

Impacts of climate  
{ change –  
globally & locally

- Effects on human society and our natural environment that are caused by changes in climate, such as rises in Earth's global temperature

# Impacts of Climate Change

# IPCC – Intergovernmental Panel on Climate Change

- Formed in 1988 to evaluate the risks of human-caused climate change
- International scientists share knowledge about climate change (ie: consensus)
- IPCC reports identified many potential impacts of climate change

# 1. Rising Sea Level

- ❖ Glaciers and ice sheets melting and ocean warming (thermal expansion) will cause sea level of oceans to rise



Lakeshore West in Toronto, July 2013

# 1. Rising Sea Level

- This leads to increased risk of flooding



# 1. Rising Sea Level

- Tuvalu, Federated States of Micronesia, Bangladesh, Netherlands, Florida all at high risk of flooding



**Tuvalu**

# 1. Rising Sea Level

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**Florida**

## 2. Impacts on Agriculture

- Dry regions (parts of Africa) will get even less water – increased drought
- Crops will be less productive leading to famine
- Other areas (ex: southern US and Japan) will get increased rain also leading to damaged crops

# 3. Impacts on Ecosystems

- As current habitats become unsuitable, plants and animals will migrate towards the poles – leads to changing ecosystems
- Leads to a loss in biodiversity; less biodiversity affects food webs, resources etc.

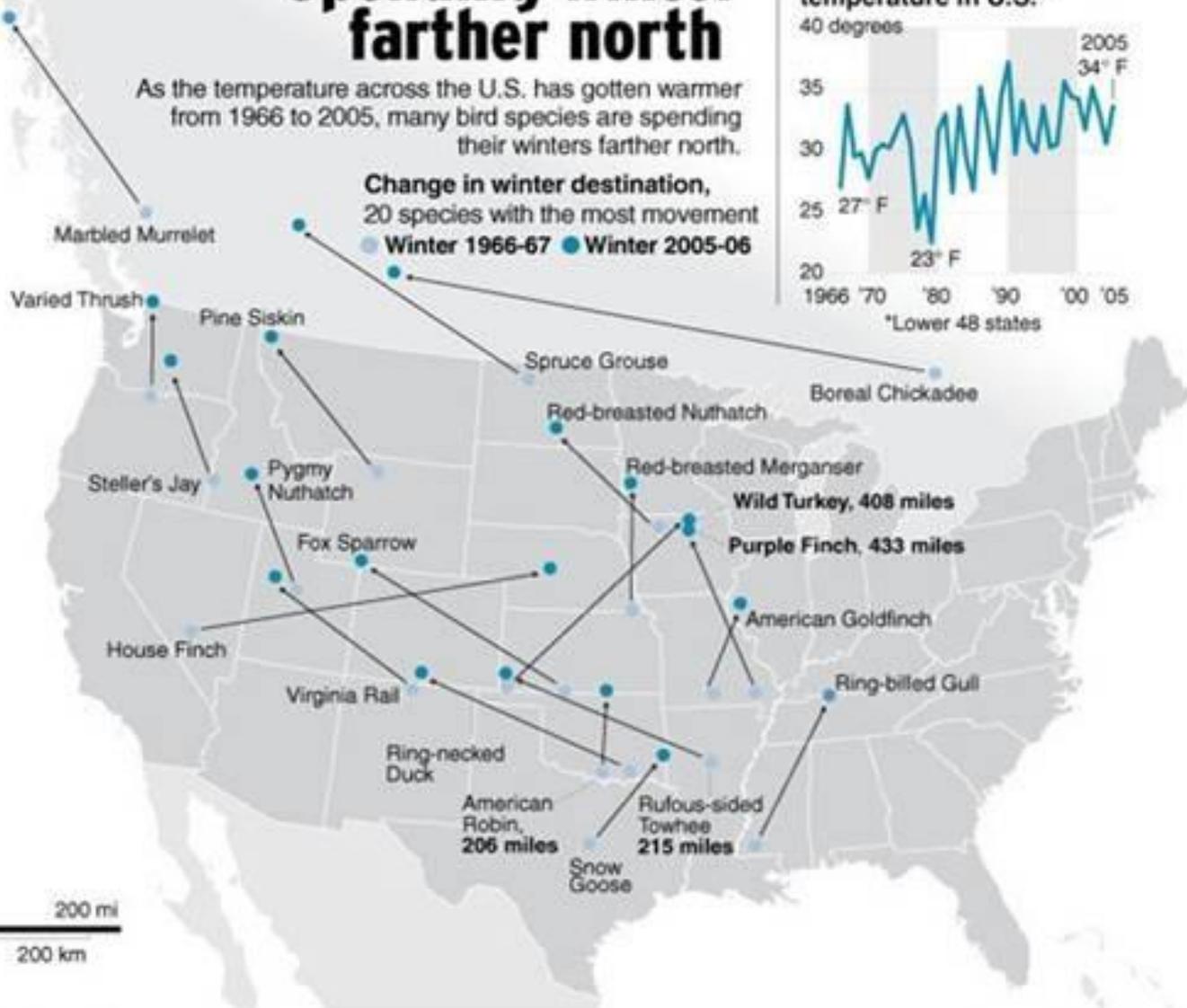
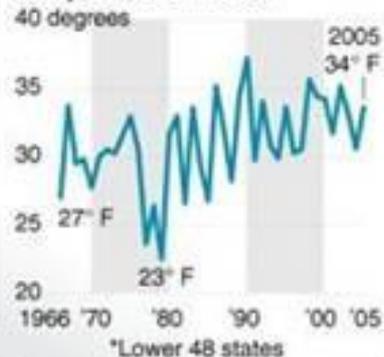
# Spending winter farther north

As the temperature across the U.S. has gotten warmer from 1966 to 2005, many bird species are spending their winters farther north.

**Change in winter destination,**  
20 species with the most movement

● Winter 1966-67 ● Winter 2005-06

Average January temperature in U.S.\*



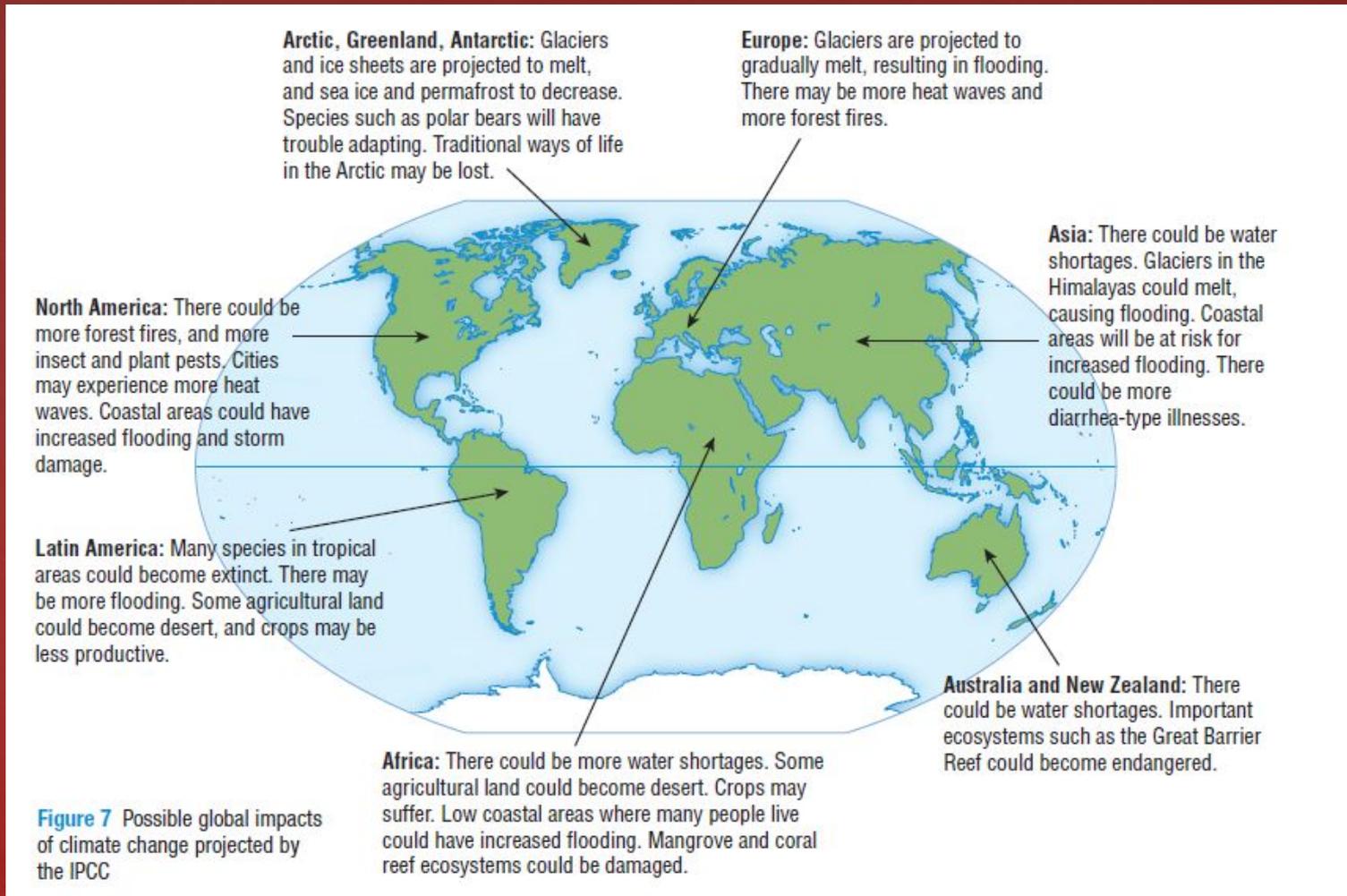
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# 4. Impacts on Human, Plant and Animal Health

- Pests, diseases and disease carriers that inhabit warmer climates could spread towards the poles.
- Ex: malaria and dengue fever transmitted by mosquitoes, plant diseases, pests that affect crops and forests



# Continental Changes



# Impacts in the Canadian Arctic

- Due to melting sea ice in the arctic, polar bears have limited mobility (ie: polar bears cannot reach their food/seals)



# Impacts in the Canadian Arctic

- Permafrost (permanently frozen soil) is melting creating sinkholes



# Some possible benefits of climate change in the Arctic

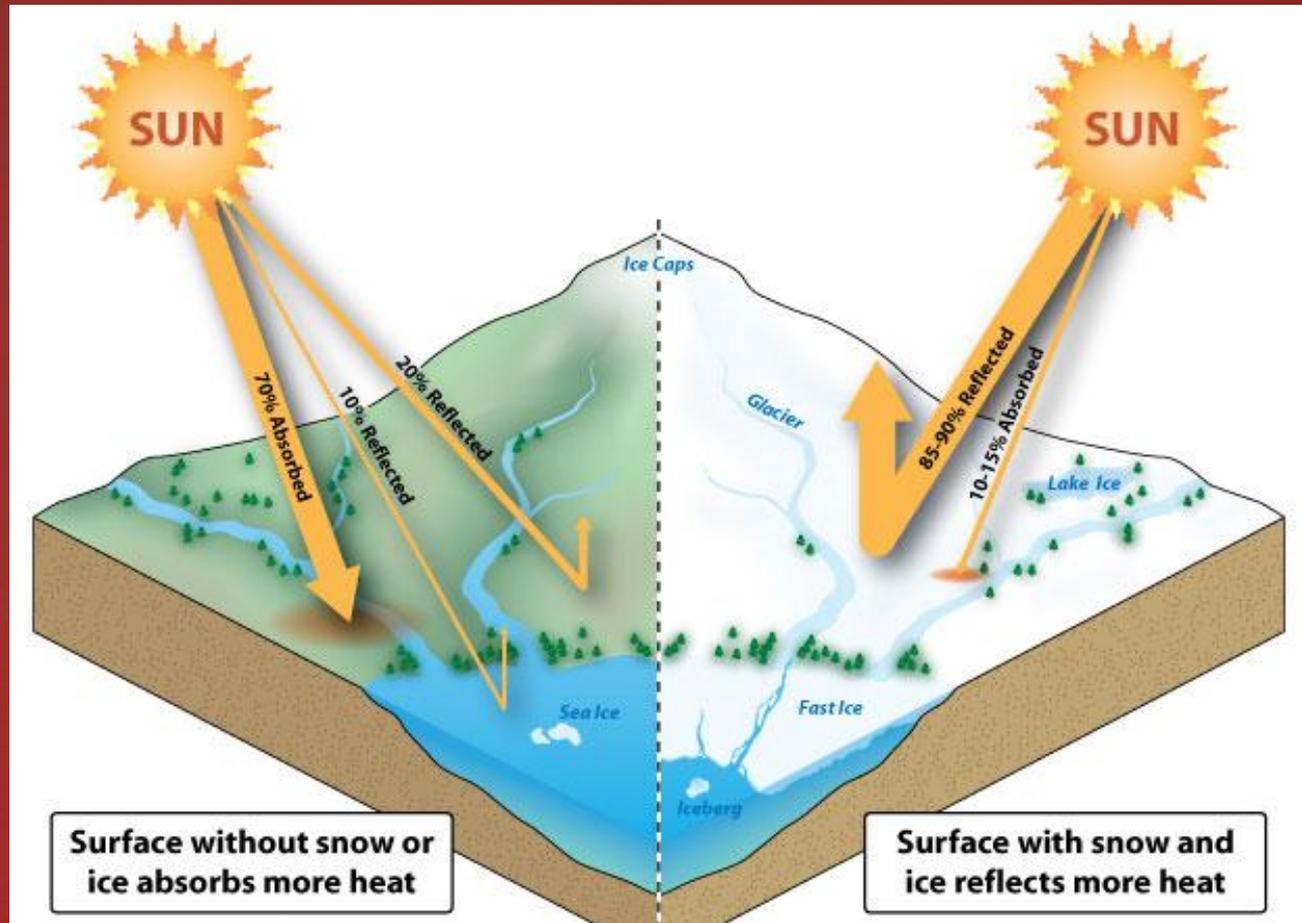
- Ships can reach the Arctic because of less ice (economic benefit)
- Trees are growing in the warmer Arctic climate helping to absorb CO<sub>2</sub>
- Perhaps farms can grow crops in the Arctic
- But, are these “really” beneficial??

# Climate Changes in the Arctic Affect the Rest of the World!



## Albedo effect

- Less ice in the arctic means less of the Sun's energy is being reflected back into space



- ❖ Release of Carbon Dioxide
  - ❖ Carbon dioxide and methane that was stored in the permafrost are being released as it melts

Climate Changes in the Arctic  
Affect the Rest of the World!

## • Sea Level

- Melting ice raises the sea level

## • Ocean Currents

- Fresh water from melting ice will flow into the Arctic Ocean causing the ocean currents to slow or stop (thermohaline circulation)

Climate Changes in the Arctic  
Affect the Rest of the World!

- Biodiversity

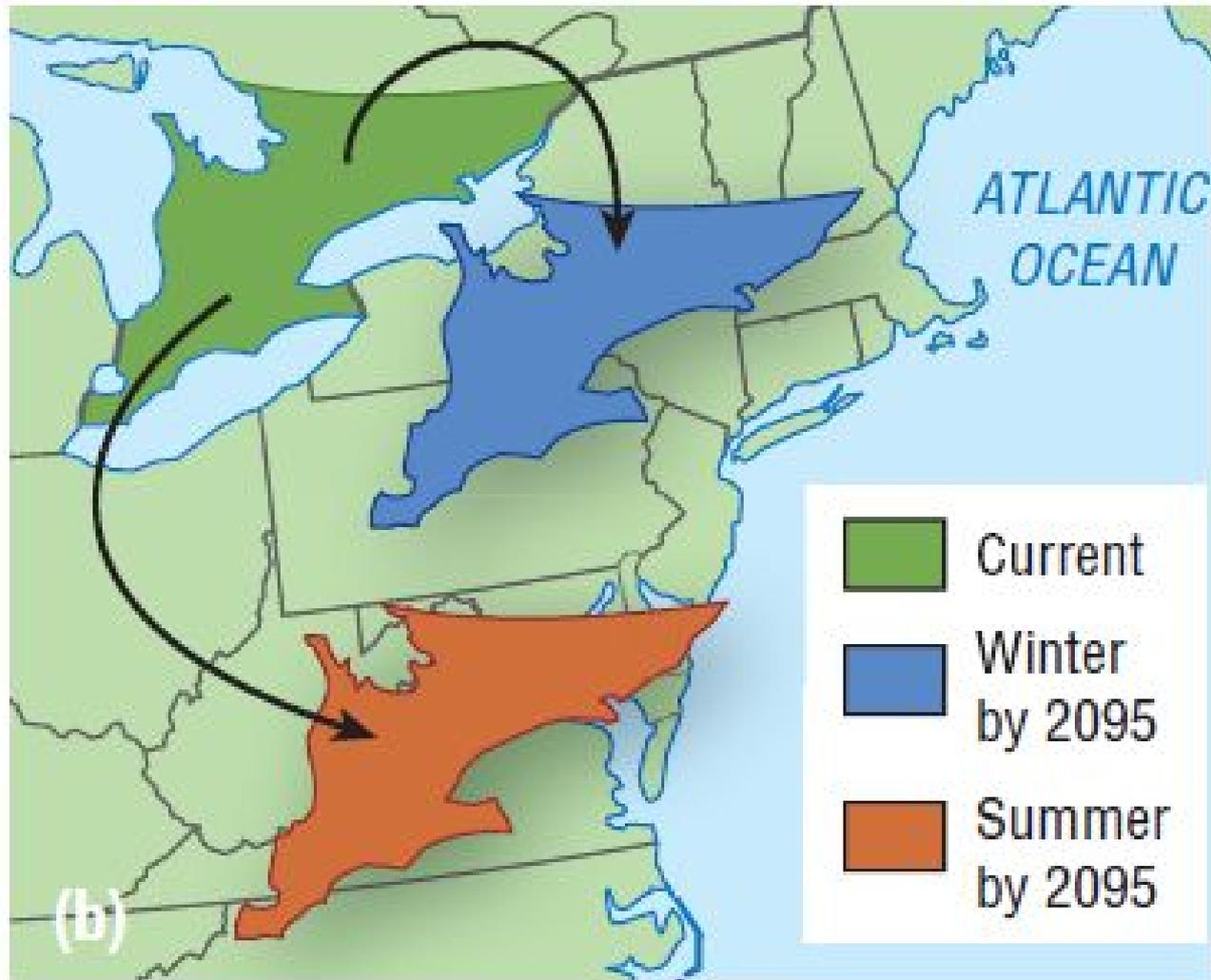
- Migratory species with breeding grounds in the Arctic may move to new ecosystems

- Shipping and Transportation

- As polar ice caps melt, ships will be able to travel shorter routes (less money and energy)

Climate Changes in the Arctic  
Affect the Rest of the World!

# Local Impacts -- Ontario



- Ontario's average temperature could increase by 3 to 6 degrees Celsius in the winter and 4 to 8 degrees Celsius in the summer

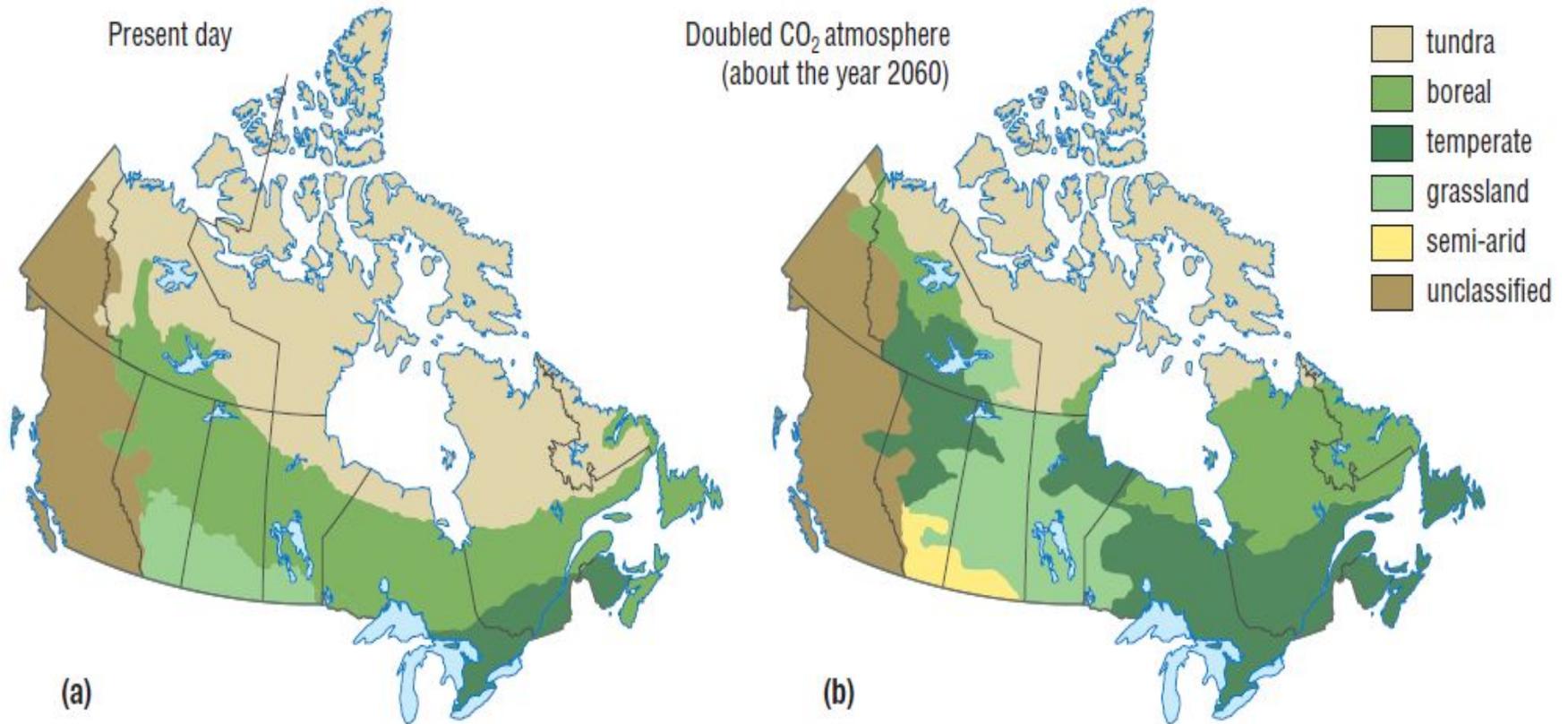
# Temperature & Precipitation

- ☛ Winters will be warmer
- ☛ More rainfall overall, but some areas will become drier while others will become wetter

# Changing Lake Levels

- Water levels of Lake Superior have dropped significantly over the last few years
- Will we see other Lakes also lose water due to evaporation?
  - Warm lake water leads to fish deaths; increased algae growth

# Ecosystems



**Figure 3** Ecoregions will move northward as carbon dioxide concentrations and temperatures increase.

- As eco-regions move northwards, we could see the invasion of species that previously weren't in the ecosystem (ex: Kudzu)



**Figure 4** Kudzu is an invasive plant that grows over almost anything. It may arrive in Ontario as the average winter temperature rises.

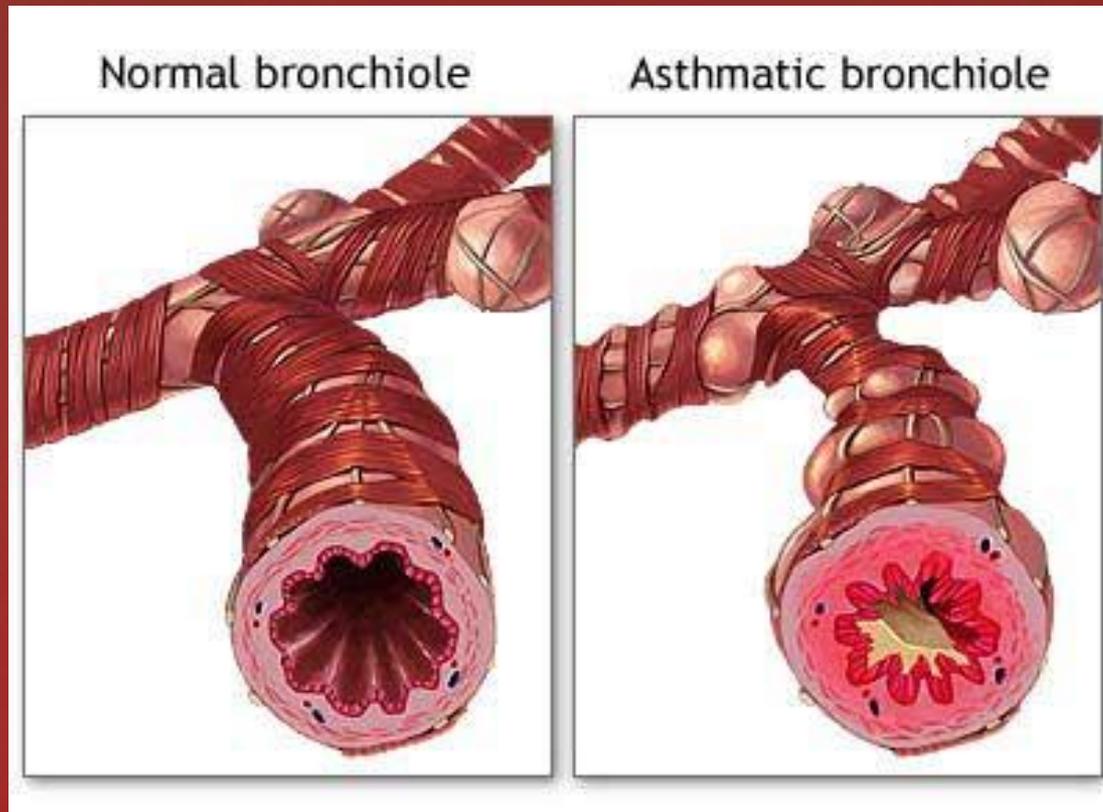
# Disease & Illness

- Increase in population of disease-carrying organisms (ex: West Nile disease (mosquitoes); Lyme disease (deer ticks))



# Disease & Illness

- Increase in respiratory disorders (asthma etc)



# Agriculture

- Changes in growing season could be beneficial for soybean and corn farmers, but we could also see growth of unwanted plants
- Crops that previously could not have been grown in Ontario, may be able to grow here

# Forests

- Hotter, drier summers will lead to more forest fires



# Forests

- Increase in insect pests will destroy forests



# Forests

- As forests become less healthy, they will become a carbon source instead of a carbon sink

# Electricity Use

- As summers get hotter, we will use more electricity for air-conditioning which will produce even more greenhouse gases
- In the winter, energy use may decrease
- In Ontario, about  $\frac{1}{4}$  of our electricity is produced using hydroelectric power which does not produce greenhouse gases, but an increase in electricity usage will lead to more blackouts