Climate Change, Environmental Degradation and Security

A presentation by

Stefan Bößner

Research Fellow & Policy Lead @ Stockholm Environment Institute, Bangkok

SEI as a global organization

Where we work



SEI Headquarters	SEI Oxford
SEI Africa	SEI Tallinn
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Facts and Figures

. Around 300 publications (in 2021), 350+ staff members, 8 centers around the world, 7 internal research initiatives and innumerable (externally financed) research projects

. Regularly ranked as world's top think tank on environmental issues

. Covering almost all issues related to sustainable development (energy, climate change, agriculture, circular economy...)



Content

- What is Climate Change & The Science of Climate Change
- Climate Change and Environmental Degradation: Impacts
- Climate Change and Impacts on Security
- What Can We Do Mitigation
- What Can We Do Adaptation
- Some New Potential Threats From the Transition
- A Way Forward
- Question and Answers



Climate Change – What is it?



Copyright: Neil Drake

- Climate Change refers to the change in global weather patterns and temperature rises primarily caused by human activities.
- Climate Change is a long-term* phenomenon with change happening over decades.
- Weather is the daily manifestation of climate, i.e. just because it snowed yesterday doesn't mean that climate change is not happening.



The physical reality of climate change

Heat from the sun is reaching earth and is partly reflected back. But not all heat from the sun bouncing off earth escapes back to space, some of it is trapped by CO2 and other gases and molecules like a blanket over your body. In moderate doses, this good as life would not be possible without it.

However...



Source: NASA

CO2 concentration



We see concentrations of CO2 in the atmosphere like we have never seen before in a million years!

(we know that because we can find traces of molecules in ice sheets that formed that long ago)

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Source: NASA

It's getting hot in here...



Which is why we see temperature rises like never seen before

(almost 20 times faster than in the previous 5000 years)

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Source: NASA

Who and what releases CO2 and other Greenhouse Gases (GHG)



Everything we produce, distribute and consume emits GHGs like Nitrous Oxide, Carbon Dioxide, Methane etc.

Methane has a larger warming potential than CO2, yet it gets less

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But who is saying that the climate changes?



- 97% of scientists around the world
- Many of those regularly meet, review the evidence (peer review thousands of papers) and publish reports like the IPCC reports
- In the past decades, evidence has been overwhelming: climate change is real, and we are causing it to a large extend.



But is it that bad? Yes, it is!





Earth's ecosystem is a delicate choreography of living beings and natural processes!

If one process is out of balance, it affects other processes, and the choreography doesn't work anymore



But what are the impacts? A selection



- Both heatwaves and floods will increase
- Oceans acidify, killing corals and sea life
- Food security will be impacted by droughts
- Water scarcity becomes an issue
- Storms and hurricanes will become more common, causing damages to people, livelihood and infrastructure
- Diseases will likely increase (destruction of eco systems leads to increased human to animal contact; flood borne diseases etc.)



But this is just the effects of a changing climate, our lifestyle has many other impacts...



- Plastic Pollution (microplastics)
- Environmental pollution from mining and fossil fuel production
- Biodiversity loss because of environmental pollution
- Erosion and degradation of soils due to overuse of fertilizer and monoculture
- Air pollution due to increased passenger traffic, crop burning and burning of fossil fuels



What does that mean for international, national and human security?



While the exact impact of climate change on state- and human security is debated in the literature, **general consensus** is that climate change acts as a **'threat multiplier'** in the sense that it amplifies existing threats

Photo from the Arab Spring in Syria, © AFP/Getty Images



Climate Change and damage to infrastructure



- Extreme weather events such as floods or hurricanes can inflict significant damage on key infrastructure such as the electricity grid, road and rail systems or communication lines
- All of those stressors will increase with climate change and/or unsustainable management of resources



Source: The Guardian Newspaper

Resource use and conflict



Source: Merieux Nutrisciences

- Water scarcity, food shortages or scarce land might provide additional stresses for already fragile systems which increases the likelihood of conflict (seen in Syria (Gleick 2014) or Afghanistan (Přívara and Přívarová 2019))
- This nexus is especially important for Southeast Asia where around 60% of the population depends on agriculture for their livelihoods
- All of those stressors will increase with climate change and/or unsustainable management of resources therefore potentially increasing the likelihood of conflict
- But climate change is not the only variable, economic inequality, weak institutions and inequitable access to resources also play an important role (de Jong et al. 2021)



The injustice of climate change

Entity	Total emissions (MtCO ₂ e)	CO ₂ emissions (MtCO ₂)	Percentage of global CO ₂ emissions
China (Coal)	276,458	248,397	14.0%
Former Soviet Union	135,113	120,875	6.8%
Saudi Aramco	68,832	64,352	3.6%
Chevron	57,898	52,797	3.0%
ExxonMobil	55,105	49,537	2.8%
Gazprom	50,687	41,031	2.3%
National Iranian Oil Co.	43,112	39,282	2.2%
BP	42,530	38,788	2.2%
Shell	40,674	36,528	2.1%
Coal India	29,391	26,408	1.5%
Poland	28,750	25,832	1.5%
Pemex	25,497	23,384	1.3%
Russian Federation	23,412	21,036	1.2%
China (Cement)	23,161	23,161	1.3%
ConocoPhillips	20,222	17,916	1.0%
British Coal Corporation	19,745	17,741	1.0%
CNPC	18.951	17,194	1.0%
Peabody Coal Group	17,735	15,935	0.9%
TotalEnergies	17,584	15,935	0.9%
Abu Dhabi National Oil Co (ADNOC)	17.383	15.929	0.9%

Table 3: Top 20 Carbon Majors entities by emissions (1854–2022) 12

- Over **70% of historic global emissions** came and come from 78 "Carbon Major" companies
- Carbon emissions of the world's <u>richest 1%</u> is more than double the emissions of the <u>poorest</u> <u>half</u> of the world
- The people who have contributed the least to climate change will likely be affected the most
- We know that there is a linkage between inequality and conflict (Østby 2013)



Source: https://carbonmajors.org/

Climate Change, Migration and Conflict



- Sea level rises, food insecurity and destruction of livelihood have the potential to increase migratory movements of people from climate impacted areas to less impacted ones internally or across borders (Missirian and Schlenker 2017) (Burrows and Kinney 2016)
- This might also increase pressure on cities as more and more people move from the countryside to cities
- This can cause (perceived) conflict and insecurity in target countries (as seen in Europe)
- But, climate change is only one factor amongst many and migration patterns are very dependent on many other things like political stability in the home country, economic opportunities etc. (Abel et al. 2019)



Source: NRDC

But what can we do? Mitigation! (i.e. help to avoid aspects of climate change)



Facilitate a low-carbon society

- Energy transitions (renewable energies)
- Change agricultural practices (tackle emissions from nitrogen and methane emissions)
- Change production of key materials (cement, steel)
- Switch to electric vehicles & rail in the transport sector
- Reduce deforestation and use afforestation
- Reduce meat consumption

But what can we do? Adaptation! (i.e. help to deal with aspects of climate change)



- Reduce Disaster Risk (introduce early warning mechanisms etc.)
- Increase resilience (also institutional resilience)
- Climate proof infrastructure and food systems

Does it make economic sense? Yes!

In the energy sector, for every dollar spent, 3-7 \$ saved



Costs and savings for the period 2016-2050 for the REmap Case, compared to the Reference Case (USD trillion)

According to the *State of Global Climate 2023* Report by the WMO, if we want to meet 1.5 C target, we need investment worth

an annual **\$9 trillion** by 2030, and an annual **\$10 trillion** through 2050!

However, cost of inaction is **\$1,266 trillion** up to the year 2100 or more than 16 trillion per year!

Source: IRENA, Global Energy Transformation Report

Things are changing: potential for conflict?

FIGURE ES.4 Countries' Preparedness for a Low-Carbon Transition



Winners and Losers

- Not every country will benefit equally (also people within countries will be impacted differently [new skills are needed])
- Rare earths and minerals (necessary for energy transitions) are quite concentrated which might lead to conflict
- Minerals mining also has the potential to increase environmental damages
- Cyber security issues of critical infrastructure
- Renewables installations also need land > competition for food and economic activity
- Maladaptation that increases inequalities

But change can also foster stability



- Renewable energy is decentralized and potentially benefits more people (energy communities)
- Nature based solutions and low-carbon agriculture (agroforestry systems etc.) can actually increase resilience while maintaining or increase production
- Agricultural waste can be transformed into economic potential (biochar)
- Instead of raw materials (oil, gas) which are concentrated, future economies might be more dependent on brain power (everyone has a brain)

Some good practices as we move forward: What can we do?

Policy makers

- Adopt supportive policies and do away with harmful policies (e.g. fossil fuel subsidies), level the playing field
- Facilitate the communication between ministries and across levels (national to sub-national)
- Adopt business friendly regulation (less red tape) but make polluters pay
- Facilitate the sharing of knowledge and best practice examples (pilot projects, learning networks)

Private sector players

- Invest in low-carbo solutions and seize new business opportunities
- Embrace transitions and sustainability not fight it

Civil Society Organisations & NGOs

- Exercise pressure on policy makers and the business sector
- Hold polluters accountable
- Perform outreach and capacity building activities

We as individuals

- Avoid overconsumption (plastics etc.)
- Change behaviour (take the bike, public transport)
- Eat less meat

Academia and Think Tanks

- Continue to provide science-based evidence
- Fill research gaps, particularly in sectors such as agriculture

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Thank you for your attention!