

# Human Vulnerability and Climate Change: An assessment of Greater Vancouver's human vulnerability to sea level rise in 2100

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# CREATING A STUDY AREA

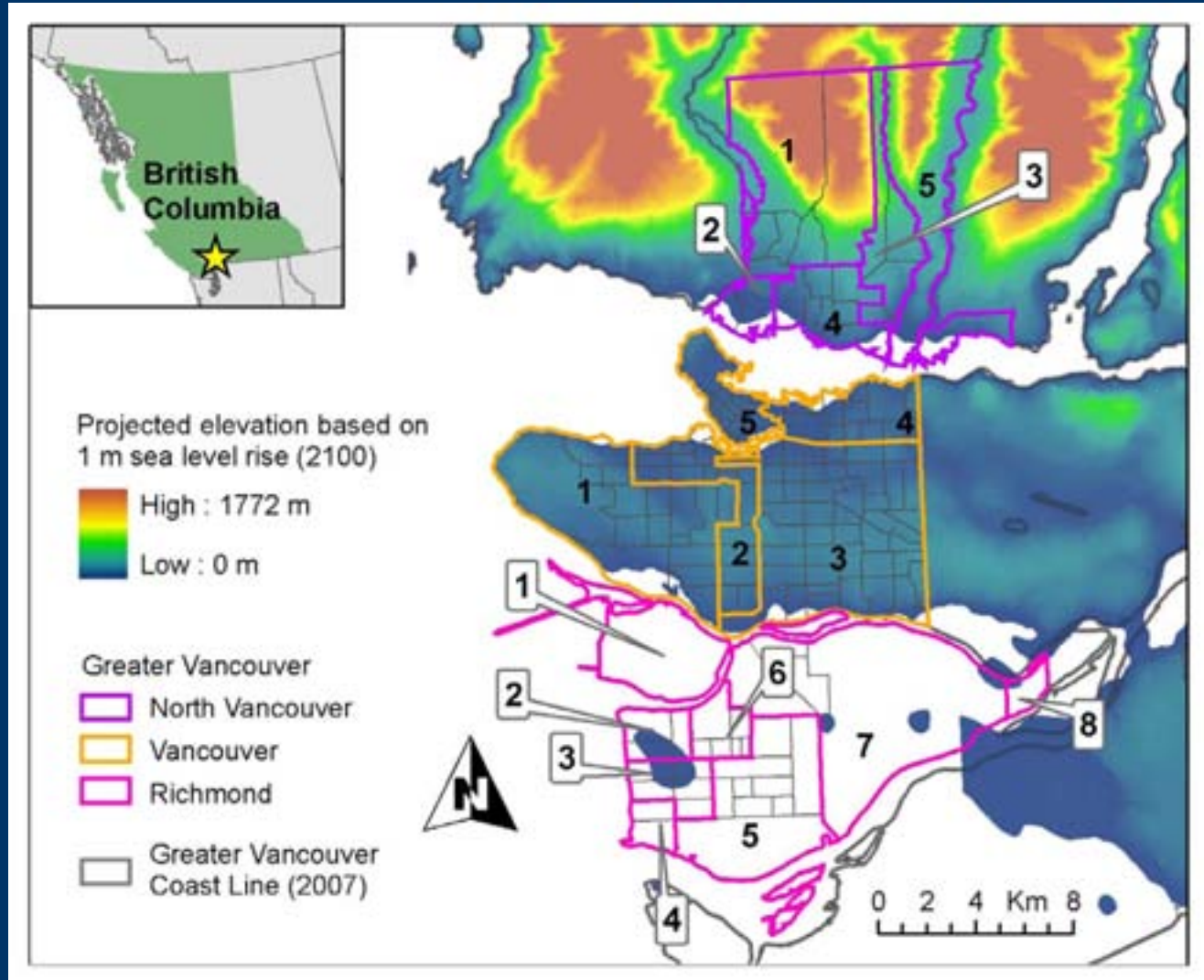
In the interest of maintaining study areas that allowed for the greatest levels of vulnerability indicators to be represented, several considerations were assessed. For instance it was vital that all of the areas in question had:

- A full range of data available from Statistics Canada
- Accessible health care statistics
- A coastline or susceptibility to coastal inundation

The chosen cities were then further divided into community clusters based on the homogeneity of their socio-economic makeup and topology.



# STUDY AREA



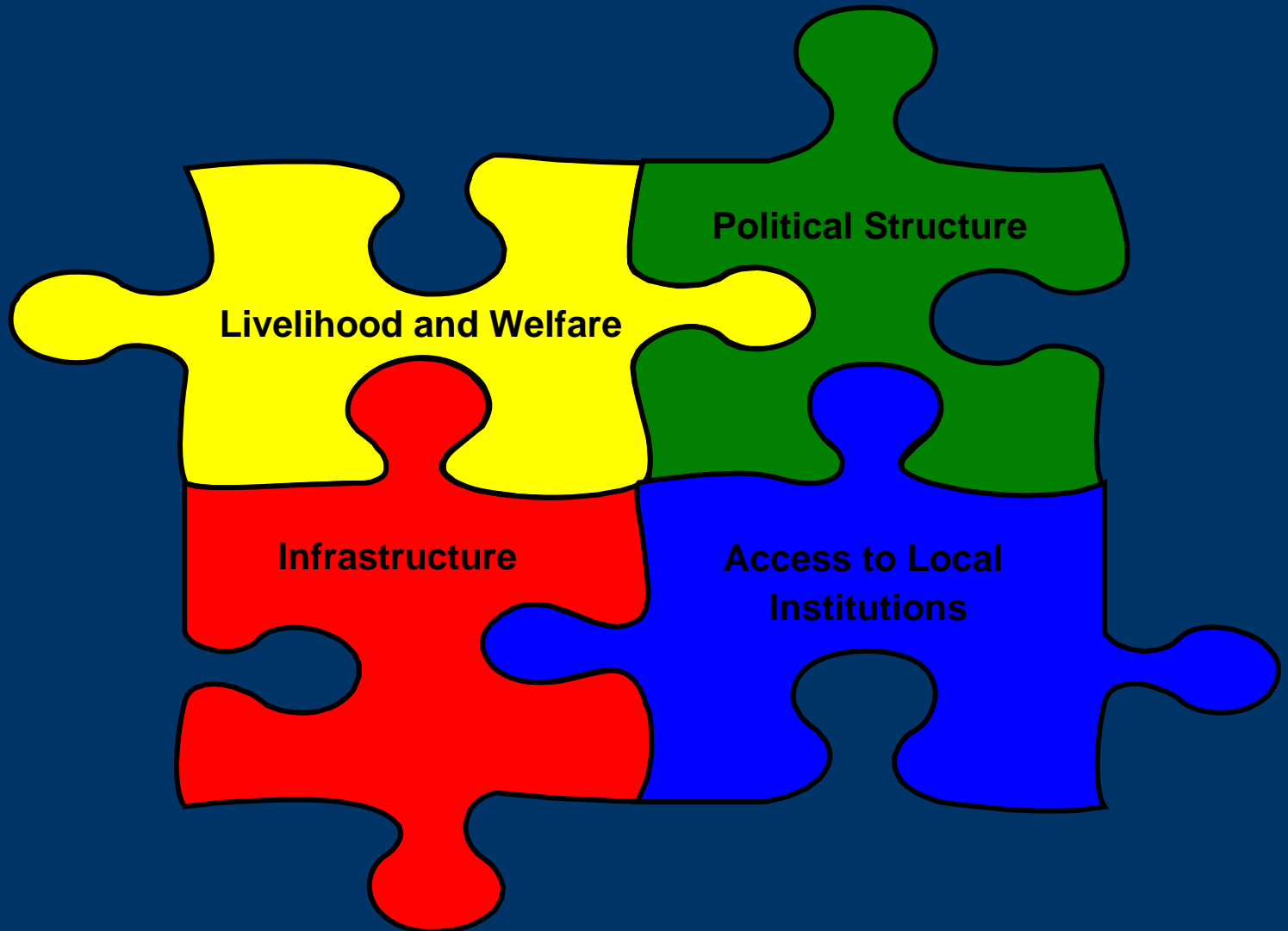
# ASSESSING FUTURE PROJECTIONS OF SEA LEVEL RISE

For the purposes of this project, three different scenarios have been used to assess human vulnerability to sea level rise in 2100:

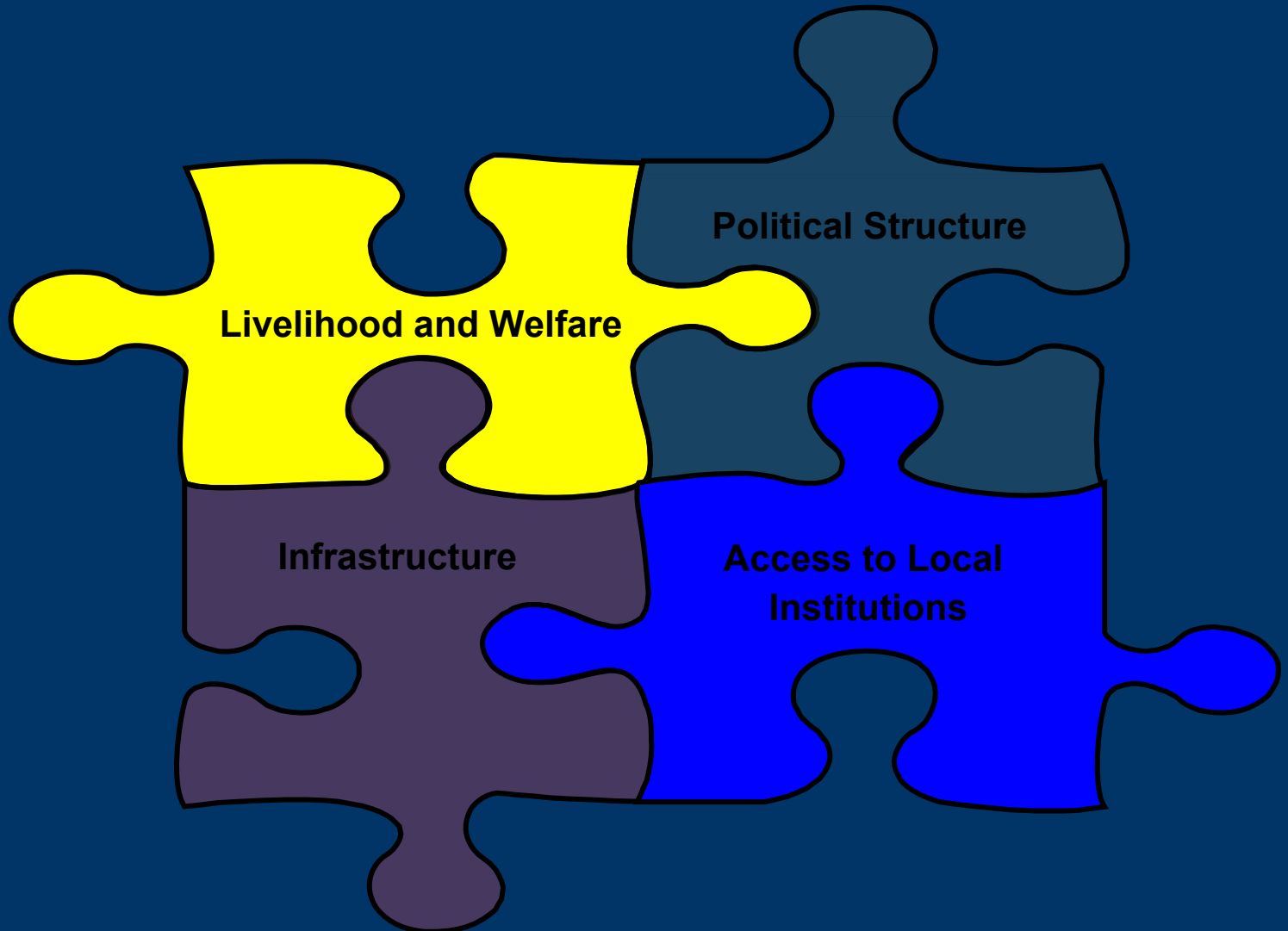
- **Best case scenario = 9 cm (\*Bindoff and Willebrand, 2007)**
- **Worst case scenario = 88 cm (\*Bindoff and Willebrand, 2007)**
- **Catastrophic case scenario = 6 m (Otto-Bliesner et al., 2006)**

\*Both the best case and worst case scenarios are highlighted in the IPCC Fourth Assessment Report

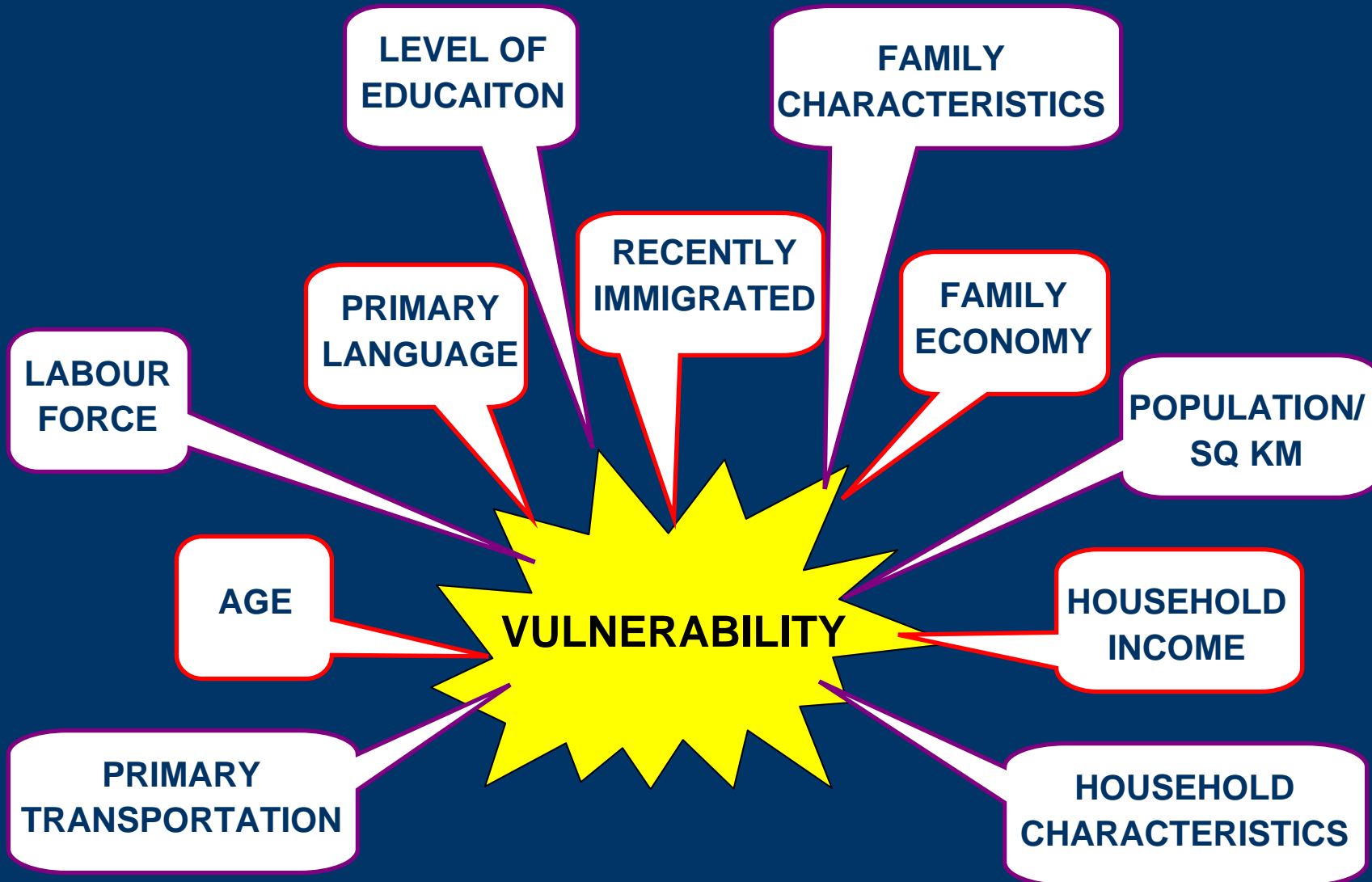
# THE VULNERABILITY PUZZLE



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# VULNERABILITY FRAMEWORK



# VULNERABILITY FRAMEWORK

Level	Weighting	Indicator	Indicator Variable	Vulnerability Weighting	Area Statistics
Level 1	Given an average weighting of 40 and ranging from a low of 30 to a high of 50	Age	0 – 19	High	17,165
			20 – 64	Low	45,210
			64 +	High	11,165
			<b>Equation</b>		

$$(50 \times 17,165) + (30 \times 45,210) + (50 \times 11,165) / (17,165 + 45,210 + 11,165)$$

Level	Weighting	Indicator	Indicator Variable	Vulnerability Weighting	Area Statistics
Level 2	Given an average weighting of 20 and ranging from a low of 10 to a high of 30	Level of Education	% of pop. With less than high school	High	5,055
			% of pop. With high school and some post secondary	Medium	19,135
			% of population with a university degree	Low	35,705
			<b>Equation</b>		

$$(30 \times 5,055) + (20 \times 19,135) + (10 \times 35,705) / (5,055 + 19,135 + 35,705)$$



# VULNERABILITY RANKING

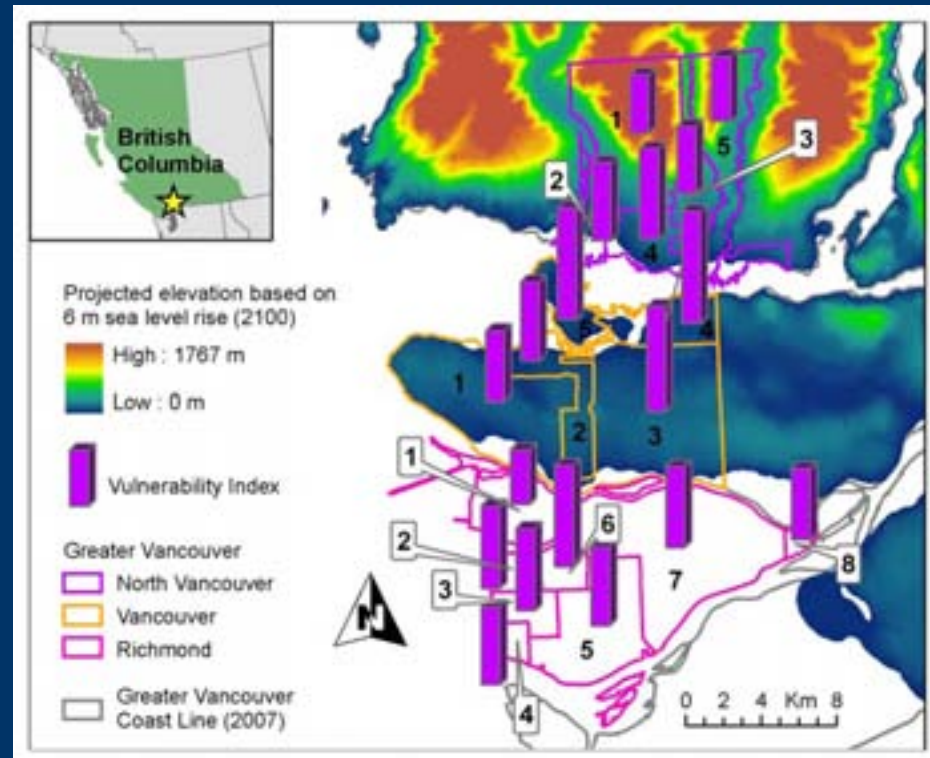
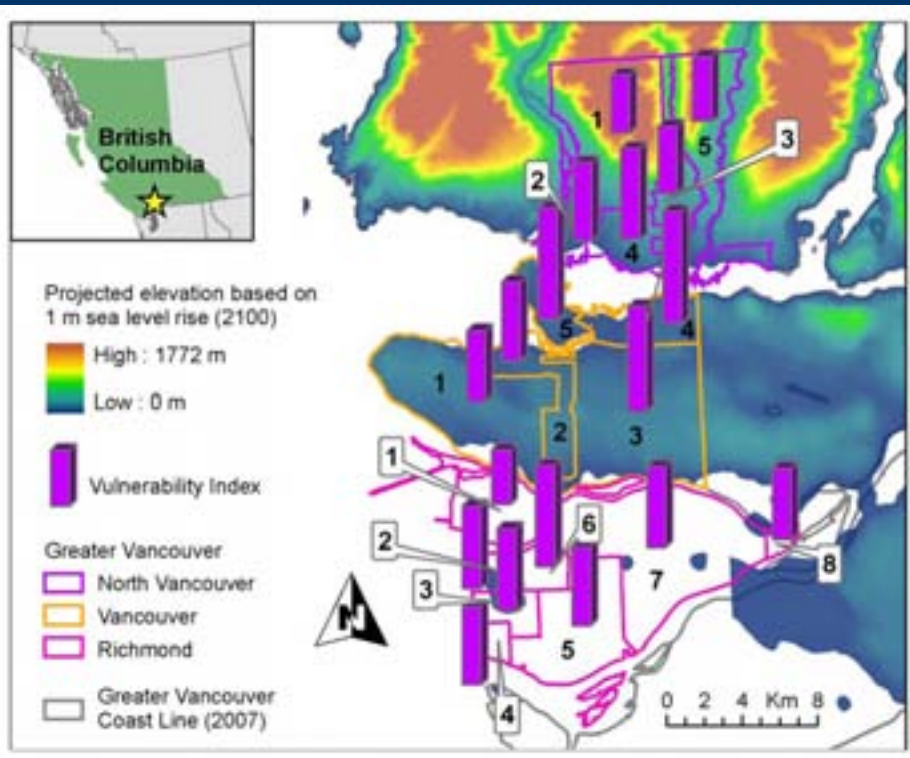
Region	Area	Vulnerability Index
North Vancouver	1	260
	2	281
	3	270
	4	294
	5	267
Vancouver	1	272
	2	282
	3	307
	4	316
	5	315
Richmond	1	256
	2	285
	3	285
	4	281
	5	281
	6	305
	7	284
	8	274



# HUMAN VULNERABILITY TO SEA LEVEL RISE

Map of Greater Vancouver indicating vulnerability to 1m sea level rise

Map of Greater Vancouver indicating vulnerability to 6m sea level rise



# Findings

- Dramatic alterations to the landscape
- Human displacement (roughly 186,900 people live in inundated areas)
- Large scale economic loss
  - Port of Vancouver
  - Vancouver International Airport
- Agricultural impacts
- Loss of coastal zones through intensification of physical processes such as:
  - Shoreline retreat
  - Erosion
  - Flooding
  - Saltwater intrusion

