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Using climate modeling and collaborative planning to develop adaptation actions across Salish Sea watersheds

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THURSTON CLIMATE ADAPTATION PLAN

Project Overview

April 4, 2018
TRPC, at a glance

- **What:** Council of governments in Olympia, WA

- **Who:** Council includes tribes, cities, transit, fire districts, schools, etc.

- **Why:** Adopted *Sustainable Thurston* in 2013:
  - **Purpose:** Enhance sustainability
  - **First Step:** Work on climate change
Project Snapshot

**THURSTON CLIMATE ADAPTATION PLAN**

- **Funding:**
  - $250K National Estuary Program grant

- **Project Area:**
  - South Puget Sound watersheds (WRIAs) in Thurston County

- **Policies:**
  - Actions for local municipalities, tribes, businesses, neighborhoods, etc.
  - Actions could be taken within entire county, S. Puget Sound ... and beyond
Science Summary

What:
- Describes observed and projected climate impacts at global, national, regional scales
- Incorporates research from IPCC and other sources

Why Adaptation?
- It’s necessary – even if we reduce our greenhouse gas emissions (mitigation)
- It’s resiliency – the ability to weather large disturbances
- It’s socially and fiscally responsible – potentially saves lives and dollars
Vulnerability Assessment

- Uses empirical data to show historical averages in region’s climate over late 20th century
  - **Study Area:** South Puget Sound watersheds (Mount Rainier to the Puget Sound)

- Uses emissions scenarios and climate models to show projected changes over 21st century
  - **Indicators:** temperature, precipitation, runoff, snowpack, streamflow, sea level, etc.

- Assesses impacts on region’s human and natural systems
  - **Assets Affected:** roads, estuaries, wells, crops, fisheries, forests, homes, health, etc.
More on the Maps

Methodology:

- Uses map format and data from UW CIG’s *State of Knowledge* report

- Models run “low” and “high” GHG emissions scenarios

- Watersheds split into smaller hydrologic units (HUCs) to show how change varies by elevation
  - (April 1 “Peak Snowpack” shown right)

Link: [www.trpc.org/climate](http://www.trpc.org/climate)
Climate Impacts

**Outlook:**

- Region’s average annual air temperate continues to rise over 21st century
  - Continued natural variability (e.g., the El Nino and La Nina cycles)
  - Generally, warmer, wetter winters and hotter, drier summers

- Changes anticipated to worsen existing hazards (floods, landslides, wildfires) and introduce threats (invasive plants and insects, infectious diseases).
Risk Assessment

**Analyzed Risks:**
- Put 80+ risks into a Consequence/Likelihood Matrix
- Assessed impact of each risk (High, Med., or Low)
  - Likelihood — probability of impacts
  - Consequence — severity of impacts

**Selected Strategies:**
- Either Accept Risk or Take Action ...
- Accept Risk means:
  - Monitoring the risk
  - Considering actions if impacts begin to occur
- Take Action means:
  - Continuing or enhancing effective actions
  - Recommending new actions
Adopted Plan

www.trpc.org/climate

Includes 91 actions within 6 themes:

- General
- Drought & Water Quality
- Flood & Erosion
- Plants & Animals
- Transportation & Energy
- Wildfire & Extreme Heat
General Actions

- **18 General Actions, including:**

- **Action G-02:** Create hazard recovery plans and prioritize the restoration of vital public safety facilities and other essential community assets (e.g., hospitals and major bridges).

- **Action G-11:** Factor climate impacts into the full life-cycle costs of roads, buildings, parks, and other assets — from their initial siting and design to their ongoing operations and maintenance.
Drought & Water Quality

- **17 actions, including:**
  
  - **Action D-03:** Increase reuse of reclaimed water for irrigating plants, supplementing low streamflow, and other purposes.
  
  - **Action D-11:** Evaluate and offer new incentives for residents to install rain gardens on well-draining soils and plant drought-tolerant landscaping to adapt to changes in seasonal precipitation.

Drought & Water Quality Actions

Projected shifts in seasonal precipitation and temperature (e.g., warmer, wetter winters and hotter, drier summers) threaten the region’s water quality and quantity. Impacts include:

- **Groundwaters:** Bigger winter storms can result in more runoff and less infiltration into aquifers. Summer droughts, in turn, could spur more groundwater pumping. Such direct and indirect climate impacts, coupled with sea-level rise, make Thurston County’s water resources more vulnerable to water quality and quantity risks.

- **Surface waters:** Changes in water volume and temperature threaten to scour streams and spur algal blooms that can degrade critical habitat for fish and wildlife, including salmon.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project’s vulnerability and risk assessments.

**D-01**

**Develop and implement a comprehensive drought response strategy that sets action levels for different drought stages.**

Thurston County experienced moderate or more extreme drought conditions in the summer months nine out of the last eleven years, including the last three consecutive years. Climate change and population growth will exacerbate these water shortages. A possible funding source for this action is the Washington Department of Ecology’s Water and Planning Implementation and Flow Achievement grant; the next funding cycle is 2018-2021.

**Thurston County Government**

**Lead Funds:**

**PARTNER:** State, Federal, Neighborhoods, Fire Districts, DRT, Water Providers, Business, Community, Tribes, TPCC

**TIME FRAME:** Short

**STRESSOR:** Increasing Drought

**D-02**

**Evaluate and secure sustained funding to support long-term monitoring of ground and surface water quality and quantity.**

This action includes enhancing monitoring of water volume, temperature, and pollution in streams, lakes, and Puget Sound. Existing resources include:

- The state Department of Ecology measures changes in the Puget Sound by tracking stream and urban shoreline areas as a result of stormwater management:
  

- Thurston County conducts data analysis and regular monitoring of specific lakes, rivers, and streams:
  
  [www.co.thurston.wa.us/health/watermonitoring.html](http://www.co.thurston.wa.us/health/watermonitoring.html)

**Thurston County Government**

**Lead Funds:**

**PARTNER:** THRC

**TIME FRAME:** Short

**STRESSOR:** Future climate change
Flood & Erosion

17 actions, including:

Action F-02: Incorporate projected sea-level rise and flooding information into the designation of regulatory hazard areas (e.g., floodplains and marine shorelines).

Action F-03: Design new and replacement stream culverts and other drainage infrastructure to accommodate projected higher peak flows associated with more frequent heavy precipitation events.

Flood & Erosion Actions

Projected rising sea levels and heavier rain events increase the risk of flooding, erosion, and landslides that threaten people, plants, and animals. Impacts include:

- **Stormwater**: Heavier rainfall and runoff can overwhelm stormwater systems (e.g., roadside culverts, drains, and pipes), especially in urban communities.
- **Wildlife Habitat**: Heavier rainfall and runoff can erode streambeds and streambanks and degrade sensitive habitat for fish and wildlife.
- **Roads and Homes**: Heavier rainfall and saturated soil can trigger landslides that endanger homes, roads, and lives near steep slopes. Sea-level rise and wave exposure magnify risks for coastal bluffs.
- **Marshes and Estuaries**: Sea-level rise can cause low-lying coastal areas to be under water more frequently and for longer periods of time. This can turn our region’s coastal marshes and forests into mudflats and alter habitat for birds and land animals.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project’s vulnerability and risk assessments.
Plants & Animals

12 actions, including:

Action P-04: Implement monitoring practices that provide early detection of invasive species on land and in water, and expand biological control and manual removal of such plants and insects.

Action P-09: Protect and enhance marine vegetation, such as eelgrass, so as to help clean water, sequester carbon dioxide, and improve fish habitat and survival.

Plants & Animals Actions

Projected changes in temperature and precipitation threaten the health and resilience of our region’s plants and animals. Impacts include:

- **Shellfish**: As the ocean becomes warmer and more acidic, shellfish have a harder time developing shells. Land-borne pollution can exacerbate such threats and make shellfish toxic and dangerous to consume.

- **Agriculture**: Crop yields and harvests can decrease or fail when summers are drier and hotter for longer periods of time. Extreme heat and flooding also threaten cattle, horses, and other large livestock.

- **Vegetation**: Warmer, drier summers can stress sensitive plants and habitat, including riparian vegetation and urban landscaping. This can leave them more vulnerable to extreme heat, pests, and pathogens.

- **Salmon**: Changes in stream temperature and volume can threaten critical habitat for juvenile salmonids that develop in streams and ocean-going adults that return to spawn.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project’s vulnerability and risk assessments.

- **Increase funding, education, and incentives for private landowners to manage lands in ways that enhance ecological and economic resilience (e.g., protecting and restoring forests, prairies, and shorelines/riparian areas).**

  - **Incentives can include expanding Thurston County’s Transfer of Development Rights (TDR) program, conservation easement funding, as well as expanding market-based approaches for ecosystem service payments or credits (e.g., for water quality, carbon sequestration and flood management).**

  - **LEAD:** County/Taxpayer, Education, TCD
  - **PARTNER:** Nonprofits, Businesses, Residents, Agricultural Community
  - **TIMEFRAME:** Long
  - **STRESSOR:** Warmer climate, Warmer Weather, Increasing Drought, Increasing Precipitation
  - **Outcome:** Improved Resilience, Population Change, Ocean Acidification

- **Use best-management practices, such as installing large woody debris in rivers, to improve water temperature, stratification, and channel conditions.**

  - **Racing large woody debris in rivers alters the flow of water, dig creates cooler pools for fish to rest, and creates and maintains fish refuges for fish to spawn. It will be necessary to choose proper sites and structures that do not cause flooding.**

  - **LEAD:** State, Nonprofit
  - **PARTNER:** County, Residents, TCD, Agricultural Community
  - **TIMEFRAME:** Medium
  - **STRESSOR:** Increasing Precipitation, Increasing Drought, Warmer Weather
Transportation & Energy

14 actions, including:

Action T-06: Relocate or retrofit low-lying roads vulnerable to coastal or inland flooding.

Action T-08: Build additional large-scale renewable energy projects (e.g., utility-scale solar arrays and wind farms) in Thurston County.
Wildfire & Extreme Heat

12 actions, including:

**Action W-02:** Require new developments in high-risk wildfire areas to submit a fire-protection plan during site plan review.

**Action W-12:** Install reflective and/or vegetated roofs to reduce building energy consumption and the urban heat island effect.

Wildfire & Extreme Heat

Projected hotter and dryer summer threatens to increase the number and severity of wildfire and extreme heat events that carry significant social, economic, and environmental costs. Impacts include:

- **Infrastructures:** Wildfires can damage or destroy homes, power poles, forests, and other important buildings and infrastructure.
- **Urban Heat Islands:** Extreme heat events make cities hotter, especially in densely developed areas. Hospitalizations and emergency service calls for heat-related illnesses can increase increasing demands on the region’s emergency medical services. The elderly and homeless are especially vulnerable.
- **Air Quality:** Increasing drought raises the risk of wildfires and extended levels of PM2.5, known particulate matter, from smoke, which degrades air quality and threatens human health.

The following actions can help the region reduce and respond to these and other climate impacts identified through the project’s vulnerability and risk assessments.

- **Create and maintain a map of the region’s high-risk wildfire areas and locations of wildfires.**
  - Such a map can be used to regulate new development practices (e.g., requiring building size and spacing, setbacks and buffers) as well as to educate property owners about wildfires.

- **Require new developments in high-risk wildfire areas to submit a fire-protection plan during site plan review.**
  - This action would help reduce the risk of wildfires spreading to and damaging buildings.
Next Steps

- Implement actions
- Monitor climate impacts
- Update plan periodically
- Continue public engagement
- Work on climate mitigation

The Thurston Climate Adaptation Plan’s first and foremost action (A-01, below) calls for updating the plan periodically to ensure it remains a relevant reference tool for our region. In short, the adaptation plan must be adaptive.

**A-01**

Update the regional climate adaptation plan periodically with new information, evaluate implementation efforts and effectiveness, amend strategies and actions as necessary, and enhance community climate literacy (e.g., by working with schools, libraries, and other partners to enhance the public’s understanding of climate change causes, impacts, and responses).

| LEAD: TRPC |
| PARTNER: All |
| TIMEFRAME: Short |
| STRESSOR: All |

TRPC should update the plan every five years with new climate data (observed and projected) and community input to ensure that the plan remains a relevant reference tool for local policy makers and residents. As part of its adaptive management process, TRPC should track which actions the community takes and consider steps to overcome barriers to implementation and coordination.
Questions?

[Cartoon image of two sharks in the ocean. One shark says to the other, "Good news! At the current rate of global warming we should be able to just swim over there and eat him in under five years...!"]

Project Website: www.trpc.org/climate

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www.funnyandjokes.com/sharks-looking-foward-to-global-warming.html