City of Vancouver - Preparing for Climate Change

November 22\textsuperscript{nd}, 2016
In 2012 Vancouver adopted a Climate Change Adaptation Strategy
Developing a Climate Adaptation Plan
Implementing the Plan
Lessons Learned
STEP 1: Getting started is the hardest part

• Why do you want to adapt?
  – Know your drivers and message

• What will success look like?
  – What is a successfully resilient Vancouver?

• What plans exist that should be integrated?

• Do you have executive champions and senior management buy in?
Step 1: PEOPLE

- Get a team together
  - Cross-departmental with Sr. Manager Buy-in
  - Get them excited
    - Local scientist speaker, video gulfport, Miss. Hancock Bank

- Guiding Principles

- Scan of actions ALREADY adaptation
Who is involved?

15 Canadian communities

MV, Surrey, Delta, N.V, Victoria, CRD

Staff Workshops and Engagement

Working Group

Adaptation Steering Committee

Executive Sponsor: City Engineer

Champion: Deputy City Manager

First Nations

Port Metro Van

Province

Board of Trade

Fraser Basin Council

Airport

Translink
Rough Steps we followed

**Milestone 1**
What are anticipated climate changes?

**Milestone 2**
What are major impacts?

**Milestone 3**
Actions to respond?

**Milestone 4**
Implement

Monitor / Iterate

- Climate Science
- GM Interviews
- Impact Statements
- Risk and Vulnerability Assessment
- Action Workshops
- Action Evaluation
- Plan and Review
- Project Management and Funding
### Summary of Climate Change for British Columbia in the 2050s

<table>
<thead>
<tr>
<th>Climate Variable</th>
<th>Season</th>
<th>Projected Change from 1961-1990 Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ensemble Median</td>
</tr>
<tr>
<td>Mean Temperature (°C)</td>
<td>Annual</td>
<td>+1.8 °C</td>
</tr>
<tr>
<td>Precipitation (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual</td>
<td></td>
<td>+8%</td>
</tr>
<tr>
<td>Summer</td>
<td></td>
<td>-1%</td>
</tr>
<tr>
<td>Winter</td>
<td></td>
<td>+8%</td>
</tr>
<tr>
<td>Snowfall (%)</td>
<td>Winter</td>
<td>-10%</td>
</tr>
<tr>
<td></td>
<td>Spring</td>
<td>-58%</td>
</tr>
<tr>
<td>Growing Degree Days° (degree days)</td>
<td>Annual</td>
<td>+283 degree days</td>
</tr>
<tr>
<td>Heating Degree Days° (degree days)</td>
<td>Annual</td>
<td>-548 degree days</td>
</tr>
<tr>
<td>Frost-Free Days° (days)</td>
<td>Annual</td>
<td>+20 days</td>
</tr>
</tbody>
</table>

The table above shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the 2050s for the British Columbia region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections (see the "Notes" tab for more information). The range values represent the lowest and highest results within the set. Please note that this summary table does not reflect the "Season" choice made under the "Region & Time" tab. However, this setting does affect results obtained under each variable tab.

* These values are derived from temperature and precipitation. Please select the appropriate variable tab for more information.
From Impacts to Actions

Brainstorm Actions 100s → Evaluate Actions → 9 Primary Actions 50+ Supporting Actions

80 Impacts → Risk and Vulnerability Assessment → 20 Impacts

Must Do → Monitor → Investigate Further
Risk and Vulnerability: Prioritize Action

• Vulnerability: Function of Exposure, Sensitivity, Adaptive Capacity

• Risk: Function of Likelihood and Consequence

Overall Adaptation Plan

Impact Statements

Actions

Specific Assessments

Where First?

Facilities

UHI Mitigation

Coastal Flood

Implement from Menu of Actions
Implementation
Wetter Vancouver

MAJOR IMPACTS:
when it rains it pours
rare heavy rain events increase in intensity by
35%

higher flood risk
• Green Infrastructure Strategy
• Future-cast Sewer Sizing
• Separating Sanitary and Storm Sewer
• Public Communication
Hotter, Drier Summers

- **more frequent heat waves**
- **hottest days even hotter**
- **twice as many days above 25°C**

18 days in the 1980s vs. 43 days in the 2000s, which means increased health risks to vulnerable people.

- **20% less rain**
- **increased water restrictions**
Vulnerability = Exposure, Sensitivity, Adaptive Capacity

Knudby and Aminipouri, SFU (2015)
Hotter, Drier Summers

- Cooling Networks and Stations
- Planting gaps in canopy cover
- Cooling Buildings
- Adding Water Fountains
- Heat Response Guidelines
Preparing for Sea Level Rise
Coastal Flood Risk Assessment (CFRA) Overview

<table>
<thead>
<tr>
<th>PHASE</th>
<th>Activity</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flood hazard today and in 2100 What is at risk and potential losses</td>
<td>2012</td>
</tr>
<tr>
<td>VBBL</td>
<td>Flood Construction Level from 3.5m to 4.6m</td>
<td>2014</td>
</tr>
<tr>
<td>2</td>
<td>Develop response options for 11 areas and compare options</td>
<td>2015</td>
</tr>
</tbody>
</table>
With increasing sea level rise our risk grows significantly

Risk = Likelihood X Consequence

Extreme Storm Event, High Tide 2020
Future Flood Hazard Mapping

Extreme Storm Event, High Tide 2100
Lessons
Challenges and Lessons

Challenges:
• Business Case
• Financial Tools
• Mainstreaming
• Sophisticated hazard information

Lessons:
• Integration: Co-benefits
• No regret actions
• Priority setting
• Action while planning
• Keep adaptation potential high – adaptive management
• Examples from elsewhere
• Best process not just best practice
• Collaboration and partnerships
• Champions and sponsors