

Commonwealth Scholars Professional Development Training

Approaching COP26: climate change, sustainable development and climate mitigation in a warming world

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## Welcome to today's workshop

# Zoom Housekeeping:



- Please ensure you are **muted** if you are not speaking to the group
- We will pause for questions as we go
- If you are having connectivity issues, please try turning off your camera during the presentation; these can be turned on during discussion sections
- If you have any technical issues please privately message Sharmin in the chat for her help
- If you have any questions as we go, please use the chat function
- For breakout groups, we encourage use of your camera if possible please!

#### AccessEd: Who are we?



- AccessEd is a non-profit organisation committed to supporting postgraduate researchers in their professional development and university access programmes to increase social impact globally.
- AccessEd has expertise working with international students and social enterprises, as well as delivering courses in transferable skills for the 21st century. AccessEd bridges the gap from education to the professional and public sectors.



#### Introduction to your trainer







Former Management Consultant at PwC working in the Sustainability and Climate Change Department and on the International Development team



Climate change and the impacts on international development through Geography at Cambridge University



Managing Director at AccessEd working in international development in Ireland, Botswana, Hong Kong, South Africa and Malaysia

#### Session learning outcomes

You will leave with an understanding of:



The current state of knowledge on Climate Change

Where we are in relation to COP26

Climate change and impact on development

Two way climate change and sustainable development link

···• Adaptation and mitigation for climate change

#### Session learning outcomes

You will leave having practiced:



Discussions on climate change and sustainable development in your own country context

Using an interactive tool for assessing future climate scenarios and having a discussion about this

Discussing mitigation and adaptation measures in the context of your own research

#### In the news...



Name one news item that you have read or heard about recently related to climate change.











# State of knowledge on climate change



#### Breakout rooms – ice breakers!





- Introduce your name, your university, your research
- Discuss the quiz you did before the session: what do you know a lot about? What do you have more to learn about?



#### Climate change – what do we mean?

Weather: The state of the atmosphere at a particular place and time as regards heat, cloudiness, dryness, sunshine, wind, rain

**Greenhouse Gases:** Any gas that absorbs infrared radiation in the atmosphere. CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, O<sub>3</sub>,

**Climate Change:** The significant change in the measures of climate, lasting for an extended period of time.

#### Climate:

- Long Term Wide Area
- Seasonal Changes
- Measured over long spans of time

CFCs, HCFCs, HFCs, PFCs, SF<sub>6</sub>. [4]

**Global Warming:** The recent and ongoing global average increase in temperature near the Earths surface.

**Climate Disruption:** The summary of unwanted and unnatural change in climate.





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#### The Greenhouse Effect





#### Carbon Dioxide (CO2) Emissions by Source





### Total annual global greenhouse gas emissions





# The Intergovernmental Panel on Climate Change (IPCC)

The Intergovernmental Panel on Climate Change (IPCC) is the UN body for assessing the science related to climate change.

- Provides policymakers with regular scientific assessments concerning climate change, its implications and potential future risks, adaptation and mitigation strategies.
- 195 member states.

Three working groups:

WG I to assess the science of climate change WG II to assess impacts, adaptation and vulnerability WG III to assess mitigation of climate change











#### Key findings of the IPCC

Warming of the climate system is unequivocal"

"Most of warming since mid-20th century from increase in anthropogenic GHG concentrations"

"Continued GHG emissions... would induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century"

"Neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks of climate change"

"There is substantial potential for... mitigation over the coming decades that could... reduce emissions below current levels"







# "Warming of the climate system is unequivocal" (IPCC)

Global average air and ocean temperatures are increasing

Extent of snow and ice cover is decreasing rising.







### Evidence that climate is changing

Global average temperature has increased by 0,19 °C since 1880, according to NASA.

- Artic ice minimum reduced by 13,4% per decade
- Carbon Dioxide raise to 404.07 parts
  per million



Temperature Anomaly (° C) (Difference from 1980-2015 annual mean)



http://earthobservatory.nasa.gov/blogs/earthmatters/2016/09/12/her es-how-the-warmest-august-in-136-years-looks-in-chart-form/

#### **Historical Atmospheric Concentrations**





Current carbon dioxide  $(CO_2)$  & methane  $(CH_4)$  concentrations greatly exceed ice core records dating back 650,000 years.

 $CO_2$  concentrations increased ~100 ppm over last 250 years (from ~280 ppm pre-industrial to 379 ppm in 2005).

Between 1995 and 2005,  $CO_2$  increased ~19 ppm: highest average growth rate recorded for a decade since measurements began in 1950s.

"Continued GHG emissions [...] would induce many changes in the global climate system during the 21<sup>st</sup> century that would very likely be larger than those observed during the 20<sup>th</sup> century".





#### Projected Surface Temperature Changes (2090-2099 relative to 1980-1999)







Continued emissions would lead to further warming of 1.1°C to 6.4°C over the 21st century

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COP26

1994.

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#### What is it important?

First moment when countries must set out more ambitious goals for ending their contribution to climate change under the Paris Agreement.

- Biggest summit UK has ever hosted; 30,000 attendees if in person
- Seen as most significant climate event since the 2015 Paris Agreement ٠ when all the signatories to the UNFCC agreed to keep temperatures below 2 degrees C above pre-industrial levels and limit temperature increase even

Convention on Climate Change (UNFCCC) – a treaty that came into force in

COP26 is the next annual UN climate change conference.

Stands for 'Conference of the Parties' – 26<sup>th</sup> COP summit

Pushing for more ambitious goals

Attended by countries that signed the United Nations Framework

further to 1.5 degrees C







#### Net Zero









Net zero =

The balance between the amount of greenhouse gas produced and the amount removed from the atmosphere. We reach net zero when the amount we add is no more than the amount taken away.

- UK became the world's first major economy to set a target of being net zero by 2050
- This state is also referred to as carbon neutral
- Different to gross zero that would mean stopping all emissions, which isn't realistically attainable

Net zero looks at emissions overall, allowing for the removal of any unavoidable emissions, such as those from aviation or manufacturing. Removing greenhouse gases could be via **nature**, as trees take carbon dioxide from the atmosphere, or through **new technology** or **changing industrial processes**.

"If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking."

- BUCKMINSTER FULLER, **ARCHITECT, VISIONARY 1895-1983** 





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# **Climate Change simulation: En-Roads**



A cutting-edge simulation model used to test climate solutions and generate climate scenarios for the future.



#### **Baseline scenario**





### What would 3+ °C (or 5.4+ °F) of warming mean?



Arctic sea ice is gone in 2 out of every 3 summers<sup>1</sup>



**50%** of insect species lose >50% of their habitat range<sup>2</sup>



Drought: 11 months longer

Increase in average drought length<sup>3</sup>



Area burned by summer wildfires in Mediterranean doubles









3.5°C









3.5°C

#### London with 4°C of warming



Source: Climate Central

#### **Breakout rooms: simulation**



Link in the chat

You will have 10 – 15 minutes to:

(a) Use the scenario tool. What is required to bring temperatures under 2 degrees C?(b) Discuss with others in your group: how feasible does this seem?

Group discussion – main room

- What surprised you?
- What did you takeaway from this?





# Tea break



# Global and regional impact



#### Climate Change will exacerbate water stress





#### Examples of global impact



WATED	Increased water availability in moist tropics and high latitudes <sup>1</sup> Decreasing water availability and increasing drought in mid-latitudes and semi-arid low latitudes <sup>2</sup>						
WATER	0.4 to 1.7 billion <sup>3</sup>	1.0 to 2.0 billion	3	1 to 3.2 billion <sup>3</sup>	Additional people with increased water stress		
ECOSYSTEMS	Increasing amphibian extinction <sup>4</sup>	About 20 to 30 reasingly high	0% species at inc- nrisk of extinction <sup>4</sup>	Major e	xtinctions around the globe <sup>4</sup>		
	Increased coral bleaching	<sup>5</sup> Most corals bleached <sup>6</sup>	Widespread	coral mortality <sup>6</sup>			
	Increasing species range	shifts and wildfire risk <sup>7</sup>	Terrestrial biosphere tends ~15%	toward a net carbon source, ~40% of	as: <sup>8</sup> ecosystems affected		
FOOD	Сгор	Low latitudes Decreases for some cereals	9	All cereals de	crease <sup>9</sup>		
	productivity	Increases for some cereals <sup>9</sup> Mid to high latitudes		Decreases in a	some regions <sup>9</sup>		
COAST	Increased damage from	n floods and storms <sup>10</sup>					
	Additional people coastal flooding e	at risk of ach year 0 to 3 million <sup>12</sup>	2 2	About 30% loss of coastal wetlands <sup>11</sup> to 15 million <sup>12</sup>			
	Increasing b	urden from malnutrition, diarr	hoeal, cardio-respiratory and	l infectious diseases <sup>13</sup>			
HEALTH	Increased morbidity and	mortality from heatwayee	loods and droughts 14				
	Changed distribution of	some disease vectors <sup>15</sup>	Substantial	burden on health services <sup>16</sup>			
SINGULAR EVENTS	Local retreat of ice in Greenland and West Antarctic <sup>17</sup>		Long term commitment to sometres of sea-level rise due sheet loss 17 Ecosystem changes due to	beveral Le of interview of the meridiona	ading to reconfiguration coastlines world wide and undation of low-lying areas <sup>18</sup> I overturning circulation <sup>19</sup>		
	) .	1 2	2 3	3 4	5°C		

Global mean annual temperature change relative to 1980-1999 (°C)

#### **Examples of regional Impacts**



Global mean annual temperature change relative to 1980-1999 (°C)						
	0	1	2	:	3	4 5°C
AFRICA			10 to 15% <sup>1</sup>		25 to 40% <sup>1</sup>	Sub-Saharan species at risk of extinction
				Semi-arid / arid area	as increase by 5 to 8% <sup>2</sup>	
	75 to 250 m	ilion <sup>3</sup> 3	50 to 600 million <sup>3</sup>	Additional people with	increased water stress	
ASIA	2 to 5% decreas in India <sup>4</sup>	se wheat and maize	5 to 12% de rice in Chin	crease Crop yield a <sup>4</sup> potentia		
		L	p to 2 million 5	Up	to 7 mi∎ion <sup>5</sup>	Additional people at risk of coastal
	0.1 to 1.2 b	illion <sup>6</sup>	2 to 1.0 billion 6	Additional people with	increased water stress	flooding each year
			I blassblass of Care	Develop De ef 7		-
		3 000 to 5 000	pleaching of Great	deaths per year 8		
AUSTRALIA /		-10%	more near related	Murray-Darling River flow	9	-50%
	Decreasing wate	er security in south a	nd east Austra <b>l</b> ia a	nd parts of east New Zea	land <sup>10</sup>	
	+5 to +15	% in Northern Europe	11	+10 to +20% <sup>11</sup>		
	0 to -25%	in Southern Europe <sup>1</sup>	1	-5 to -35% <sup>11</sup>	Vater availability	
EUROPE	+2 to +10%	in Northern Europe	2 +10 to +25% 12		+10 to +30% 12	
	+3 to +4%	in Southern Europe <sup>12</sup>	-10 to +20% <sup>12</sup>		-15 to +30% <sup>12</sup>	Nheat yield potential
			Po	tential extinction of abou	t 25% P	otential extinction of about
			Ce	ntral Brazilian savanna tr	ee species <sup>13</sup> 4	5% Amazonian tree species <sup>13</sup>
AMERICA	м	any tropical glaciers	disappear <sup>14</sup>	Many mid-lati	tude glaciers disappear 14	
	10 to 80 m	illion <sup>15</sup> 8	0 to 180 mi∎ion <sup>15</sup>	Additional people with	increased water stress	
		5 to 20% inc	ease 10			70 to 120% increase forest
NORTH	Deserved	crop yield po	tential '	8		area burned in Canada 17
AMERICA	Decreased space	e neating and increas	ed space cooling	out 70% increase in baza	rdoue	3 to 8 times increase in heat-
			ozo	one days <sup>19</sup>	luous	wave days in some cities19
POLAR REGIONS	Increase in depth	of				10 to 50% Arctic tundra
	seasonal thaw	of 10 to 15% <sup>20</sup>	1	5 to 25% <sup>20</sup>	30 to 50% 20	15 to 25% polar desert
	Parotio porman		2 A	0 to 35% reduction of rctic permafrost area 20		replaced by tundra 21
						20 to 35% decrease annual average Arctic sea ice area 22
SMALL ISLANDS	Increasing coasta	I inundation and dam	age to infrastructure	e due to sea-level rise <sup>23</sup>		
	Alien specie	s colonise mid-				
	and high lati	Agricultural I	sses up to 5% GDF	<b>b</b>		
		in high terrain GDP in low te	rain islands, up to 20%	• • • • • • • • • • • • • • • • • • •		
	0	1	2		3	4 5°C

Global mean annual temperature change relative to 1980-1999 (°C)

#### **Climate Change Impacts**

Lloyd's says damage and weather-related losses around the world have increased from an annual average of \$50bn in the 1980s to close to \$200bn over the last 10 years (The Guardian)







Vast portions of Europe on the Mediterranean coastline, especially Italy, Greece, and France, may become completely inhospitable to grape production by 2050.

# Expected impacts on poor regions

People exposed to increased water stress by 2020:



- 120 million to 1.2 billion in Asia
- 12 to 81 million in Latin America
- 75 to 250 million in Africa

Possible yield reduction in agriculture:



30% by 2050 in Central and South Asia 30% by 2080 in Latin America 50% by 2020 in some African countries

Crop revenues could fall by 90% by 2100 across the African continent



## Developing countries are the most vulnerable

#### Impacts are worse:

- Large share of economy in climate sensitive sectors (e.g. agriculture, tourism)
- Prone to natural disasters (e.g. floods and droughts)
- Adds to existing water resource stresses

#### **Multiple stresses and lower adaptive capacity:**

- Limited financial, institutional, technological capacity
- Limited access to knowledge

#### Impacts disproportionately on poorest countries and poorest people:

 Exacerbated human health, food security, malnutrition, clean water and other resource access concerns

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#### Development will be undermined by climate change



- **Poverty:** 1.3 billion people live on less than 1 USD per day and 3 billion people on less than 2 USD per day. Top 20% income group uses 86% of resources, while bottom 20% uses under 1.3%
- **Food:** 800 million people malnourished today- food production needs to double in the next 35 years
- **Water:** 1.3 billion people without clean water; 2 billion without sanitation
- Energy: 2 billion people without electricity
- Environment: 1.4 billion people exposed to dangerous levels of outdoor pollution and even larger number exposed to dangerous levels of indoor air pollution and vector-borne diseases
- **Shelter:** many live in areas susceptible to civil strife, environmental degradation, and natural disasters.



#### Group discussion





Think about your own research topic.

What are the links or potential links to climate change and the impact on development?

What might you need to be aware of when thinking about your research?





# Climate Change and Sustainable Development



### Sustainability and sustainable development



**Sustainability:** The ability or capacity of something to be maintained or to sustain itself, to support, or endure.

**Sustainable development:** The development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

(World Commission on Environment and Development (WCED), 1987)



The Goals and targets will stimulate action over the next fifteen years in areas of critical importance for humanity and the planet



# Two way relationship between climate change and sustainable development

Climate change influences natural and human living conditions, and social/economic development



Society's priorities on sustainable development influence GHG emissions, causing climate change and vulnerability



Is it fair that countries should be made to develop 'sustainably' when other countries had the luxury of unsustainable, industrial development in the past?

## The example of energy poverty



\*\*\*70% greenhouse gas emissions come from the production and consumption of energy.... energy sector has to central to any climate change strategy!



Source: OECD/IEA

1.3 billion people in the world live without electricity and 2.7 billion live without clean cooking facilities

## Sustainability approach and goals







# Mitigation and adaptation





### Adaptation and Mitigation – what are the differences?





## Hazard, Risk, Adaptation, Mitigation





#### Adaptation methods





#### Mitigation strategies











- Research, development and demonstration
- Appropriate energy
  infrastructure investments
- Regulations and standards
- Taxes and charges
- Change in lifestyles and consumption patterns
- Effective carbon price signal





# Sectoral approaches to mitigation technologies and policies

Sector	Key mitigation technologies and practices currently commercially available. Key mitigation technologies and practices projected to be commercialised before 2030 shown in Italics.	Policies, measures and instruments shown to be environmentally effective	
Energy supply	Improved supply and distribution efficiency; fuel switching from coal to gas; nuclear power, renewable heat and power (hydropower, solar, wind, geothermal and	Reduction of fossil fuel subsidies; taxes or carbon charge on fossil fuels	
	bioenergy; combined neat and power; early applications of carbon dickle capture and storage (ICCS) (e.g. storage of removed CO <sub>2</sub> from natural gas); CCS for gas, biomass and coal-fired electricity generating facilities; advanced nuclear power; advanced renewable energy, including tidal and wave energy, concentrating solar, and solar photovoltaics	Feed-in tariffs for renewable energy technologies; renewable energy obligations; producer subsidies	
Transport	More fuel-efficient vehicles; hybrid vehicles; cleaner diesel vehicles; biduels; modal shifts from road transport to rail and public transport systems; non-motorised	Mandatory fuel economy; biofuel blending and CO <sub>2</sub> standards for road transport	
	transport (cycling, walking); land-use and transport planning; second generation biofuels; higher efficiency aircraft; advanced electric and hybrid vehicles with more powerful and reliable batteries	Taxes on vehicle purchase, registration, use and motor fuels; road and parking pricing	
		Influence mobility needs through land-use regulations and infrastructure planning; investment in attractive public transport facilities and non-motorised forms of transport	
Buildings	Efficient lighting and daylighting; more efficient electrical appliances and heating	Appliance standards and labelling	
	and cooling devices; improved cook stoves, improved insulation; passive and active solar design for heating and cooling; alternative refrigeration fluids, recovery and recycling of fluorinated gases; integrated design of commercial buildings including	Building codes and certification	
	technologies, such as intelligent meters that provide feedback and control; solar photovoltaics integrated in buildings	Demand-side management programmes	
		Public sector leadership programmes, including procurement	
		Incentives for energy service companies (ESCOs)	



Who else has some examples of sectoral approaches to mitigation? Related to the field that they are working in?

# Studies Show Potential for Mitigation Actions to Greatly Reduce Global Emissions





#### CO, emissions and equilibrium temperature increases for a range of stabilisation levels

According to the IPCC (2007), "There is *high agreement* and *much evidence* that all stabilization levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialized in coming decades, assuming appropriate and effective incentives are in place for their development, acquisition, deployment and diffusion and addressing related barriers."

#### Group discussion



#### Mitigation and adaptation

- What mitigation or adaptation strategies are closest to your own lives?
- What mitigation or adaptation strategies are most closely linked to your research?
- Where do you see cross-over between mitigation and adaptation in your research?



#### **Co-benefits of mitigation**





#### Potential co-benefits of mitigation

- Health co-benefits from reduced air pollution
- Increased energy security
- More rural employment
- Increased agricultural production and reduced pressure on natural ecosystems
- Improved technological base
- Strengthened institutions and human capacity





### Case study: Bogotá's Bus Rapid Transit System





Traveling Time WITHOUT TransMilenio Traveling Time WITH TransMilenio

The **TransMilenio Bus Rapid Transit (BRT) system** in **Bogotá, Colombia** demonstrates how co-benefits of more efficient transportation can have benefits for the less wealthy.

The lowest income groups enjoy the greatest savings in travelling time.



#### **Impacts of mitigation of GDP growth** (\*for stabilization scenario of 445-535 ppm CO<sub>2</sub>-eq)





# Integrating mitigation and adaptation

#### **Possible relationships:**

- Complementary
- Substitutable or
- Independent?

#### Imperfect substitutes:

- Because of long lag times in the climate system, no mitigation efforts will be able to prevent some amount of climate change
- Conversely, reliance on adaptation alone would lead to a large magnitude of climate change, to which it would be very expensive to adapt.

#### SO WE NEED BOTH TOGETHER!





# Case study: Tanzania National Agroforestry Strategy





Tanzania National Agroforestry Strategy:

- Goal: By 2020, 60% of resource-poor households adopt agroforestry technologies, contributing to improved livelihoods.
- Complements "MKUKUTA" national development strategy (increasing household income while protecting the environment).

Crops, livestock, and trees/shrubs planted/retained on farmand create a web of resilient land use practices to mitigate and adapt to climate change, conserve biodiversity, and stop land degradation.

### How do we do decision making under uncertainty?



- Uncertainties in long-term studies assessing net benefits of avoided changes vs. costs of GHG reduction
- Strategies include combining economic analysis and precautionary principles, insurance, hedging, in risk assessment
- Seeking robustness in decision-making given uncertainties and differing stakeholder interests
- "Mainstreaming" to integrate policies and measures that address climate change into ongoing sectoral and development planning and decision making to ensure long-term sustainability



#### **Breakout rooms**



#### **Rotations to discuss:**

- How might mitigation and adaptation policies differ in terms of implementation challenges across the world?
- Where are there opportunities to integrate climate change mitigation and sustainable development priorities in your country?
- What are the pros and cons of approaching mitigation from a sectoral perspective? Is that fair?





# Keynote speaker: Simeon Abel



#### What can you do?





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#### Extra reading and resources

#### Reading:

- https://ukcop26.org/
- Book: Dull Disasters: <u>https://documents.worldbank.org/en/publication/documents-</u> reports/documentdetail/962821468836117709/dull-disasters-how-planning-ahead-will-makea-difference
- Financial Protection Forum: https://www.financialprotectionforum.org/

#### **Activities:**

https://en-roads.climateinteractive.org/scenario.html?v=2.7.39

#### Podcasts:

- TILClimate (MIT)
- For What It's Earth
- Mongabay Newscast (journalism on climate change, wildlife, diversity)
- How to Save a Planet
- The Climate Question





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#### Learning portfolio





#### Reflections







# Thank you & Evaluation

