Climate Change & Water: The Metrics Don’t Lie

Albany Kiwanis
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Dr. Richard A. Meganck
Guest Speaker

Invited by:
Bob Kaufman (So, blame it on him!!!)

Admissions as to My Background

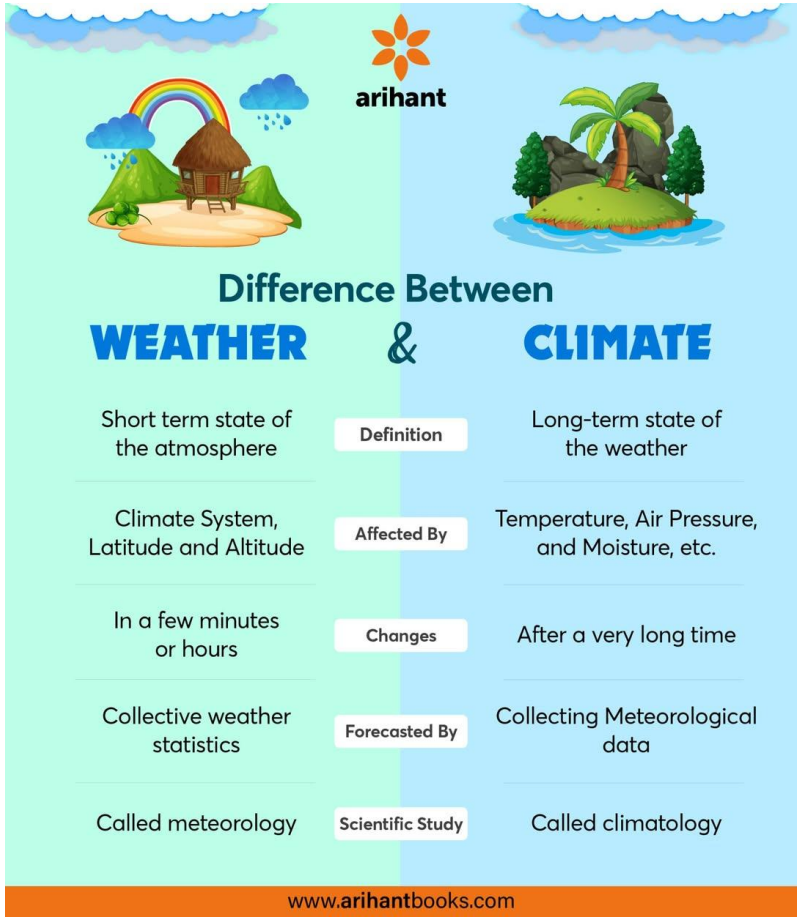
- I am a hydrologist who worked 40 years in the United Nations = a built-in bias towards science and principles of international development / humanitarian assistance.
- I am a firm believer that we are living through a period of changing climate, and water fragility based on long-term data analysis leading to trend lines ± 20-50+ years.
- I do not subscribe to climate conspiracy theories.
- I will send this program electronically to anyone who desires.

Climate Change & Water: Trends and Data Globally and in Oregon

- Trends are generally more subjective and open to debate.
- Data, if collected and analyzed properly, are more objective.

- Focus on climate change / water - data and trends globally and then Oregon references.

Weather (short term data)
Climate (long term trends based on data)



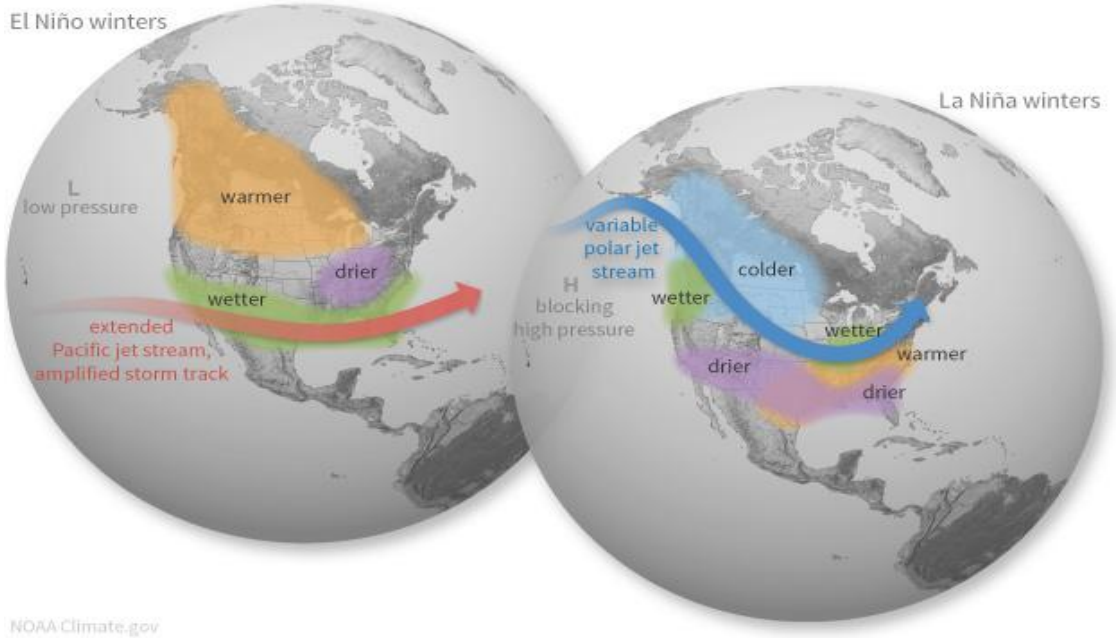
Globally – Four Main Influences / Indicators of Global Climate Change (of many)

- El Nino / La Nina Cycles (long term trends 30-100 years)
- Land – Ocean Temperatures Data / ??Trends
- Sea Level Rise Data / ??Trends
- Impact to Species Data / ??Trends

I. El Nino / La Nina – Long Term (30-100 year cycles)

El Niño and La Niña are opposing weather patterns, characterized by variations in sea surface temperatures (impacted by ocean upwellings and temperature gradients) impacting global weather trends.

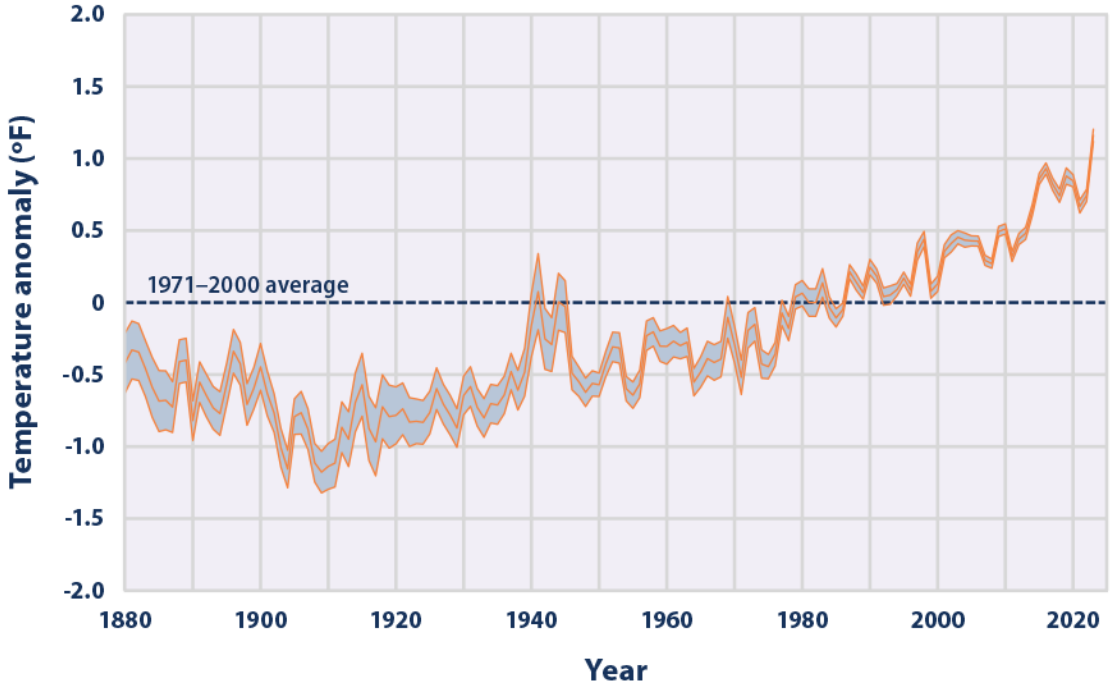
El Niño is the warm phase with above-average temperatures**. La Niña** is the cold phase with below-average temperatures.



II. Sea Temperature trends 1880-2020 (NOAA)

The average sea surface water temperature has increased by 0.5°F (0.3°C) per decade since the mid-20th century (La Nina phase), and is projected to increase by an average of 2.2°F per decade (1.2°C) by the mid-21st century – a 400+%>

A 1.5℃ rise in sea / land temperatures globally is considered a tipping point, which could be reached by 2030 (measured from the Zero baseline of 1970).



III. Sea Level Trends 1900-2020 (NOAA)

Rising sea levels are driven by two main processes:

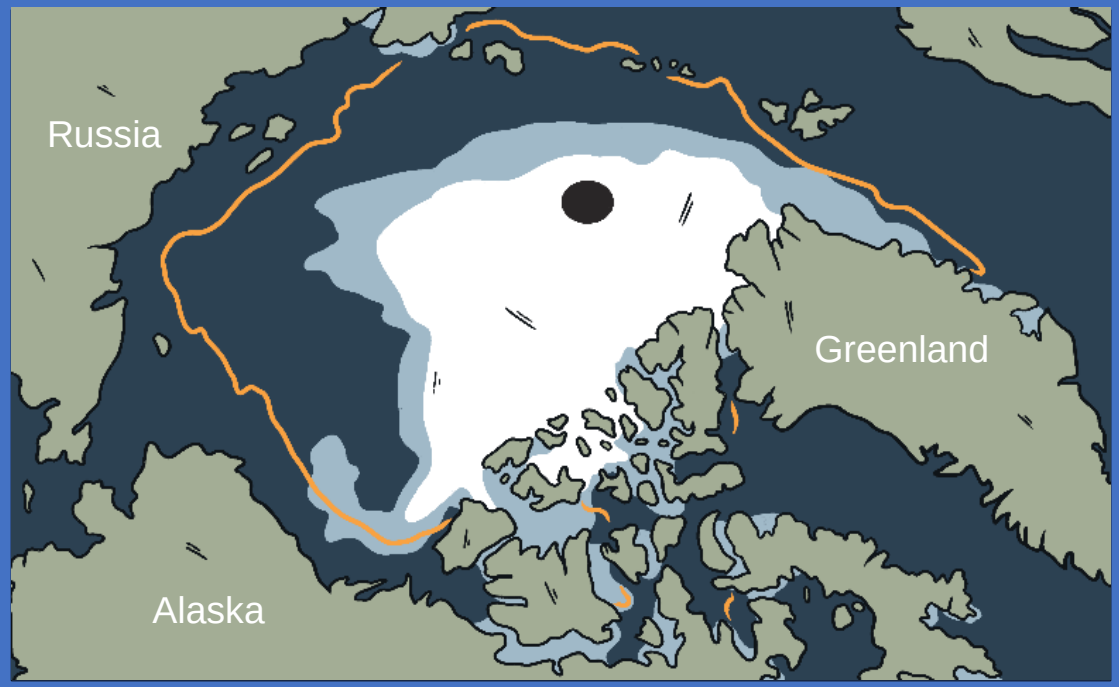
1. **Ice Melt:** When the atmosphere and ocean get warmer, ice sheets and glaciers melt, resulting in the addition of fresh water to the ocean.
2. **Thermal Expansion:** As ocean water gets warmer, it expands, causing sea levels to rise.
3. Globally - Sea level rise of ± 230mm = 9” between 1900 - 2020.

Example: Artic Ice Shield Retreat

The bright surface of the ice reflects 80% of the sunlight that hits it back into space. This keeps the polar regions cool and moderates the global climate.

When the area of sea ice is reduced, less sunlight is reflected back into space. This causes more ocean warming driving faster climate change.

The orange line on the picture marks the minimum sea ice coverage in 1980. The white ice shows the sea ice coverage in 2020. The difference exceeds one million sq. miles, 10x the size of Oregon (98,000 sq. miles).



Climate Change Impact in Oregon

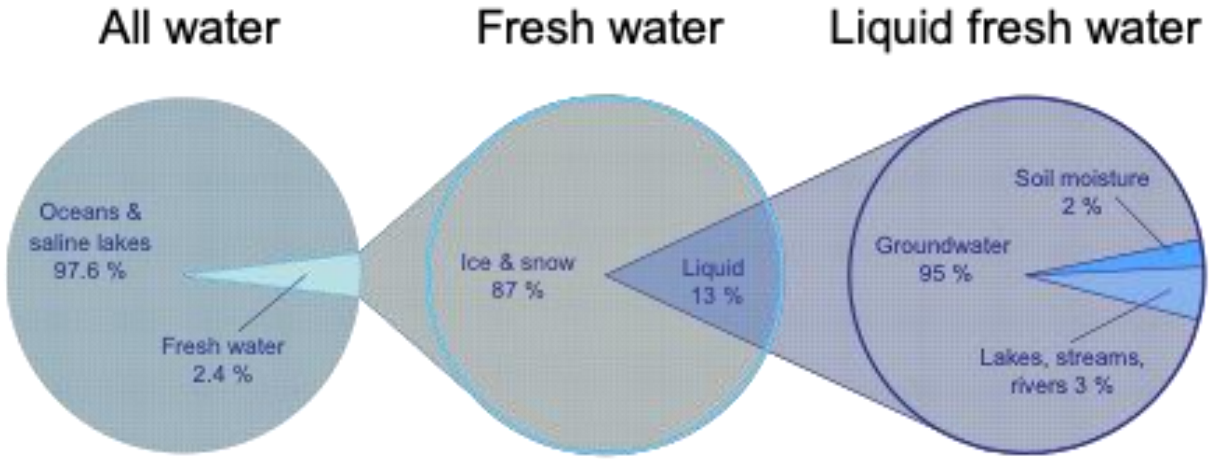
Increased Temperatures / Water Balance

Extreme Weather Events

Coastal Impacts

Other Impacts

Water - the Key to Life
But How Much is Available in OREGON?

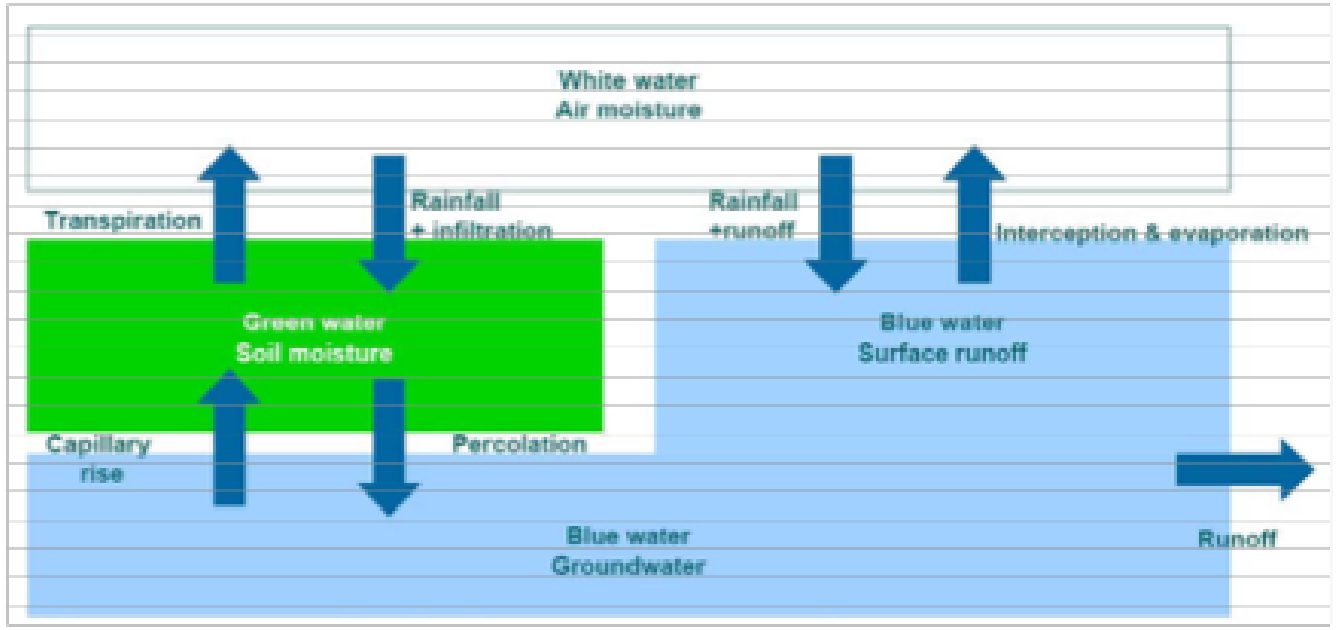


Three startling facts in Oregon:

- 70% of Oregon's drinking water comes from groundwater.
- 88% of public water systems rely at least in part on groundwater.
- 95% of Oregon's available freshwater is stored underground.

Water is the Key to Life
Liquid Fresh Water

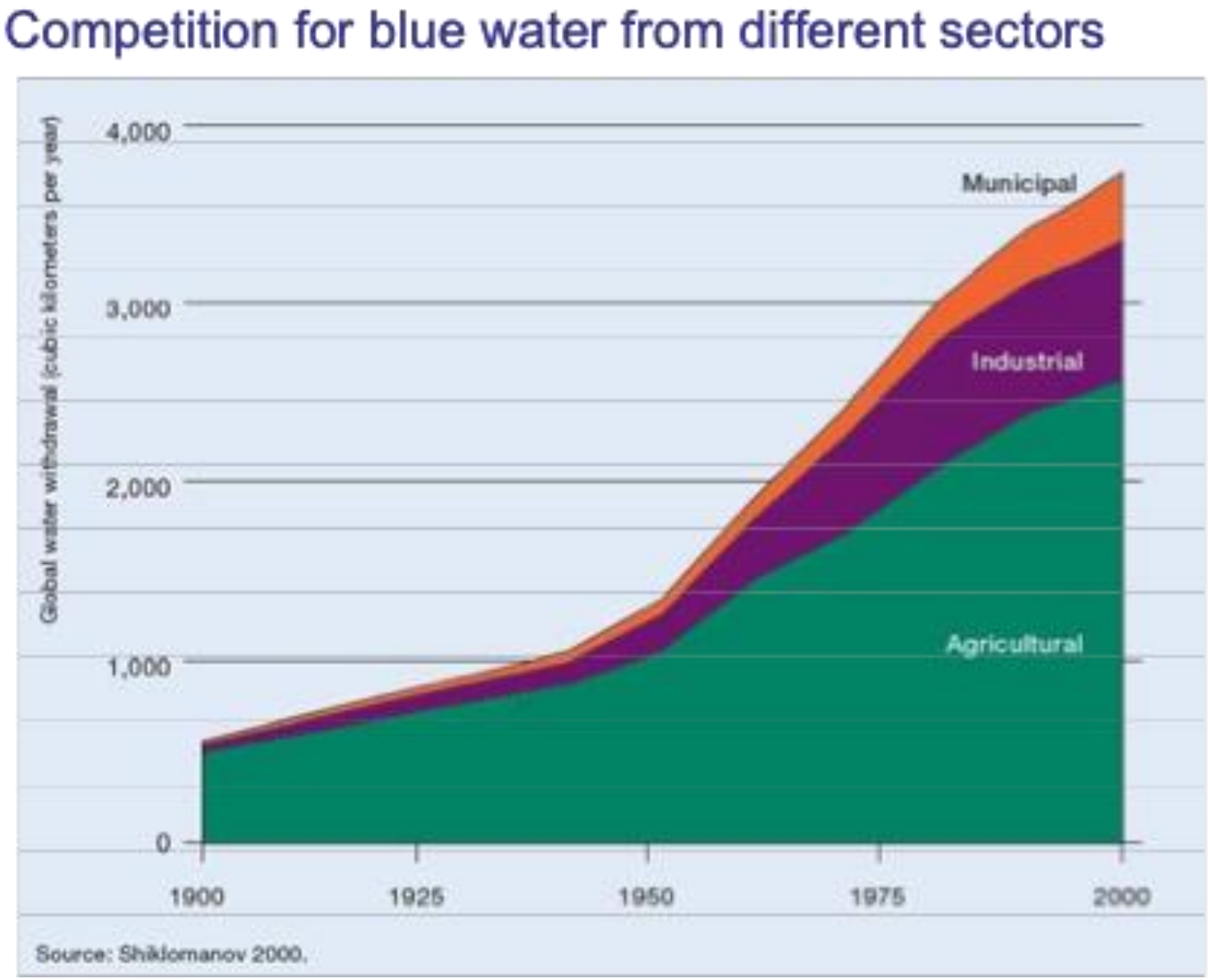
Blue water : in reservoirs, lakes, rivers, aquifers
Green water : in soil moisture and vegetation



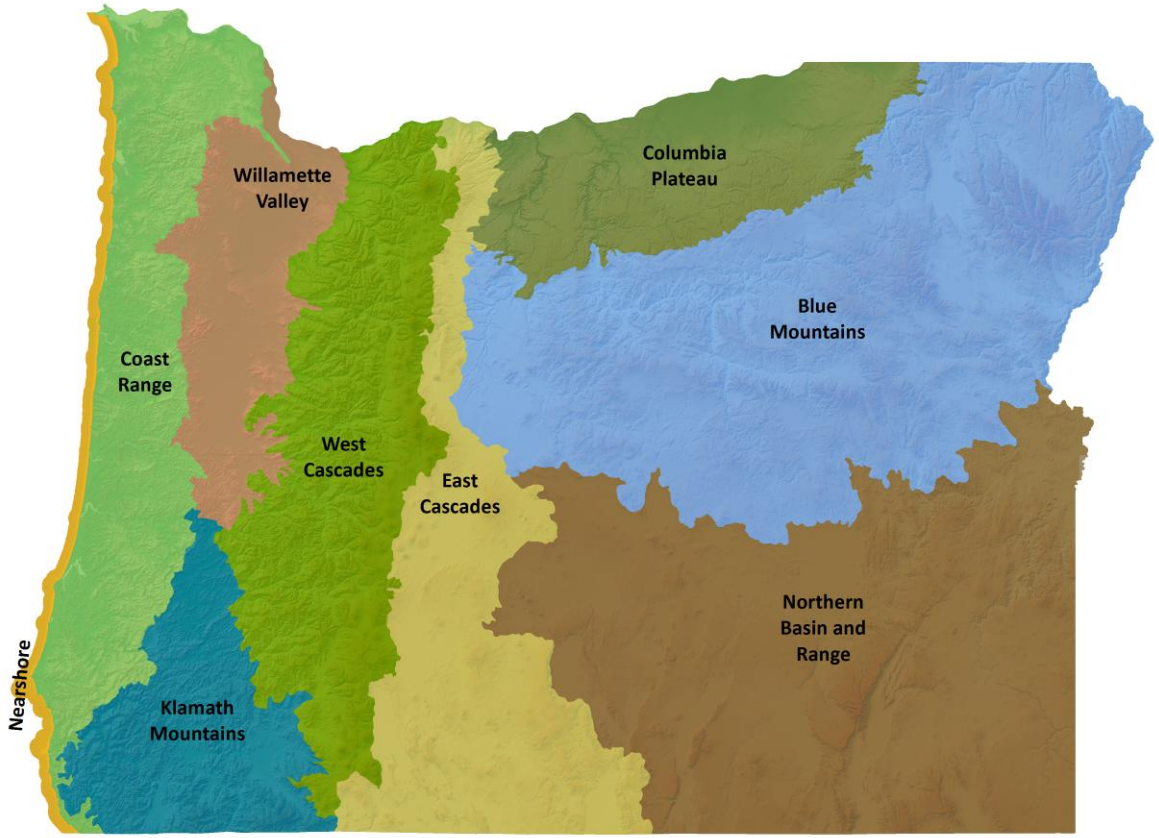
Oregon vs. USA

USA: 70% water use (Blue water) for Ag.

OR: 85% water use (Blue water) for Ag.



How Does Oregon Compare Nationally / Globally?
Complex Geography - Macro-Eco-Regions



Drought Susceptibility
(soil & vegetation moisture, precipitation models)

Intensity

- None
- D0 abnormally dry
- D1 moderate drought
- D2 severe drought
- D3 extreme drought
- D4 exceptional drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/about.aspx

Author

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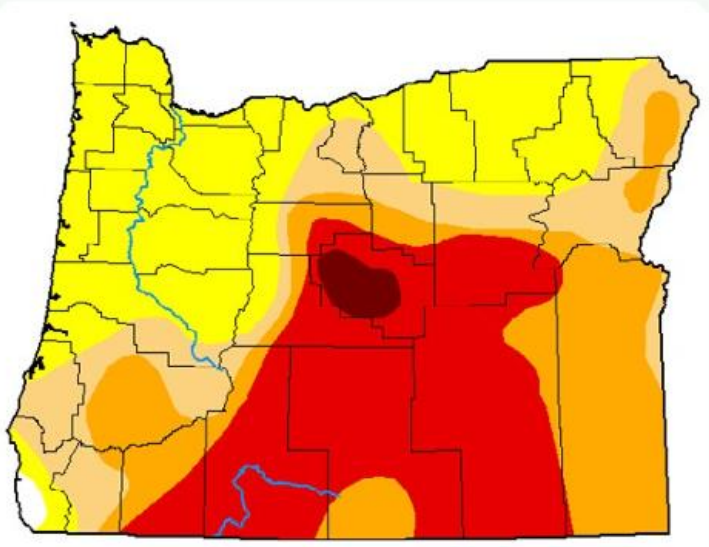
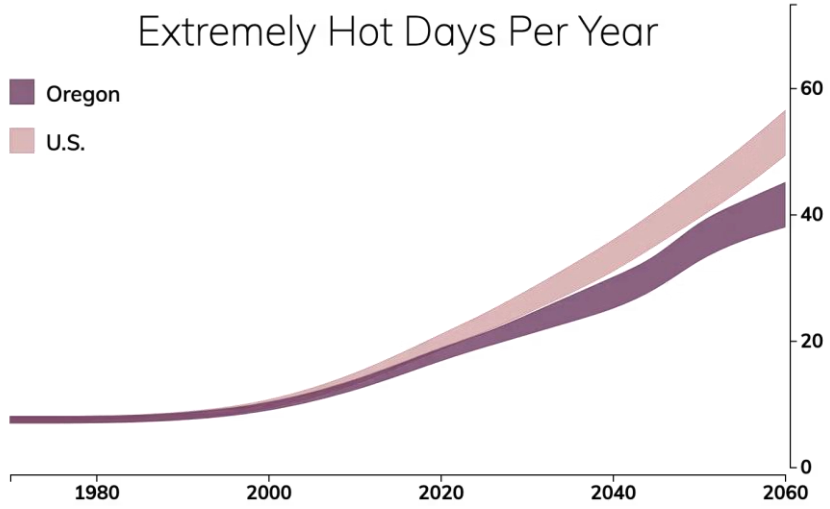


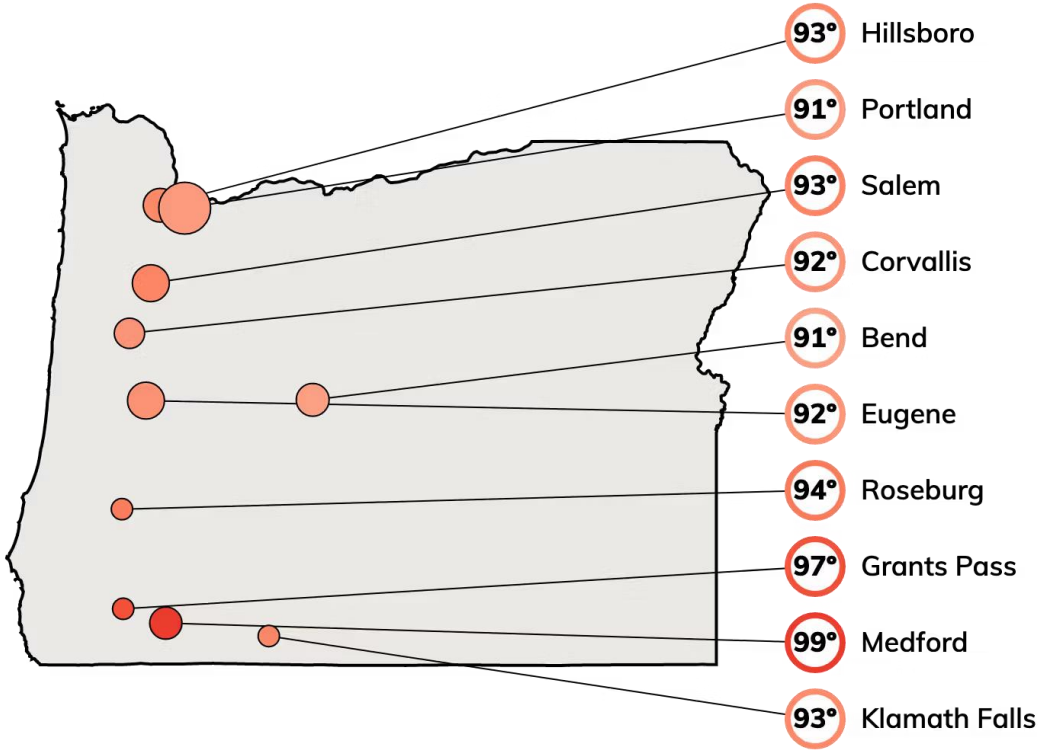
Oregon Average Temperature Trends 1980-2060
We are doing better than most of the USA

Oregon's average land temperatures increased by ± 0.5°F (1.8°F Nationally) over the last century but is likely to become as much as 2.2°F warmer in the next 50 years following global trends. The U.S. average is 55 extreme days of heat; Oregon is 46 days of extreme heat – total days Statewide.



“Extreme” Weather – “Extreme” Climate

An extremely hot day in Oregon depends on your location: **98ºF**is extremely hot for **Medford**, while **90ºF** is considered extremely hot for **Klamath Falls**, based on historical maximum temperatures on the top 2% of days in an average year.



Oregon's Complex Climate Future – issues at our doorstep – risk, intensity, frequency

1. Temperatures and Precipitation:

- Increased temperatures
- Changing precipitations patterns
- Reduced snowpack and ground moisture

2. **Extreme Weather Events:**

- Wildfires urban-forest fringe
- Floods
- Droughts
- Heatwaves

3. Coastal Impacts:

- Sea level rise coastal flooding
- Ocean acidification, fisheries viability
- Algal blooms, recreation
- Land subsidence, insurance rates
- Tsunamis, life risk, insurance rates, security

4. Other Impacts

- Water shortages / quality
- ecosystem biodiversity
- Human health – wildfire smoke, vulnerable populations, vector borne diseases
- Agriculture & Fisheries competition for H_2O

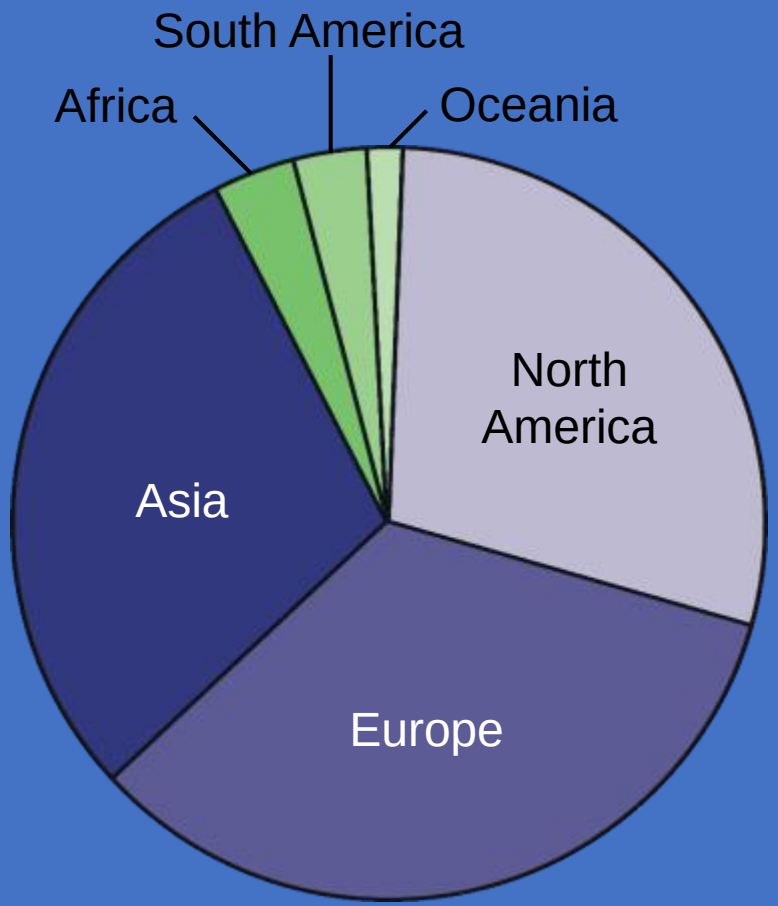
What Causes Climate Change?

Climate change can be caused gradually (millennia) by **natural processes or suddenly by large events**, such as a massive meteorite strike or volcanic activity. However, the rapid climate change we are experiencing now is due to three main **human activities**:

- **Burning fossil fuels** for heating and cooking, generating electricity and powering vehicles releases carbon dioxide into the atmosphere.
- **Deforestation** (destruction of forests) releases carbon dioxide and reduces the number of trees able to capture carbon dioxide from the atmosphere.
- **Reduction of biodiversity** creates an unstable ecosystem. Nature loss leads to ecosystems that are less able to capture carbon from the atmosphere and less resilient to rising temperatures.

The Political Message - Who Causes Climate Change?

The 50 least developed countries are thought to have contributed 1% of the greenhouse gases that have caused global warming. The USA, the EU and China alone have contributed around 60%.



Who Does Climate Change Affect?

In the long term, everyone will feel the effects of climate change. However, some people are currently more affected than others.

In most cases, the wealth of prosperous countries has come from activities which contribute to greenhouse gas emissions. This wealth allows these countries to protect themselves from the effects of climate change.

Poorer countries are less able to adapt to climate change and therefore suffer the most from its effects. They are also less able to develop because they need to focus on addressing the challenges caused by climate change.

The countries who have contributed the least to the climate crisis are the ones who are affected the most.

Is this fair? In 2023, there were about 32 M environmental refugees

Who Can Fix It?

Governments can make laws and policies that reduce the amount of greenhouse gas emissions.

Businesses can change their processes to run more sustainably (innovation, research & development investments)

We can all make choices in our own lives that reduce our carbon footprint (the impact our actions and purchases have on climate change).

We can also use our voices to let businesses and governments know that we want them to act quickly to reduce their impact on climate change.

THANK YOU FOR YOUR ATTENTION