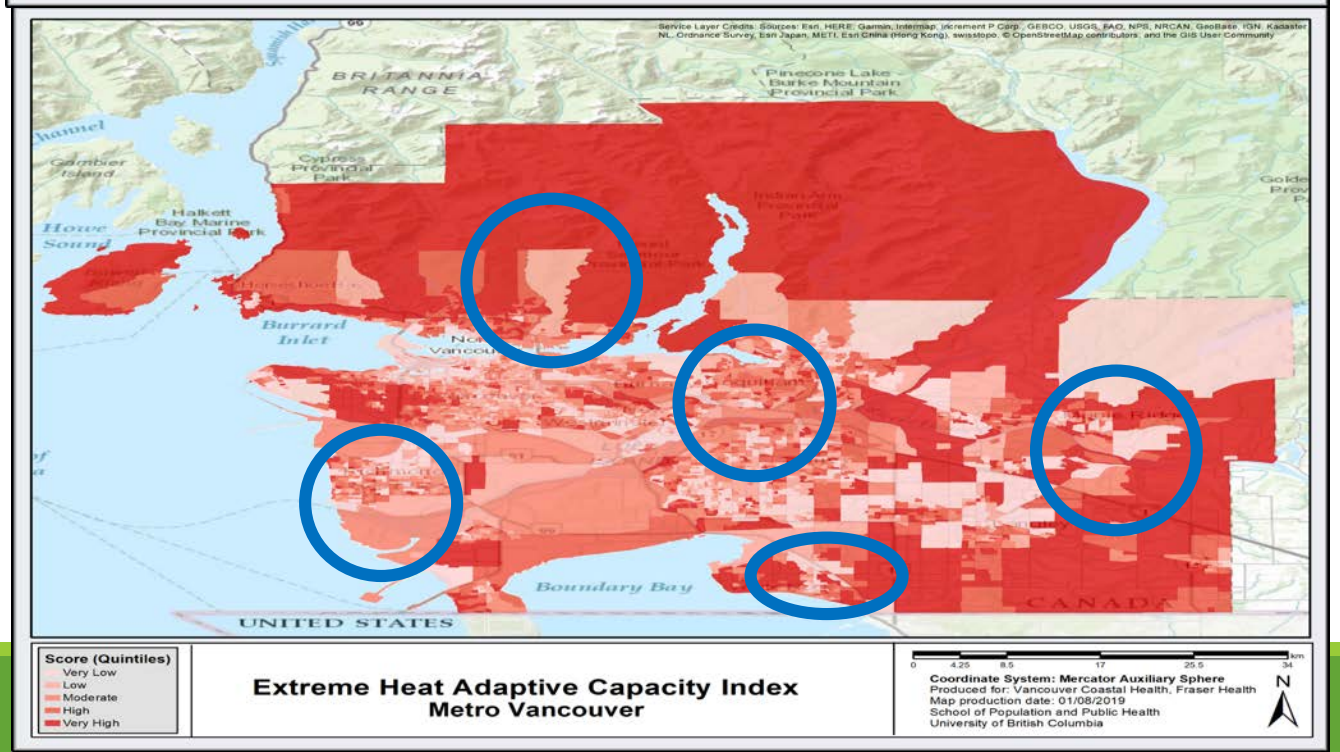




Spatial analysis possibilities:

High vulnerability areas for all climate hazards – high priority?





Spatial analysis possibilities:

High exposed areas and low adaptive capacity – areas that are more amenable to changes?

Interactive data visualization tool

https://public.tableau.com/views/Vulnerability_final_packaged/Ozone_Final?:embed=y&:display_count=yes

Concluding thoughts and questions

What is the role of local public health in the climate change response?

Are maps / information from this type of project useful ?

- For what, for whom
- How can the maps be made more useful?
- Unintended consequences?

Thank you for any feedback! ☺

Feel free to contact me at j.yu@ubc.ca

The Vulnerability Mapping Project

Funding from the Health Protection Program, Office of the Chief MHO, VCH

VCH/FH advisory team	Dr. James Lu
	Emily Peterson, MPH, VCH
	Dr. Lisa Mu, FH
	Sara Forsting, MSPH, VCH
	Geoff Ramler, VCH
UBC team members	Dr. Michael Brauer, SPPH
	Jessica Yu, PhD Candidate, SPPH
	Kaitlin Castellani, MSc., Geomatics
	Angela Yao, PhD Candidate, SPPH
	Krista Cawley, MSc Candidate, IRES
	Xuan Zhao, MD student

Problem framing

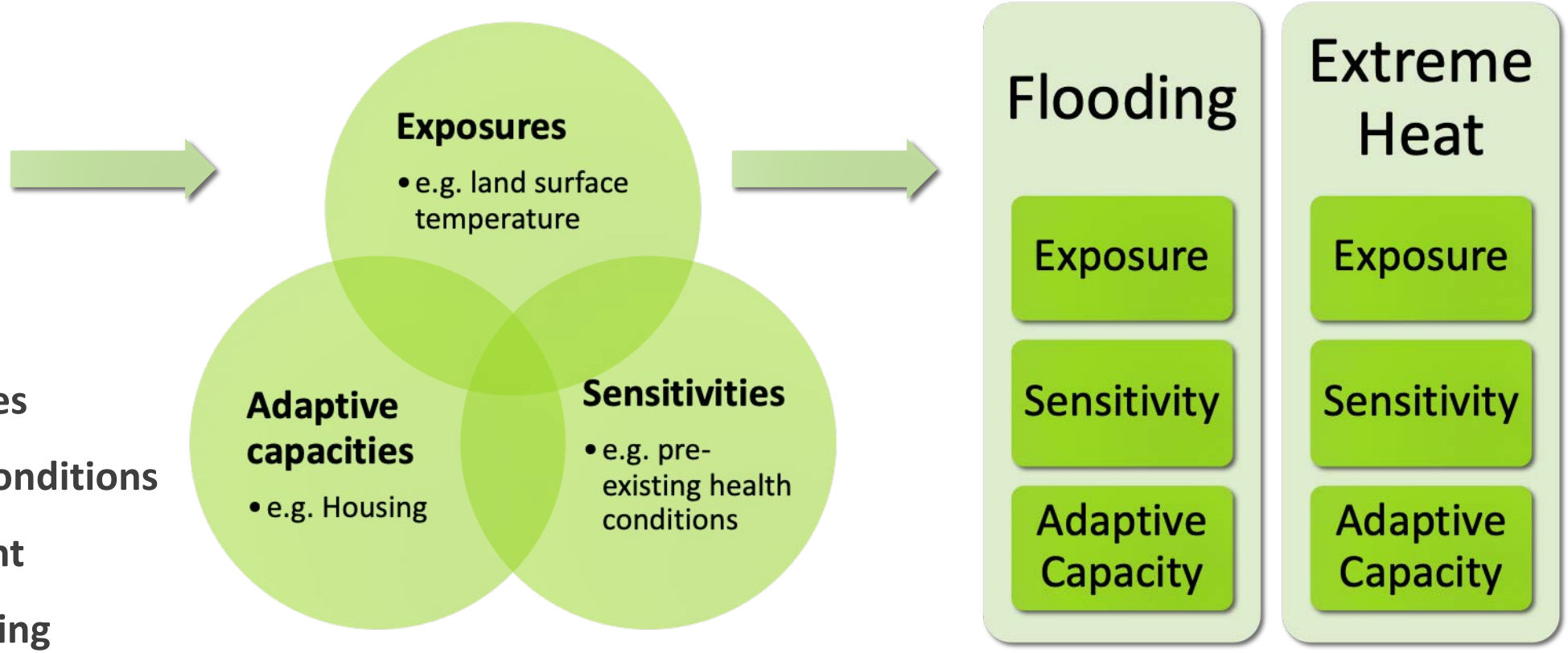
Increasing frequency and magnitude of natural hazards because of climate change –new 'climate reality'

Disproportionate health impacts within a city

- ***Health and spatial equity issues***

Categorisation of determinants

- Age
- Sex
- Race/ethnicity
- Socioeconomic
- Climate exposures
- Existing health conditions
- Built environment
- Institutional setting



35+ indicators collected – some examples

Exposures

Daily max temperature

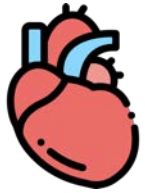
Land area in flood plain

Daily PM 2.5 concentration

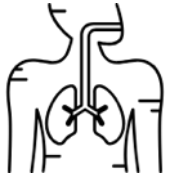
Ground level ozone

Sensitivity

Children and elderly



Cardiovascular



Respiratory

Mental health

Adaptive Capacity

Housing quality

Green space

Social network

Public transit

"A changing climate is a reality, and Vancouver needs to continue to be a leader on the environment.” – Mayor Kennedy Stewart