True Cost Of Wildfires And Why Building Wildfire Resilience Is Our Best Option

Getting Climate Ready: Adaptation Tools for Northwest Communities
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Terrace, BC

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How is climate change affecting wildfires in BC?

Top-Down
Climate/Weather

Bottom-Up
Fuels/Vegetation
Climate models: what does the future hold
Global mean temperature has risen approximately 1.11° C since 1850
Later start to winter snow and earlier snow melt

- Warmer winters and reduced snowpack,
- Very low late season water flows,
- Drought impacts,
- Access to water for fire suppression will become more of an issue
Changes in temperature and relative humidity

- Warmer daytime temperatures,
- Lower daytime relative humidity,
- Higher minimum nighttime temperatures (poor overnight recoveries)
Edmonton - PM2.5 - Last 14 Days (hourly averages)
Higher incidence of lightning
Less precipitation during the fire season and higher incidence of strong convective storms
Higher incidence of strong wind events
Longer fire seasons

The season for large fires in the West is getting longer
Days between first and last fire greater than 1,000 acres, decade average

- '73-'82: +42 days
- '83-'92: +24 days
- '93-'02: +26 days
- '03-'12

States: CA, NV, OR, WA, ID, MT, WY, UT, CO, AZ
Source: Anthony Westerling
More frequent, longer, worsening droughts

SWL = specific warming level
Effect of climate change on cyclical weather anomalies
Effects on fire and fuels: bottom-up influences
Reduced soil moisture will kill some trees outright; others will be weakened and be vulnerable to insects and diseases.

- Research suggests we will see 7-9 major seedling killing drought events between now and 2100.
- Currently >100,000 ha’s of drought-caused mortality – mostly plantations.
Live and dead fuels will dry out, be available to burn earlier/longer

- More ecological impact – burn severity, loss of diversity
- Harder to suppress
- More smoke, carbon emissions
Burned area will increase annually to a point…
Patches of high severity fire will be larger
Reburns will increase in frequency
Some large, severely burned areas will fail to reforest

- Colorado Front Range, Jemez Mountains in NM, west Chilcotin Plateau
- Forest area will decrease and grass, shrub, woodland area will increase
Climate change and wildfire: the cumulative effect

The cumulative forest area burned by wildfires has greatly increased between 1984 and 2015, with analyses estimating that the area burned by wildfire across the western United States over that period was twice what would have burned had climate change not occurred. From Figure 25.4 (Source: adapted from Abatzoglou and Williams 2016).

Source: 4th US National Climate Assessment (released November 23rd, 2018)
Climate Change And Wildfire: The Total Cost
Annual economic burden of wildfires on the US economy is estimated to range from $71.1 to $347.8 Billion (National Institute for Standards and Technology)
Direct Costs
Indirect and Additional Costs

- Long-term human health
- First responder and citizen fatalities
- Ecosystem services
- Emotional problems
- Property values
### Economic Consequences of An Evacuation of Cranbrook

<table>
<thead>
<tr>
<th>Category</th>
<th>1 day</th>
<th>3 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grocery</td>
<td>$720,000</td>
<td>$22,160,000</td>
</tr>
<tr>
<td>Hospitality</td>
<td>$210,000</td>
<td>$630,000</td>
</tr>
<tr>
<td>Industrial</td>
<td>$2,100,000</td>
<td>$6,300,000</td>
</tr>
<tr>
<td>Transportation</td>
<td>$2,400,000</td>
<td>$7,200,000</td>
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<tr>
<td>Productivity loss</td>
<td>$1,906,216</td>
<td>$5,718,648</td>
</tr>
<tr>
<td>Household evacuation</td>
<td>$5,838,216</td>
<td>$9,196,392</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$13,174,432</strong></td>
<td><strong>$51,205,040</strong></td>
</tr>
</tbody>
</table>
## Social Consequences

<table>
<thead>
<tr>
<th>Household Income Range ($)</th>
<th>% of Households in Cranbrook</th>
<th>% of household income spent for a 1 day evacuation</th>
<th>% of household income spent for a 3 day evacuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10,000</td>
<td>4</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>10,000 – 19,999</td>
<td>13</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>20,000 – 29,999</td>
<td>13</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>30,000 – 39,999</td>
<td>12</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>40,000 – 49,999</td>
<td>12</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>50,000 – 59,999</td>
<td>7</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>60,000 – 69,999</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>70,000 – 79,999</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>80,000 – 89,999</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>90,000 – 99,999</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>&gt;100,000</td>
<td>16</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
“a cost avoidance business case approach should be taken to quantify the estimated future savings from prevention and preparedness investments.” 2016 KPMG Wood Buffalo Wildfire – Post Incident Assessment Report.
Can’t change the climate; its set.....unfortunately; but we can change what burns and how hot it burns!
Re-building Resilience At The Landscape-scale

- Treatments need to be in the right places, regardless of existing land use constraints,
- Treatments have to be intense enough (remove enough fuel),
- The scale of fuel treatments has to match or exceed the scale of wildfires – our treatments are so small the wildfires aren’t even finding them,
- Fuel treatments need to be maintained periodically – we are never “done” applying fuel treatments,
Summary

- Climate change will result in conditions that favor longer fire seasons, and larger and more severe fires.
- The result will be significant impacts on society, the environment, and the economy.
- The only element we have control over is fuel – the solution is to focus on reducing potential fire behavior – which means reducing hazardous fuel over large areas,
- The public is strongly encouraged to engage in the solution by supporting fuel treatments, reducing fire hazards on their own property, and encouraging the agencies and politicians to aggressively tackle this problem.