Climate Change and Indigenous Peoples

Joji Carino, Tebtebba
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Overview

• History of human-nature relations
• Biodiversity and climate change
• Climate Change and Indigenous Peoples
A Historical View of Nature-Human Inter-actions

• Formation of continents
• Ecosystems
• Humans within Ecosystems
• Nested, inter-locking, inter-dependent systems
• The Earth as a finite, closed system
• Changing Climate
Formation of Continents

- Movements in the earth’s crust have meant changes in the distribution of land mass -

- These movements manifested in natural "disasters" such as earthquakes, volcanic eruptions, tsunamis

- These movements determine the distribution of natural and mineral resources, as well as plants and animals
Natural Ecosystems

- Grasslands
- Tropical Rainforests
- Drylands and deserts
- Coral reefs
- Islands
- Mountains
- Icecaps and polar regions - tundra
Humans and Ecosystems - 99% of Human History

• 3.5 million years - 2 million years ago
  *Homo erectus* - upright posture, large brain size, use of speech, tool-making
  Fossil evidence from Africa and Java

• 100,000 years ago - *Homo sapiens* - east and southern Africa

• 30,000 years ago - *Homo sapiens sapiens* in all continents

• Hunting and gathering was the primary means of subsistence
Human tools and technology

• 2 million years - gathering, herding and hunting
  Principal technology - stone tools such as axes, then spears
  Later use of fire
  Global population - 4 million - 5 million by 5000 BC

• 10,000 years ago - agriculture, settled societies, emergence of cities, elites
  Known as the neolithic revolution
  Southwest Asia, China and Mesoamerica
  Population began doubling every millennium to 50 million by 1000 BC

• Past 200 years - exploitation of Earth’s fossil fuels
  Global population - 5 billion
First Great Transition

- 10,000 years ago - agriculture, settled societies, emergence of cities, elites

The combined phenomenon of transition to agriculture, the growth of settled societies, the eventual emergence of cities, the development of craft specialisation and the rise of powerful religious and political elites is known as the neolithic revolution.

Southwest Asia, China and Mesoamerica

Population began doubling every millennium to 50 million by 1000 BC

No clear distinction between gathering and hunting on one hand, and agriculture on the other. Both ways of obtaining food are part of a spectrum of human activities of different degrees of intensity to exploit animals and plants.

The adoption of agriculture was the most fundamental change in human society. Not only did it produce settled societies for the first time, it also radically changed society itself.
### Worldwide Diffusion of Crops and Animals

Chief Centres for Diffusion of Major Crops and Animals

<table>
<thead>
<tr>
<th>SEast Asia</th>
<th>Europe</th>
<th>Americas</th>
<th>Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugar cane</td>
<td>Wheat</td>
<td>Tobacco</td>
<td>Hard wheat</td>
</tr>
<tr>
<td>Rice</td>
<td>Barley</td>
<td>Potato</td>
<td>Sorghum</td>
</tr>
<tr>
<td>Orange</td>
<td>Oats</td>
<td>Tomato</td>
<td>Coffee</td>
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<tr>
<td>Lemon</td>
<td>Sheep</td>
<td>Manioc</td>
<td></td>
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<tr>
<td>Lime</td>
<td>Cattle</td>
<td>Cocoa</td>
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<tr>
<td>Spinach</td>
<td>Horse</td>
<td>Rubber</td>
<td></td>
</tr>
<tr>
<td>Aubergine</td>
<td>Pig</td>
<td>Pineapple</td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td>Bee</td>
<td>Avocado</td>
<td></td>
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<tr>
<td></td>
<td>Rabbit</td>
<td>Peppers</td>
<td></td>
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<td></td>
<td></td>
<td>Squash</td>
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<td></td>
<td></td>
<td>Sisal</td>
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<tr>
<td></td>
<td></td>
<td>Maize</td>
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<td></td>
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<td>Turkey</td>
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</tbody>
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The major diffusion of plants and animals in the world took place in two places:

- **The Islamic world from the 7th to 10th century** - the creation of the Islamic empire with its trading networks brought a major diffusion of crops from SE Asia and India westwards to the Near East, Mediterranean region and eventually parts of southern Europe.

- **After the European contacts with the Americas after 1492** - the Europeans who went to settle the Americas took with them their own crops and animals, in the process significantly altered the environment. Equally important was the diffusion of previously unknown American crops, which influenced the agriculture of not just Europe, but also the Near East, India, Africa and China.

- The subsistence base of many societies, which was narrow and highly vulnerable became wider, reducing the risk of catastrophic crop failure and famine. Nutrition also improved.
The long struggle

• Agriculture did not solve the problem of producing enough food to meet the needs of the world’s population. Until about the last two centuries, in every part of the world, nearly everyone lived on the edge of starvation.

• Only slowly, in the relatively recent past, did a few societies begin to escape a situation where a large part of the population lived on a poor diet barely adequate for minimum subsistence. The first country to move along this path was the Netherlands in 16th and 17th centuries through intensified agriculture. Followed by England in the 18th.

• The real revolution in the European food situation came after 1850s with widespread emigration to the colonies, and the equally large-scale importation of food from the rest of the world. The key lay in its changing relationship with the rest of the world and its ability to control an increasing share of the world’s resources.
End to Self-sufficient Agriculture

• The 19th century marked the beginning of the end of several thousand years of largely self-sufficient agriculture, with only limited trading in a few luxury items. European countries, especially Britain became dependent on imported food in the late 19th century, and it was one of the major factors that enabled them to industrialise on such a large-scale and sustain highly urbanised populations.
The expansion of agriculture

- For most of the 20th century, the expansion of cropland took place away from the temperate areas of the world and was concentrated in the tropical area - west Africa, the interior of south America and Indonesia. For example, the area under crops in Brazil rose six-fold between 1930 and 1970, and then accelerated still further as the Amazon area was opened up.
Second Great Transition

- The second great transition involved the exploitation of the world’s vast (but limited) stocks of fossil fuels that led to the creation of societies dependent on high energy use.

- This was a fundamental change - until the 19th century, every society across the globe had very few sources of energy and the total amount of energy they could generate was small.
Second Great Transition

• This transformation was at least as important as the rise of agriculture and the rise of settled societies. And its impacts on the environment were far greater and took place over a far shorter period.

• Before this transition all forms of energy used were renewable. The last two centuries have been characterized by the use of non-renewable fossil fuels and by a vast increase in energy consumption.
Human Power

• Until the 19th century about 3/4 of the world’s mechanical energy came from humans. And nearly all the rest was provided by animals.

• Humans provided the main energy inputs for farming.

• Human power was the main form of energy in the house until the invention of a range of labour-saving household appliances in the 20th century.

• Even in the early 21st century, hard work around the home, especially gathering wood and collecting water is the norm for hundreds of millions of women around the world.
Wood

• The world’s main source of fuel, well into the 19th century was wood. Wood had many advantages - it was easy to collect, readily available, burned well when dried and it was often free.

• Over the centuries, the steady but relentless destruction of forests, with very little replanting slowly exhausted the resources of India, China, the middle East and western Europe.

• The response to this increasingly to an increasingly severe energy shortage was a change to what was widely regarded as an inferior fuel - coal. The demand for coal rose as wood and charcoal became scarce.
Coal

• The shift to the use of coal marked a fundamental shift in human history - a move from the energy shortage that had characterized human societies until this point, into societies that depended upon rapidly growing and very high energy use.
Electricity

• One of the most significant energy developments in the last two centuries has been the use of fossil fuels to provide electricity.

• A major increase in electricity production and consumption took place in the 20th century and relied upon a number of linked developments.

• In 1950, electricity production took up 10% of the world’s fossil fuel production, and by 2000, this had risen to 40%.

• Although electricity provides a highly convenient form of energy, it is a highly inefficient way of producing energy. Generators have to be built and operated, and high-voltage transmission lines constructed, all of which consume energy. Although a third of the world’s energy is used to produce electricity, at least 2/3 of it is wasted in generation and transmission.
Oil

• First commercial oil production was in 1889, but was very small scale.

• The development of the internal combustion engine in the late 19th century transformed the oil industry.

• Just as coal proved to be the means to support an otherwise impracticable increase in energy use in the 19th century, the availability of cheap oil was the motive force behind the even bigger increase in energy use in the 20th century.
Energy in the 21st Century

• World energy patterns are now completely different from those that prevailed in all but the last 2 centuries of human history. Until the early 19th century, renewable resources - human, animal, wood, water and wind provided all of the world’s energy. Now, over 85% comes from non-renewable fossil fuels - 40% oil, 25% coal and 21% natural gas.

• Ultimately, the impact of energy consumption on the environment comes from the total amount of resources used, and the pollution that is produced.
For decades, exploration for new oil and gas fields has gone hand in hand with encroachment on people’s land and with preparations to dispossess them. Extraction, meanwhile, has provoked resistance all over the world. From Ecuador to Sakhalin, from Nigeria to Burma, fossil fuel corporations, usually backed by governments, have stolen or contaminated local land, forests and water, and communities affected have responded accordingly.
Energy inequalities

• In the first half of the 20th century, the industrialized countries of western Europe and North America, consumed over 90% of all the fossil fuels used in the world. In the early 21st century, the 1/5 of the world’s population that live in the rich countries of the world still consume over 70% of the world’s energy.

• The majority of the world’s people who live in the developing use only 10% of the world’s energy. The poorest quarter of the world’s population - 1.5 billion use only 2.5% of the world’s energy.

• The average American now uses four times as much as their predecessors a century ago, twice as much as the average European, 30 x more than the average Indian, and almost 100x more than the average Bangladeshi.
Facts and Figures on Poverty and Ecosystem Services

- In 2001, just over 1 billion people survived on less than $1 per day of income, with roughly 70% of them in rural areas where they are highly dependent on agriculture, grazing, and hunting for subsistence.

- Inequality in income and other measures of human well-being has increased over the past decade. A child born in sub-Saharan Africa is 20 times more likely to die before age five than a child born in an industrial country, and this disparity is higher than it was a decade ago. During the 1990s, 21 countries experienced declines in their rankings in the Human Development Index, an aggregate measure of economic well-being, health, and education; 14 of them were in sub-Saharan Africa.
Facts and Figures on Poverty and Ecosystem Services

■ Despite the growth in per capita food production in the past four decades, an estimated 852 million people were undernourished in 2000–02, up 37 million from 1997–99. South Asia and sub-Saharan Africa—the regions with the largest numbers of undernourished people—are also the areas where growth in per capita food production has been the slowest. Most notably, food production per person has declined in sub-Saharan Africa.

■ Some 1.1 billion people still lack access to an improved water supply, and more than 2.6 billion lack access to improved sanitation. Water scarcity affects roughly 1–2 billion people worldwide. Since 1960, the ratio of water use to accessible supply has grown by 20% per decade.
## The World in the 20th Century
### Increase 1900 - 2000

<table>
<thead>
<tr>
<th>Category</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>World population</td>
<td>x 3.8</td>
</tr>
<tr>
<td>World urban population</td>
<td>x 12.8</td>
</tr>
<tr>
<td>World industrial output</td>
<td>x 35</td>
</tr>
<tr>
<td>World energy use</td>
<td>x 12.5</td>
</tr>
<tr>
<td>World oil production</td>
<td>x 300</td>
</tr>
<tr>
<td>World water use</td>
<td>x 9</td>
</tr>
<tr>
<td>World irrigated area</td>
<td>x 6.8</td>
</tr>
<tr>
<td>World fertiliser use</td>
<td>x 342</td>
</tr>
<tr>
<td>World fish catch</td>
<td>x 65</td>
</tr>
<tr>
<td>World organic chemical production</td>
<td>x 1,000</td>
</tr>
<tr>
<td>World car ownership</td>
<td>x 7,750</td>
</tr>
<tr>
<td>Carbon dioxide in the atmosphere</td>
<td>+ 30%</td>
</tr>
</tbody>
</table>
The earth is a closed system

• Because the earth is a closed system, everything must go somewhere. The “disposal” of waste merely means placing it somewhere in the planet.
Pollution

- Pollution was at first mainly localised - it was normally confined to a city, river, mine or waste dump.

- As industrialisation increased the areas affected widened to whole regions, continents and oceans. By the late 20th century, pollution was on such a scale that there was a clear threat to the global regulatory mechanisms that make life on earth possible.
The Services/Values of Nature
QuickTime® and a TIFF (Uncompressed) decompressor are needed to see this picture.
Global Warming

• Without greenhouse gases in the atmosphere to trap outgoing terrestrial infrared radiation, the average temperature on earth would be -18 C and too cold for life. These gases, mainly carbon dioxide and methane maintain the average temperature of the earth at about 15 C.

• However, in the last 200 years, human activities have added extra quantities of these greenhouse gases - turning this vital life-sustaining mechanism into the world’s most threatening environmental problem - global warming.
Greenhouse Effect
What is Climate?

Climate is usually defined as “the average weather.” It is measured by observing patterns in temperature, precipitation (such as rain or snow), wind and the days of sunlight as well as other variables that might be measured at any given site.

The climate is the manifestation of a highly complex system consisting of five interacting components: the atmosphere (air), the hydrosphere (water), cryosphere (frozen part of the earth), the land surface, and the biosphere (part of the earth where life exists).
What is Climate Change?

Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity (anthropogenic causes).

Changes in the world’s climate are not new. It is one factor which has influenced the course of human history and human evolution. Historically, humans have been able to cope and adapt to these changes.

Current climate negotiations are addressing human activities which cause climate change, which have dramatically increased in the past 200 years.
The climate crisis is, above all else, a problem of oil, coal and gas. It’s a problem that has come about mainly through fossil carbon being taken out of the ground, run through combustion chambers, and transferred to a more active and rapidly-circulating carbon pool in the air, oceans, vegetation and soil.
Fossil Carbon

Fossil carbon is plentiful. It’s the final resting place of carbon removed by plants from the atmosphere over millions of years. But the carbon-absorbing capacity of oceans, vegetation and soil at any one time is limited. Some of the huge amounts of carbon being transferred from underground to aboveground builds up in the atmosphere, destabilizing the climate.
Fossil fuel crisis

In the end, then, climate politics boils down to finding ways of keeping most remaining coal, oil and gas in the ground.

One thing that’s often forgotten in all the panic over the new problem of global warming:

This isn’t the first fossil fuel crisis. Coal, oil and gas have been associated with environmental degradation, damaged lives, social conflict and war for a long time.
Oil and militarization

Finally, militarization and the craving of industrialized societies for oil has endangered security, poisoned lives and blighted politics around the world.

Today, wars costing uncounted lives and billions of dollars can be fought over only a few months’ or years’ worth of oil.
Global Warming

Global warming is the noted average increase of the earth’s surface temperature and oceans as compared to previous centuries.

This is a result of the continuous trapping of heat within the earth’s atmosphere due to increased quantity of greenhouse gases.