THURSTON CLIMATE ADAPTATION PLAN

Presentation: Analyzing Risks

Nov. 17, 2016

thurston regional planning council

Risk Assessment

- **Overview:** Use EPA tool for watershed-scale adaptation planning
- **Steps 1-2:** Define project area, gather stakeholders and establish goals *[July-September 2016]*
- **Step 3:** Identify how climate opportunities and risks affect goals *[October 2016]*
- **Step 4:** Assess risks (*probability, consequence, extent, time horizon, etc.*) *[November-December 2016]*
- **Step 5:** Compare risks (*put in probability/consequence table*) *[December 2016-January 2017]*
- **Steps 6-7:** Decide course of action (*e.g., mitigate, transfer or accept risk*) *[January-February 2017]*
- **Step 8:** Draft, revise and prioritize adaptation strategies *[March-June 2017]*

Risk Assessment

- High-level determination using qualitative scales
  - Consequence
  - Likelihood
  - Spatial Extent
  - Horizon
  - Confidence
- Risks vs. Opportunities

Goal 1 **Create vibrant centers, corridors, and neighborhoods while accommodating growth.**

High Consequence Risks

1. Makes it harder to balance competing demands for water (water available to support new urban development)

Stressor	**Increasing Drought**
Consequence	**High** Having adequate water is fundamental to supporting growth (in urban areas — or anywhere, for that matter) and achieving but it would not prevent us from achieving the goal of creating vibrant corridors (which factors in jobs, housing, and other opportunities/amenities).
Likelihood	**Medium** Water quantity (supply-and-demand) vulnerability will likely to be highest in snow-influenced watersheds with existing conflicts over water resources (e.g., fully allocated watersheds with little management flexibility), according to this project's vulnerability assessment. Vulnerability will be lowest where hydrologic change is smallest (i.e., existing rain-dominant watersheds), where there are simple institutional arrangements, and where current water demand rarely exceeds supply. The Nisqually Watershed (home of Yelm) is projected to shift this century from a mixed rain-and-snow watershed (i.e., a watershed that receives 10-40 percent of its precipitation as snow) to a rain-dominant watershed (i.e., a watershed that gets less than 10 percent of its precipitation as snow); the Kennedy-Goldsborough and Deschutes (home of the Olympia, Tumwater, Lacey and Rainier) watersheds will remain rain-dominant systems.
Spatial Extent	**Place** The risk of balancing water needs and having adequate water to support new urban development will be higher in the snow-influenced Nisqually Watershed than the rain-dominant Deschutes Watershed, where most of the county's urbanized population lives.
Horizon	**0-10 years**
Confidence	**Low** Studies conducted in Everett, Tacoma and Seattle and noted in UW CIG's 2015 assessment find that the reliability of municipal water supplies — that is, the probability of meeting demand in a given year — is largely unaffected by projected changes precipitation. The report did not reference any Thurston County communities.

Medium Consequence Risks

2. Increases frequency, depth and duration of inundation of low coastal areas, which could displace coastal residents

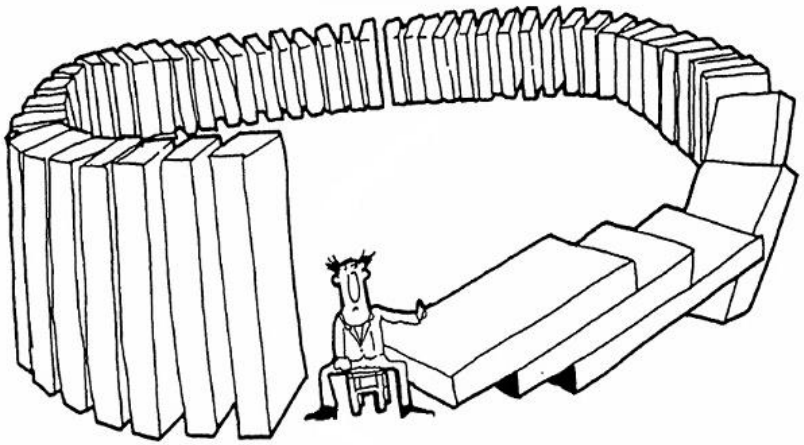
Stressor	**Sea-level Rise**
Consequence	**Medium** Downtown Olympia, Boston Harbor, Nisqually, Mud Bay, Brewery District are among the region's urban center/neighborhood centers that are directly affected by sea-level rise. Other centers, e.g., Woodland District and downtown Yelm, would not be affected. Thus, this risk would not entirely prevent the region from achieving this goal.
Likelihood	**High** Heavy rain combined with a high-tide event already floods downtown Olympia, and frequency and intensity of flooding is projected to increase with rising sea-levels.
Spatial Extent	**Place** Most of downtown Olympia — targeted for 25% (about 5,000 residents) of the City's population growth over the next 20 years — would be affected by sea-level rise over the 21st century.
Horizon	**0-10 years**
Confidence	**High**

Probability

- **Is this risk likely to occur in the project area?**
  - **Low.** (unlikely to occur)
  - **Medium.**
  - **High.** (almost certainly to occur)

Consequence

- **Will this risk prevent us from reaching our goal?**
  - **Low.** Few if any disruptions (life will go on); not as important as many other things; goal can still be attained
  - **Medium.** Could see some disruptions; attaining goal is more difficult but still possible
  - **High.** Major disruption; goal is out of reach or not even attainable

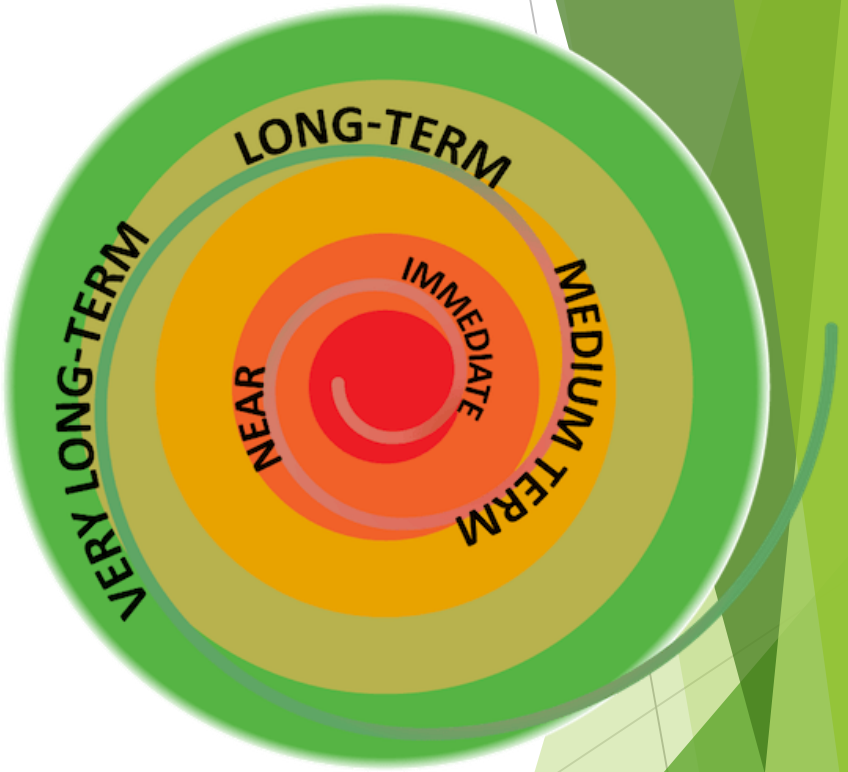


Extent

- **What geographic area will the risk affect?**
  - **Site** (specific properties; a bridge/roadway; sewage treatment plant)
  - **Place** (downtown Olympia, Nisqually Estuary, Alder Lake area)
  - **Extensive** (most or all of the project area; a specific watershed or the Puget Sound waters/shoreline)

Horizon

- **When will problems associated with the risk become evident?**
  - **In the future.** 30+ years
  - **Soon.** 10-30 years
  - **Immediately.** 0-10 years
- Horizon is independent of a risk's likelihood
- Distinguish between a problem occurring due to climate change vs. some other factor



Confidence

- **How sure are you in the analysis/data sources?**
  - **Low.** Little if any scientific analysis or understanding of the risk's impact
  - **Medium.** Some data available, but still not enough to be entirely sure of the risk's impact
  - **High.** Plenty of data to support analysis; more than one study available

Group Exercises

- Split into 4 groups at tables, discuss goals on posters
- Consider whether changes are needed
  - Changes to the risk/stressor may be needed
- Make comments on posters (write on sticky notes or margins)
- Report back to full Stakeholder Advisory Committee
- Discuss as full group

Goal 1: Create vibrant centers, corridors, and neighborhoods while accommodating growth.

High Consequence Risks		Likelihood	Stressor	Spatial Extent	Horizon	Confidence
1.	Makes it harder to balance competing demands for water (water available to support new urban development)	Medium	Increasing Drought	Place	0-10 years	Low
Medium Consequence Risks		**Likelihood**	**Stressor**	**Spatial Extent**	**Horizon**	**Confidence**
2.	Increases frequency, depth and duration of inundation of low coastal areas, which could displace coastal residents	High	Sea-level Rise	Place	0-10 years	High
3.	Increases frequency, depth and duration of inundation of low coastal areas (e.g., downtown Olympia), which could damage or disrupt use infrastructure and result in loss of cultural resources (e.g., homes, roads, etc.)	High	Sea-level Rise	Place	0-10 years	High
4.	Causes urban heat islands, which could affect livability/health in heavily developed centers and corridors	Medium	Warmer Summer	Place	30+ years	Medium
Low Consequence Risks		**Likelihood**	**Stressor**	**Spatial Extent**	**Horizon**	**Confidence**
5.	Stresses sensitive urban landscaping, which could leave them vulnerable to extreme heat, pests or pathogens	High	Increasing Drought	Place	0-10 years	Medium
6.	Increases range and survival of pests and diseases that kill vegetation (urban landscaping)	Medium	Warmer Winter	Place	30+ years	Low

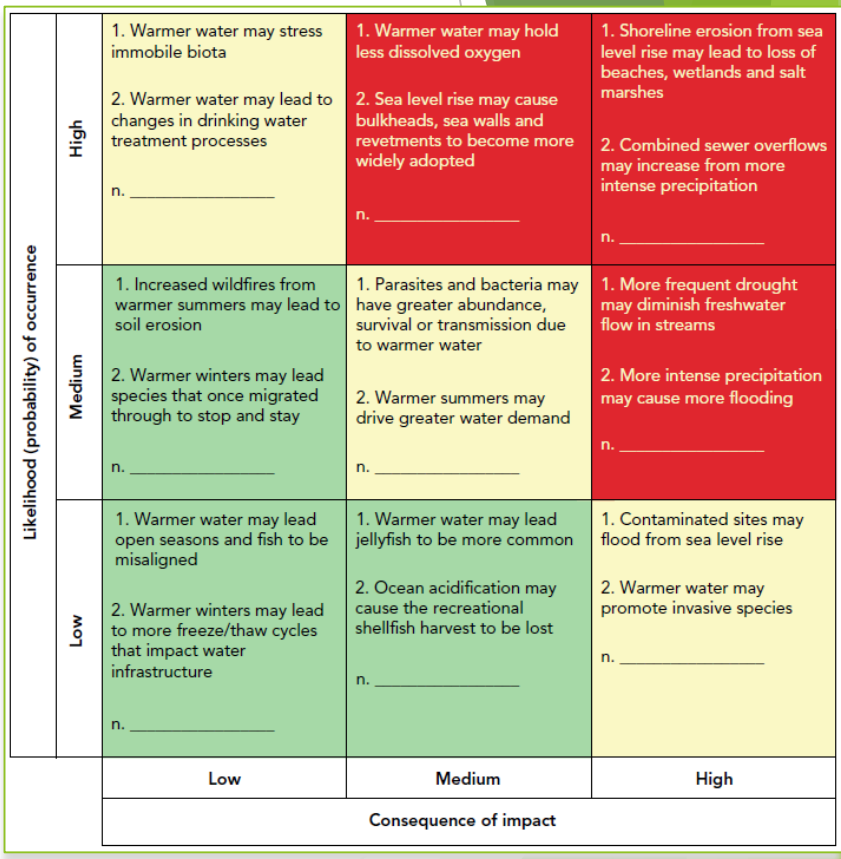
Goal 3: Create a robust economy through sustainable practices.

High Consequence Risks		Likelihood	Stressor	Spatial Extent	Horizon	Confidence
24.	Makes it harder to balance competing demands for water (water available to support new development)	High	Increasing Drought	Place	0-10 years	Medium
25.	Raises the risk of floods and landslides, which could damage private property and result in economic losses	High	Increasing Storminess	Site	0-10 years	High
26.	Threatens to flood low-lying industrial, commercial, agricultural, and residential properties, disrupt commerce and damage infrastructure (power, water, etc.)	High	Sea-level Rise	Place	30+ years	High
27.	Raises the risk of floods and landslides, which could damage infrastructure (roads, utility lines, etc.) and cut off access to goods and services	High	Increasing Storminess	Place	0-10 years	High
28.	Threatens to flood local highways, railways, bridges, port marine terminal and other transportation infrastructure that are critical to moving people and goods throughout the region	High	Sea-level Rise	Place	30+ years	High
Medium Consequence Risks		**Likelihood**	**Stressor**	**Spatial Extent**	**Horizon**	**Confidence**
29.	Reduces summer hydropower production, a comparatively clean and inexpensive electricity source for commercial and residential customers	High	Increasing Drought	Extensive	30+ years	Medium
30.	Increases volume of urban runoff and flooding, which could render inadequate some stormwater/flood-control facilities	High	Increasing Storminess	Place	0-10 years	High
31.	Raises the risk of floods and landslides, which could disrupt transportation, business, school, emergency service, and public works and private utility operations	High	Increasing Storminess	Place	0-10 years	High
32.	Raises the cost of new development and redevelopment	High	Sea-level Rise	Place	30+ years	Medium
33.	Raises the risk of wildfires which could damage forests that are important to the region's economy	Medium	Increasing Drought	Place	30+ years	Medium
35.	Increases demand for and cost to provide services (social, emergency, etc.)	Medium	Population Change	Extensive	30+ years	Low
36.	Puts more strain on transportation (roads, transit, etc.)	Medium	Population Change	Extensive	30+ years	Low
37.	Makes it harder to balance competing demands for water (water available for agriculture and industry)	Medium	Increasing Drought	Place	0-10 years	High
Low Consequence Risks		**Likelihood**	**Stressor**	**Spatial Extent**	**Horizon**	**Confidence**
38.	Raises risk of low crop yields or failure due to warmer temperature, reduced summer precipitation and increased pest prevalence	High	Warmer Summer	Extensive	30+ years	Medium
39.	Thermally stresses salmonids, which support economically important fisheries	High	Warmer Winter	Extensive	0-10 years	High
40.	Makes it harder to balance competing demands for water (water available for salmon fishery)	High	Increasing Drought	Extensive	0-10 years	High
41.	Reduces food available for and survival of salmon and other marine life	High	Ocean Acidification	Extensive	30+ years	Medium
42.	Reduces snowpack and alters stream volume and temperature, impacting long-term productivity of anadromous fish populations and fisheries	High	Warmer Winter	Extensive	30+ years	High
43.	Raises the risk of floods and landslides, which could damage agricultural crops, buildings and equipment	High	Increasing Storminess	Place	0-10 years	High
45.	Increases the risk of marine water stratification and hypoxia, which could alter the timing of spring plankton blooms that support the marine food web (including salmon and other economically important fish)	Medium	Warmer Winter	Extensive	30+ years	Medium
46.	Rising temperatures increases risk for heat injuries which will increase demand/cost for emergency medical services and hospitalizations	Medium	Warmer Summer	Extensive	10-30 years	Medium
47.	Increases the rate of erosion of unprotected coastal bluffs, which could threaten the property and safety of nearby residents	Medium	Sea-level Rise	Site	30+ years	Medium
50.	Raises the cost of development (flooding and runoff mitigation measures)	Low	Increasing Storminess	Site	0-10 years	Medium
51.	Increases extreme heat events, which could result in project delays and increased costs (e.g., in the construction industry)	Low	Warmer Summer	Site	10-30 years	Low

Next Steps

- ***12/22/16:** Stakeholders continue discussion of risk analyses (*if necessary*)
- ***1/26/17:** Project team presents stakeholders 3x3 grid of risks' probability and consequence (*low, medium, high*)
- ***2/23/17:** Project team presents draft evaluation for each risk *(do we mitigate, transfer, or avoid risks?)*

**** Stakeholder meeting***



Likelihood (probability) of occurrence				
	High	1. Warmer water may stress immobile biota 2. Warmer water may lead to changes in drinking water treatment processes n. _____	1. Warmer water may hold less dissolved oxygen 2. Sea level rise may cause bulkheads, sea walls and revetments to become more widely adopted n. _____	1. Shoreline erosion from sea level rise may lead to loss of beaches, wetlands and salt marshes 2. Combined sewer overflows may increase from more intense precipitation n. _____
	Medium	1. Increased wildfires from warmer summers may lead to soil erosion 2. Warmer winters may lead species that once migrated through to stop and stay n. _____	1. Parasites and bacteria may have greater abundance, survival or transmission due to warmer water 2. Warmer summers may drive greater water demand n. _____	1. More frequent drought may diminish freshwater flow in streams 2. More intense precipitation may cause more flooding n. _____
	Low	1. Warmer water may lead open seasons and fish to be misaligned 2. Warmer winters may lead to more freeze/thaw cycles that impact water infrastructure n. _____	1. Warmer water may lead jellyfish to be more common 2. Ocean acidification may cause the recreational shellfish harvest to be lost n. _____	1. Contaminated sites may flood from sea level rise 2. Warmer water may promote invasive species n. _____
		Low	Medium	High
		Consequence of impact		