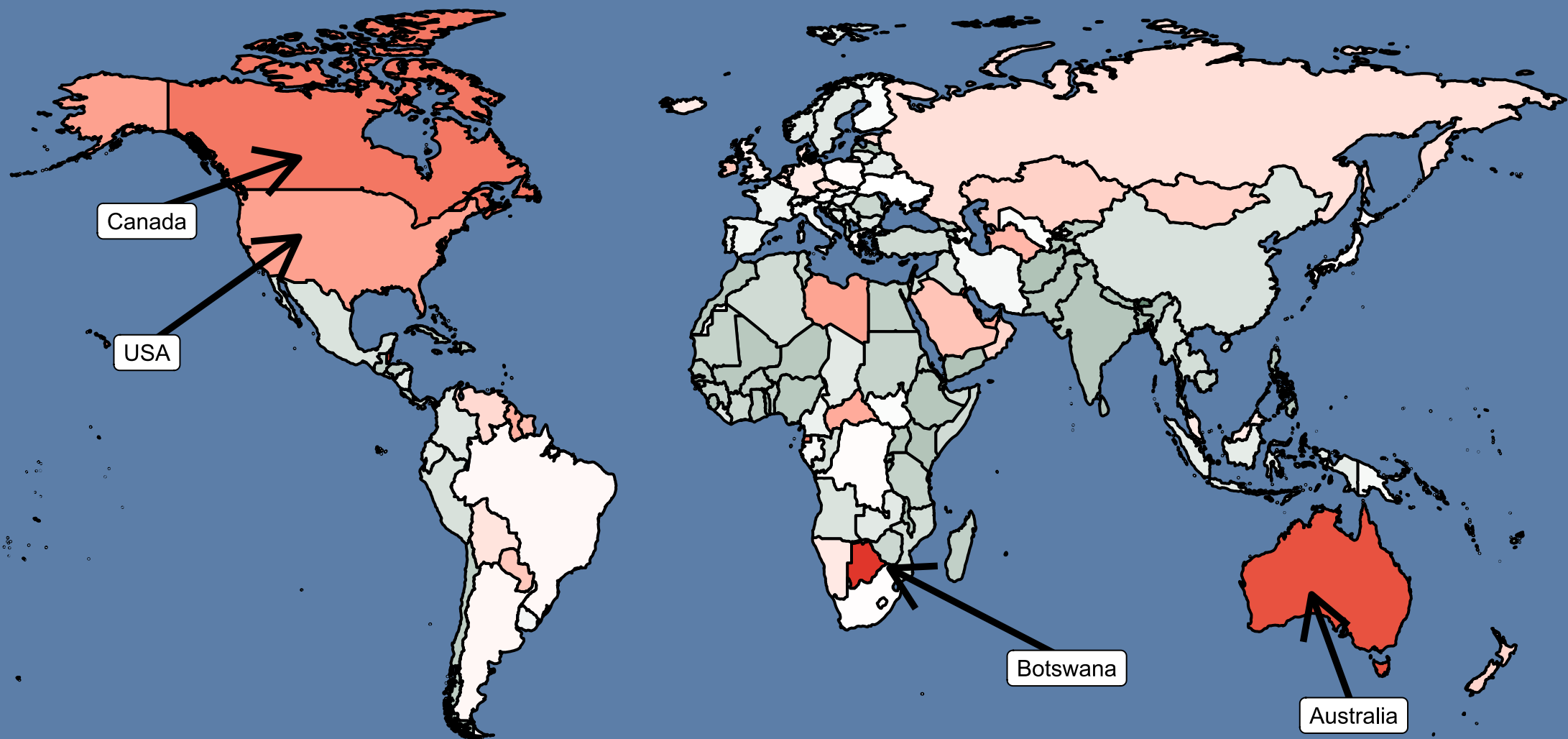


Greenhouse gas(GHG) emmision and its impact on temperature change

Climate change refers to the long-term changes in the climate that occur over decades, centuries or longer. It is caused by rapidly increasing greenhouse gases in the Earth's atmosphere primarily due to burning fossil fuels (e.g., coal, oil, and natural gas). These heat-trapping gases are warming the Earth and the Oceans resulting in rising sea levels, changes in storm patterns, altered ocean currents, changes in rainfall, melting snow and ice, more extreme heat events, fires, and droughts. These impacts are projected to continue and in some cases, intensify, affecting human health, infrastructure, forests, agriculture, freshwater supplies, coastlines, and marine systems.

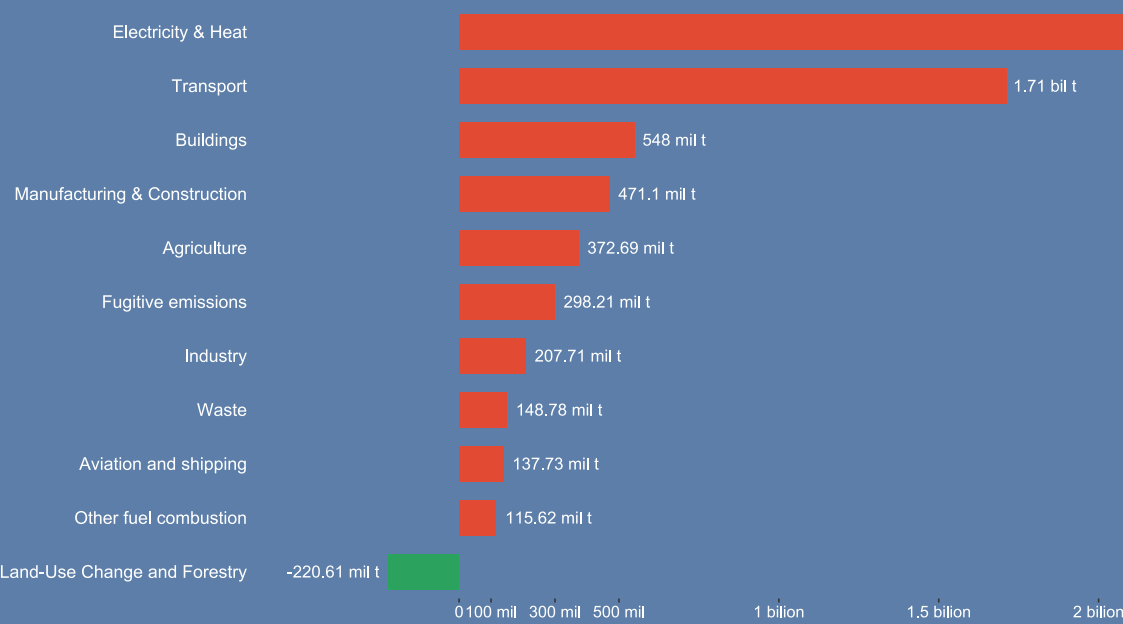


The graph shows the average per capita greenhouse gas emissions over the last 30 years.

The countries with greenhouse gas emissions below the median are marked in green, and those with emissions above the median are marked in red.

Based on the chart, we selected 4 countries for further analysis: **USA, Canada, Botswana and Australia**

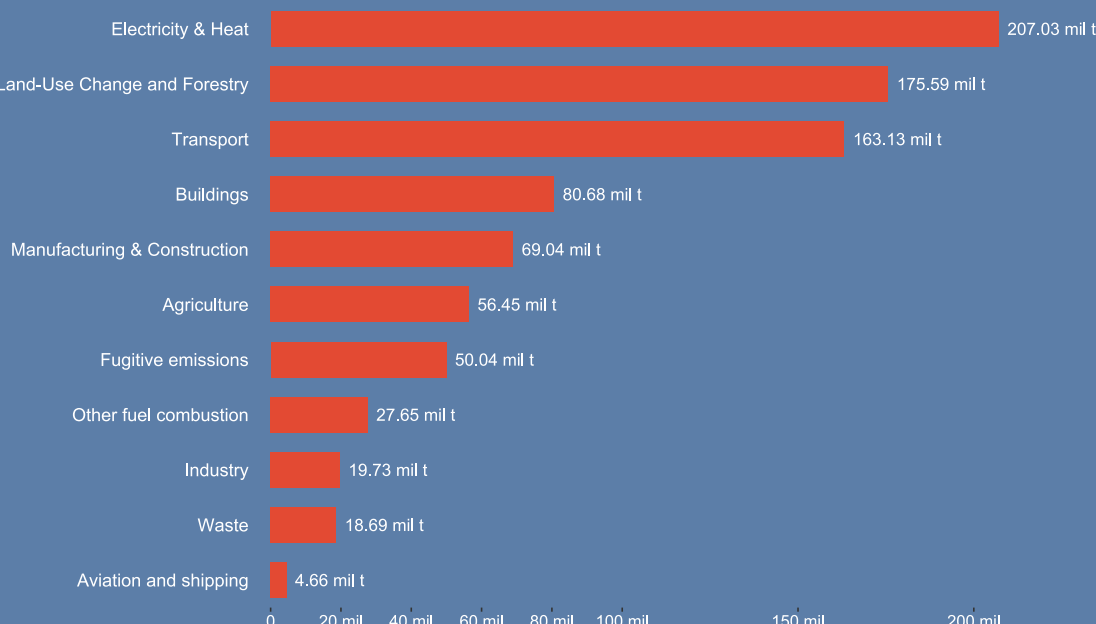
Greenhouse gas emissions by sector - United States 2000-2016



Primary source of GHG emissions in the United States is mainly Electricity & Heat. Approximately 62% of electricity in USA comes from burning fuels, mostly coal and natural gas.

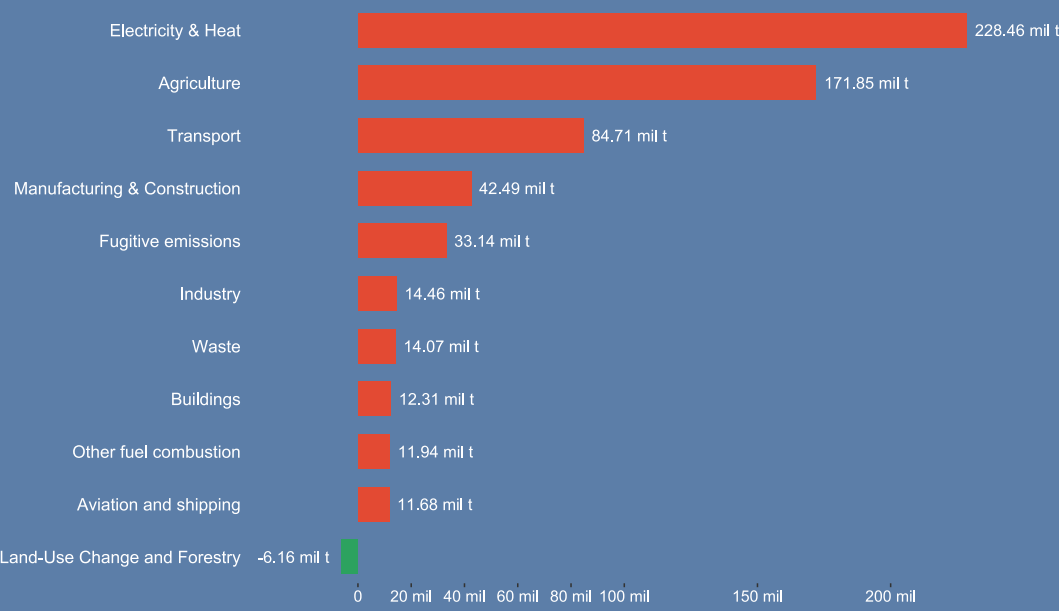
Second one is transport sector, emissions come mostly from burning fossil fuel for cars, trucks, ships, trains and planes. Over 90% of the fuel used for transportation is petroleum based, which includes primarily gasoline and diesel.

Greenhouse gas emissions by sector - Canada 2000-2016



By far the largest source of GHG emission in Canada comes from the combustion of fossil fuels to make energy, including heat and electricity. Mining, oil and gas, and manufacturing are collectively responsible for the largest slice of this pie, followed closely by houses, shops, schools and other private and public buildings. What is more, in Canada, a lot of energy goes into growing food. Large volumes of fuel and fertilizer are used to run farms and both contribute to national GHG emissions.

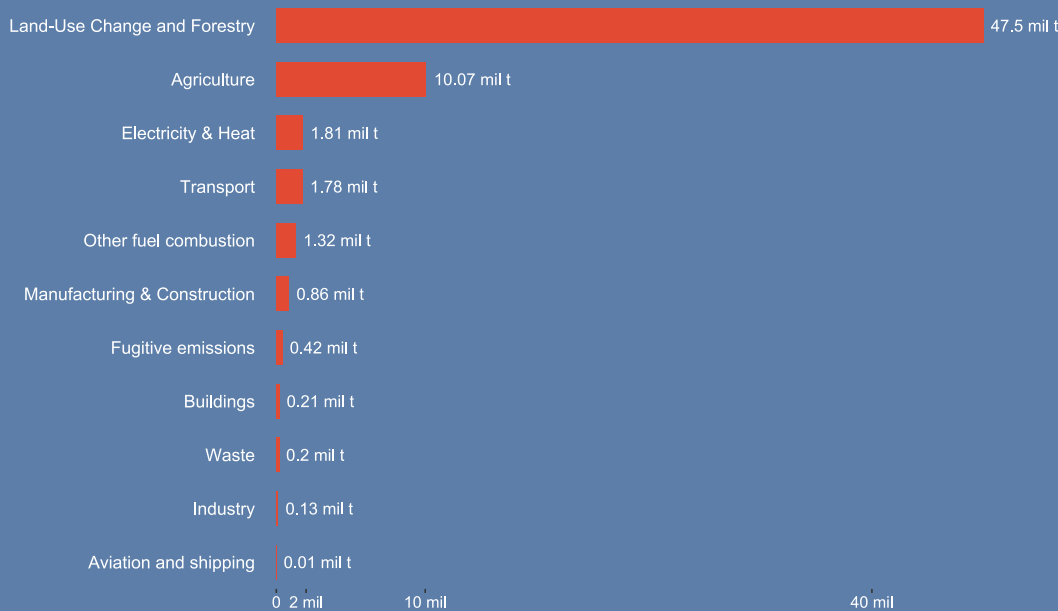
Greenhouse gas emissions by sector - Australia 2000-2016



As well as the USA, Australia produces most emissions from electricity. Emissions are being generated by methane from sheep and cow belches. Australia has 140 million sheep and her population is 25.7 million. Australia is the leading global supplier of wool and the world's largest wool export nation, producing 39% of global wool exports, which results in high emissions caused by transport.

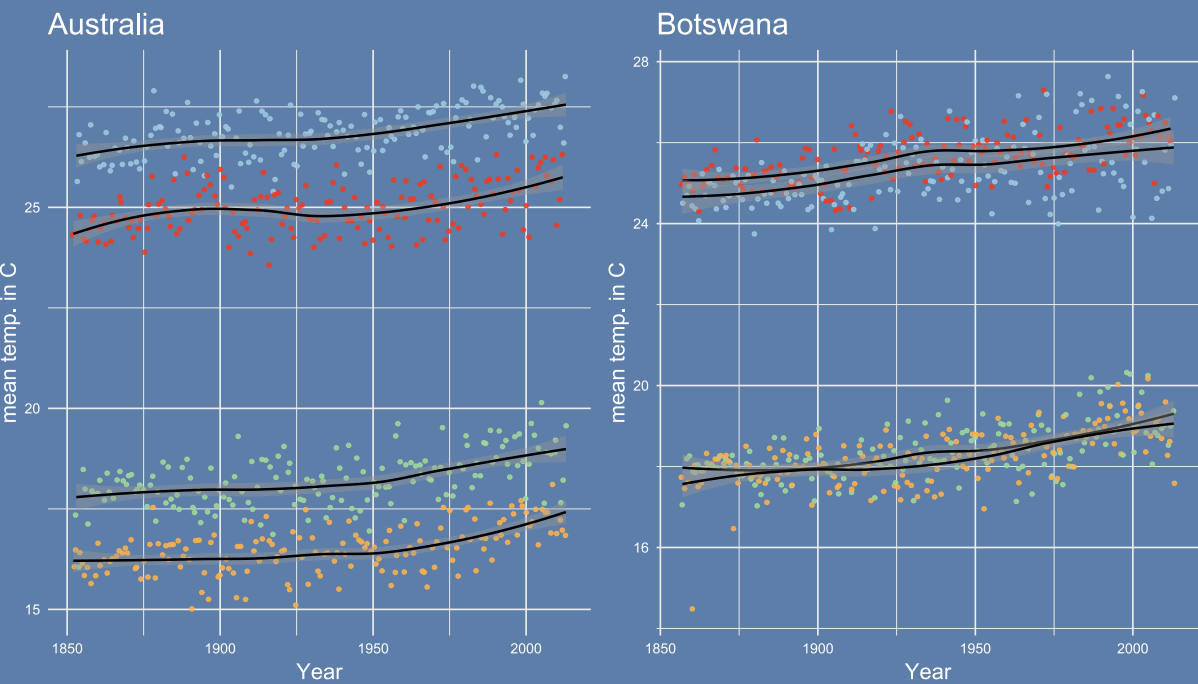
We can notice that Australia, USA and Canada share a similar distribution of ghg emissions per sector - that of a developed country.

Greenhouse gas emissions by sector - Botswana 2000-2016

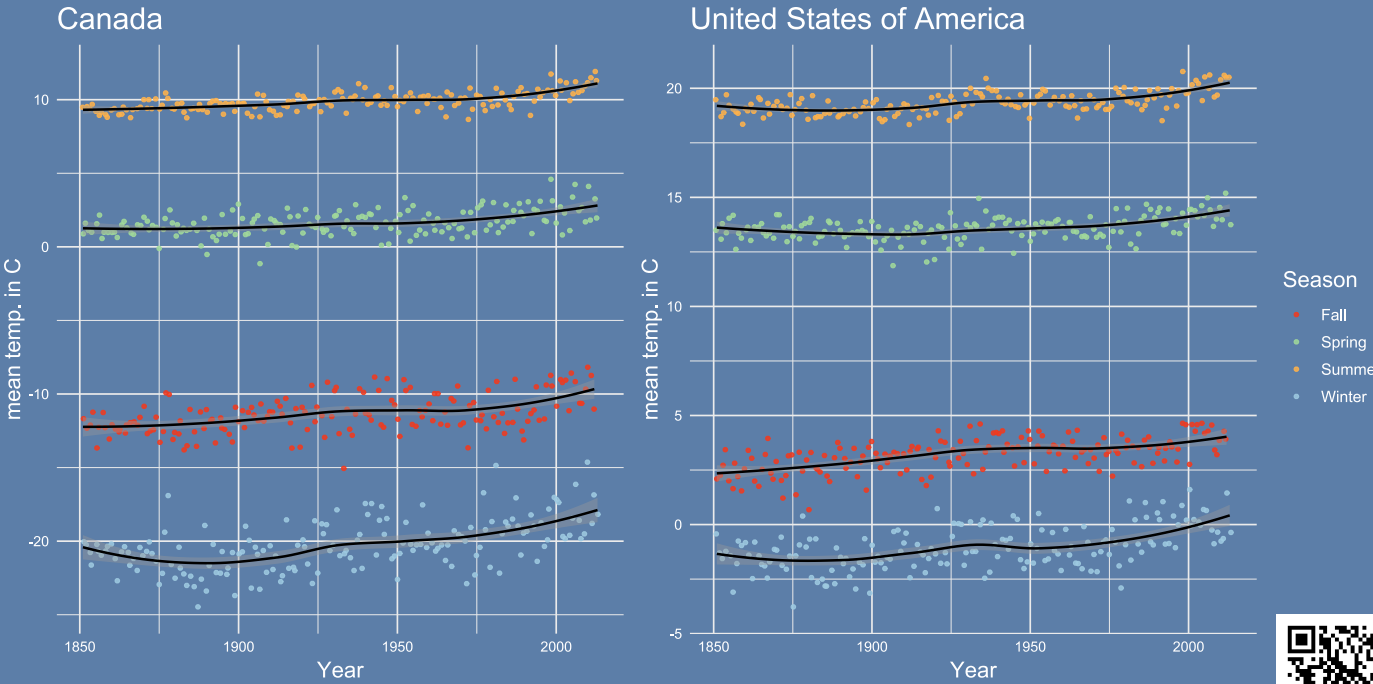


How does land use change and Forestry increase greenhouse gases in the atmosphere? In the 21st century, Botswana has experienced rapid growth in population (~40%) thus making it necessary for new settlements to be created. When forests are converted to other land uses, they release their carbon as carbon dioxide, an important greenhouse gas. Not only that, the land previously occupied by forests no longer contributes to the sequestration of CO2.

(Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide.)



High emission of GHG results in rise in global temperatures. Plots above represents how the temperature changed over the last 150 years. As we can see in all the selected countries it has risen, so there is definitely a high correlation between GHG emission and rise in temperature.



Authors:
Bielecki Piotr
Gałkowski Mikołaj
Gut Szymon

Wydział Matematyki
i Nauk Informatycznych
POLITECHNIKA WARSZAWSKA

