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UNIT 8: DEALING WITH CLIMATE CHANGE: THE NATIONAL AND INTERNATIONAL ARENA

INTRODUCTION AND LEARNING OUTCOMES

In recent decades, our society has been preoccupied with the possibility that humans are changing the composition of the atmosphere in ways that are harmful to life on earth. In the middle of the 20th century, clean air efforts were focussed on regional problems related to smoke pollution caused by coal burning. This was followed by concerns over the so-called "hole in the ozone layer" and climate change.

In this unit, students will explore how governments and international organisations have responded respectively to smoke pollution and the ozone problem. They will learn what caused these different episodes of pollution and how societies responded to them. The last section of the module will focus on recent international attempts to deal with global warming and asks whether we can learn anything from previous problems of air pollution which can help us tackle the present crisis. The module ends with a suggested student exercise that will encourage students to think about past and present issues related to air pollution, the successes and failures of dealing with these problems and what we can or cannot learn from them for dealing with today's greenhouse gas emissions.

THE GREAT LONDON SMOG

As we have already seen in unit 4 the use of coal increased steadily in British cities, during the early modern period, both as a domestic fuel and as a source of energy for industrial activities. This led to an increase of smoke and soot pollution that would reach a peak in the mid-20th century.

London was infamous for its combinations of smoke and fog, combined in the word smog, and therefore earned the nickname 'the Big Smoke'. All major cities suffered from smoke pollution and Edinburgh's nickname, 'Auld Reekie' refers partly to the sanitary situation of the town as well as to smoke pollution.

The effects of this air pollution brought cities to a halt, disrupting traffic but more dangerously also causing death rates to rise. It also had a curious side effect. London became quite famous for its smogs, and many visitors came to see the capital in the fog, most notably, the artist Monet. He painted the atmospheric conditions at sunset caused by the smog many times between during his visits in the years 1899 and 1901. A recent study has shown that Monet's paintings of the House of Parliament were not created from his imagination but that these were firmly based on actual observations made during the artist's visits to London. It is perhaps the earliest visual record of the great London smogs.

'The Houses of Parliament' by Monet. The paintings of Monet form probably the best coloured record of the Victorian smog in London. *Monet.parliament.jpg*, ©Nicolas Pioch, *WebMuseum Paris*, http://virgo.bibl.u-szeged.hu/wm/paint/auth/monet/parliament/

In the paintings of Monet the smog appears harmless, producing vividly coloured skies but the reality could be deadly. A week of smog in 1873 killed over 700 people in London. In the decades before the disaster the earliest examples of legislation to control air pollution could not prevent smog deaths on such a scale. The first

piece of legislation was introduced by Home Secretary Lord Palmerston in the form of the Smoke Nuisance Abatement (Metropolis) Act of 1853. This Act demanded that every industrial furnace and steam boat navigating on the Thames between London Bridge and Richmond should be fitted with equipment to consume their own smoke, as far as possible, or should burn coke instead of coal. However, soon after the Act came into force it became clear that there were no arrangements to enforce the law. The problem was that the wording of the law was too vague and that many could easily prove that it was not practical to 'consume their own smoke'.

However, the real problem was not so much industrial smoke pollution. While air pollution control legislation may have reduced industrial air pollution, any reduction was more than offset by the increase in smoke created by domestic coal fires. By the turn of the 20th century it was becoming increasingly apparent that the main barrier to improved air quality was not of a technical nature but the general public's dependence on the use of open coal fires.

During the years of the First World War a parliamentary committee chaired by Lord Newton was set up to investigate possible legislative options to enforce smoke control. The so-called Newton Committee produced its report in 1920 and this formed the basis for the Public Health (Smoke Abatement) Act 1926. The Act included increased penalties for industrial polluters but did not go as far as the lobby groups had wished - with domestic smoke still exempt.

In 1929, the National Smoke Abatement Society was formed and this group introduced the idea of creating smokeless zones with homes designed for the economical use of fuel, with insulation and the use of smokeless fuel. These ideas influenced a Government Committee chaired by Sir Ernest Simon to report on domestic fuel policy. Their report, published in 1946, supported the transition to smokeless coal claiming that in terms of health, cost, efficiency and convenience these were superior to ordinary coal. The report concluded that a shift to smokeless coal would require positive action on behalf of the Government. However, there was not much public support to deal with smoke pollution because reconstruction was regarded as more important than clean air. It would take a disaster to shift public opinion and shock the politicians in Westminster into action.

In early December 1952 thick smog fell over London that lasted for five days and led to over 4,000 deaths in excess of the number of deaths in normal circumstances. The Government panicked and realized that it had to act immediately. Yet in good Westminster fashion a committee under the chairmanship of Sir Hugh Beaver was appointed in June 1953 to examine the causes and effects of air pollution and what preventive measures were practicable.

The Beaver Committee presented its report in November 1954 and there was nothing new about its recommendations which included the introduction of smokeless zones and the relocation of industries. In short, many smoke abatement lobby groups had been pressing for similar measures for almost a century. However, what was new was the suggestion to put all existing legislation into a single comprehensive Clean Air Act that covered not only industrial air pollution but also domestic smoke.

The recommendations of the Beaver Report resulted in the Clean Air Act of 1956. This Act aimed to control domestic sources of smoke pollution by introducing smokeless zones. In these areas, smokeless fuels had to be burnt by households. In addition industrial pollution of towns decreased because of the use of tall chimneys and relocation of power stations to rural areas. There is no doubt that the reduction

of domestic and industrial coal burning and the use of smokeless coals have led to a reduction in the levels of emission of sulphur dioxide, one of the main contributors to acid rain. Indeed, the emissions fell between 1970 and 1994 by 60%. However, the most important cause of the decline in urban air pollution was the introduction of new fuels and technologies. The switch from coal to oil and gas as the main fuels for heating, cooking, transport and industrial activities reduced emissions dramatically. Gas and oil produce only a fraction of soot, smoke and sulphur of coal, making the London smog a thing of the past. The question that remains is whether air quality in Britain improved because of the 1956 Clean Air Act or whether this would have happened regardless as a result of the introduction of new fuels and technologies.

TRANS-NATIONAL AND GLOBAL ATMOSPHERIC POLLUTION

For most of human history air pollution problems were local or regional in scale, with the exception of lead pollution. None of these instances of air pollution altered the composition of the atmosphere significantly to have any long-term consequences. That all changed during the 20th century with the emergence of two problems: the hole in the ozone layer and global warming. These two problems were the result of industrialization of the globe, which was made possible by technical developments such as the invention of the steam engine, and the internal combustion engine, and the availability of cheap energy in the form of fossil fuels.

A HOLE IN THE OZONE LAYER

The story of the hole in the ozone layer started in 1928. It was then that Thomas Midgley invented CFC (Chloroflourocarbon), a gas that was perfectly suited to refrigerating and for use in spray cans. Midgley is an interesting individual and historian John McNeill has remarked that Midgley 'had more impact on the atmosphere than any other single organism in earth history.' Not only did he invent CFCs but also discovered that adding lead to fuel makes engines run better. One could argue that Midgley's inventions symbolize how humankind, by developing technology, is supposedly killing itself. However this view is too simplistic since it was thought initially that CFCs were harmless. In addition, the gas is highly stable: it does not react with any other gas or substance. This remarkable chemical stability made people confident that there would be few, if any, environmental side effects. As a consequence the chemical was embraced by industry.

In 1974, Sherwood Rowland and Mario Molina discovered that CFCs are agents that can destroy stratospheric ozone under the influence of ultraviolet light. By 1977 it was almost certain that these gases, which were used on a large scale in spray cans and refrigerator systems, were damaging the ozone layer - which protects us from harmful UV-B radiation. However, governments, pressurised by the chemical industry, refused to act, since the mechanisms by which ozone was destroyed were by then not fully understood. It was argued that more data and research was needed to warrant action.

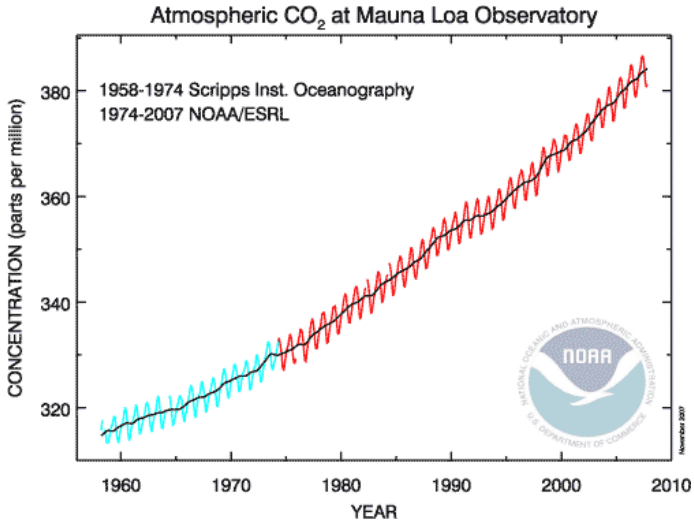
By the mid-1980s a severe seasonal thinning of ozone over the Antarctic was observed and by 1987 the world's media were reporting on a 'Hole in the Ozone Layer'. It was during that year that the Montreal Protocol established a scheme that led to a total global ban of the production of CFCs by the late 1990s. In 2003, observed levels of chlorine in the atmosphere peaked and then began to fall. However, they will remain high for decades to come and it is expected that atmospheric concentrations of ozone will not return to natural levels before the middle of the century.

Since depletion of stratospheric ozone has been the first human caused global environmental threat, it seems a good example of what can be achieved by international cooperation and determined action. However, on close inspection, it appears that if the precautionary principle had been applied at an early stage, money could have been saved and damage to the ozone layer avoided. The chemical industry reacted in the same way that the tobacco industry reacted to research that showed that smoking caused lung cancer. In both cases the industry in question bought scientific 'evidence' and launched public campaigns based on this so-called evidence to deny any harmful effects of either smoking or the use of CFCs. In addition governments were successfully lobbied to take no action on the grounds that there was not enough data to establish any harmful effects. As a result action was delayed for a decade, which resulted in the formation of the infamous ozone hole over Antarctica. When it was decided that CFCs had to be banned, alternatives that were more difficult to produce than the chemicals they replaced had to be developed at high costs and in a hurry. If it had been decided in 1977 to reduce the production of CFCs to levels that the atmosphere could cope with, and if alternatives had been developed during subsequent years, the hole over Antarctica could have been avoided altogether.

A combination of luck and foresight neutralised the threat caused by CFCs. If bromine instead of chlorine had been used on a large scale, the ozone hole would have been global by about 1970. Bromine and chlorine can be used interchangeably for many purposes but bromine is 45 times more potent than chlorine to destroy ozone. Luckily, bromine is too expensive and was for this reason not widely adapted. More by luck than wisdom the catastrophe did not develop. Next time we might not be so lucky.

GREENHOUSE GASES

Another major by-product of industrial activity, transport and agriculture is the increased emission of carbon dioxide (CO2) and methane, the two most important of the so called 'greenhouse gases'. These gasses in the earth's atmosphere act like a blanket that keeps heat in. Once the sun's energy heats up the earth surface, the heat is radiated back into space but the greenhouse gasses in the atmosphere traps part of this heat so the earth is much warmer than it would be if it had no atmosphere. This is essential for life and without greenhouse gases the earth would be permanently frozen. However, a rise in the concentration of the greenhouse gases caused by industrial processes has meant that more heat than usual is being trapped, leading to a potentially significant rise in the earth's average temperature.



This figure shows the history of atmospheric carbon dioxide concentrations as directly measured on top of the Mauna Loa volcano, Hawaii. This curve is known as the Keeling curve, and is an essential piece of evidence of the man-made increases in greenhouse gases that are believed to be the cause of global warming. The Mauna Loa observations are the longest record of carbon dioxide increase available and confirm that human activity is increasing the amount of this gas in the atmosphere. The annual fluctuations in the graph are caused by seasonal variations in carbon dioxide uptake by vegetation. The black line

shows the average monthly concentrations of CO2.

Source: Image courtesy of the National Oceanic and Atmospheric Administration, http://www.esrl.noaa.gov/gmd/webdata/ccgg/trends/co2_data_mlo.png

The increase in industrialisation has led to an annual increase of 5 billion tonnes of CO2. Methane from landfill sites and agriculture is increasing at a rate of over 1% per year. Plant life cannot absorb this rapid increase of greenhouse gases so the overall concentration of CO2 is rising, and the temperature with it. The release of greenhouse gases is now recognised as a hazard for the planet. International legislation is trying to decrease the levels of pollution but the already industrialised countries, although reducing their levels of pollution, still contribute most to the problem.

NGOs AND CORPORATE INTERESTS

The year 1989 is often regarded as the breakthrough year of environmentalism and saw a surge of awareness concerning issues ranging from soil pollution to habitat loss and global warming. It was around this time that non-governmental organizations (NGO's) started to frame climate change as a 'green' issue. Large NGOs like the Sierra Club, Friends of the Earth and Greenpeace began to make global warming one of their top campaign priorities.

In response to the emerging climate consensus, corporate interests started to fund well-organised lobby groups to undermine any policies designed to counter climate change.

The most influential of these groups was the formidable Global Climate Coalition (GCC), a grouping of car, oil and other industrial companies. It claimed that the American economy would be damaged, and that consumers would suffer from increasing energy prices. They also believed that exempting developing countries from taking carbon reduction measures would create unfair competition. The GCC used disruptive and underhand tactics, aiming at discrediting climate change science and to sow doubt about the necessity of reducing emissions. It applied the experience of the smoking industry lobby to 'prove' that mainstream medical science was wrong with regard to the dangers of smoking.

But the GCC found it hard to maintain unity in the face of the growing evidence compiled by the IPCC. Many major corporations such as BP and Shell left the Coalition and the GCC was disbanded in early 2002.

However, with the disbanding of the GCC climate sceptics started to employ new tactics from the base of well-funded think tanks politically aligned with right wing political organizations. These tactics aimed at politicizing science itself and portraying scientific consensus as if it were a democratic process. This meant that climate sceptics demanded equal time for alternative 'theories'. If this was not happening, science could not be trusted, they argued. Since the about 2005 climate sceptic organizations have sustained a media campaign in which they have repeated this message over and over again, and not without results. Recent surveys in the United States and Britain have shown that increasing number of people have doubts about global warming. These pressures from NGOs and lobby groups as well as public opinion have had a considerable influence on the formal political negotiations.

INTERNATIONAL POLITICS OF CLIMATE CHANGE

In 1988 the World Meteorological Organization and the United Nations formed a joint organization: the Intergovernmental Panel on Climate Change (IPCC). This new body was charged to fairly and openly assess the science and socio-economic challenges that societies are facing in the light of climate change. To date, the IPCC has published four full assessment reports in 1990, 1995, 2001 and the most recent one in 2007. The reports are a comprehensive review of the current state of scientific knowledge about global climate change, bringing together evidence of changes in the chemical composition of the atmosphere, evidence of warming of the climate system, understanding of the human contribution to the observed warming, and projections of changes to the global climate expected during the next few centuries.

The IPCC is only a scientific reporting body and has no powers to broker any internationally binding treaties to reduce the emissions of greenhouse gasses. The first attempts to come to an internationally binding agreement over reducing greenhouse emissions took place at the Earth Summit in Rio de Janeiro in July 1992. During this summit, a preliminary meeting of the so-called Conference of Parties (COP) was held. At that meeting, 154 countries signed the Framework Convention on Climate Change (FCCC), a treaty that committed signatories to voluntary cuts in greenhouse gas emissions, with the goal of bringing those emissions down to 1990 levels by the year 2000.

The Convention recognized the global climate system as a shared resource whose stability can be affected by carbon dioxide and other greenhouse gases. But since developed counties have been historically the main emitters of greenhouse gases, much of the convention was devoted to recommendations for those countries to reduce their emissions of greenhouse gasses.

The Convention entered into force on 21 March 1994, after ratification by more than 50 countries the previous December. To date, 192 countries have ratified the Convention, according to the FCCC. The first meeting of the signatories, the so-called COP1, took place in Berlin in 1995. It was not until COP3 in Kyoto in 1997, five years after the first meeting in Rio, that industrialized nations finally agreed to hard targets for cuts in carbon dioxide emissions. The Kyoto Protocol committed major greenhouse gas emitters to an average reduction of 5 per cent compared with 1990 levels between 2008 and 2012. An important detail that would have huge implications for future negotiations was that developing countries were exempt from reducing their emissions.

But the effectiveness of the Kyoto Protocol was undermined when the world's biggest greenhouse gas emitter at the time, the United States, walked away from this international framework in March 2001. Their justification for this course of action was that Kyoto would damage American economic prospects, that consumers would suffer from increasing energy prices and that large developing countries would benefit at the US's expense because they did not have to cut their emissions. These arguments were almost identical to those used by the Global Climate Coalition.

Without US participation, the American delegation was relegated to observer status, as negotiations moved forward. Notwithstanding the absence of the United States as partners in the international framework many countries moved forward and signed the treaty, including all the countries of the European Union and Russia.

During the 11th COP meeting held in Montreal in November 2005, a successor to the Kyoto Protocol, which expires in 2013, was discussed for the first time. Given the small scope of emissions cuts involved in the Kyoto Protocol, a new framework extending beyond 2013 was seen as the best way of restoring momentum to the fight against climate change.

In 2007, the international community took a decisive step in Bali, Indonesia, in their discussion for a 'post-Kyoto' treaty. Parties at the COP13 negotiations adopted the 'Bali Action Plan,' which committed them to a follow-up treaty to the Kyoto Protocol by the time of the 15th COP meeting in Copenhagen, Denmark, in December 2009. The expectation was that the meeting in Copenhagen would result in a comprehensive new treaty to limit greenhouse emissions. But things did not go according to plan. The climate meeting in Copenhagen did not end with the hoped for comprehensive treaty that would replace the Kyoto Protocol. In essence major differences in approach between key countries, and especially between the groups of large population: low wage developing countries labelled as the BASIC countries (Brazil, South Africa, China, India, and ASEAN) and the large OECD players in the form of the US and the EU resulted in a stalemate. The large developing countries like China, India, Brazil, and South Africa resented the pressure from rich western nations for parity in economic decarbonization at the very moment when their countries were enjoying rapid economic development. China, for example, is willing to cut carbon emissions but rejects legally binding targets for large developing countries. At the same time, China wants rich countries to be legally bound to a treaty to cut *their* emissions.

African developing countries want rich countries to pay poor countries for the mitigation of climate impacts. They have proposed a climate mitigation fund to reach $100bn a year by 2020. Like China, African nations want rich countries legally bound to cut emissions to 40% below 1990 levels by 2020.

Another strong voice in Copenhagen was a group of low laying islands and coastal nations. They literally fear they will disappear into the sea if temperatures rise beyond 1.5 degrees centigrade. In order to prevent the flooding of their territories they have lobbied for a goal to cut global greenhouse emissions by a whopping 85 per cent by 2050.

And finally, it is not surprising that oil-producing countries led by Saudi Arabia have been lukewarm to climate science and a climate agreement. Together they pressed for compensation to offset any decline in oil export revenues due to any reduction in carbon dioxide emissions.

All these voices with their own agenda's made negotiations almost impossible and the outcome of the Copenhagen meeting was an unusual small document of three pages. This small document contained a non-binding accord that for the first time made 2 degrees Celsius the maximum acceptable global temperature increase an official guideline, rather than a EU aspiration. It also put in place a commitment to significant funding for developing nations to adapt to climate change, although falling short of the $100 billion a year demanded by African nations. On the other hand, no hard emission reduction targets were set. This was left to the next meeting in Mexico in November 2010.

LESSONS FROM THE PAST?

Many regard the Copenhagen climate conference as a failure and much rests on future negotiations to limit the impacts of global warming. Looking at the history of pollution and environmental problems, the question arises if we can learn anything from the 1952 smog disaster and the ozone problem.

In the case of smog in Britain, the underlying causes had been known for more than a century when the Great London Smog occurred. The reasons that no serious action was taken - despite the many committees favouring it - were economic interests, the technology to mitigate air pollution was not yet sufficiently developed, and the general public was unwilling to give up their open coal fires. It took a disaster to introduce legislation to limit smoke pollution and combined with the introduction of new fuels and technologies it made the London smog a thing of the past.

The ozone problem is slightly more complex because it is a trans-national issue mixed with corporate interests. The ozone problem could occur because clever lobbying and the argument that additional scientific data was needed delayed action. The delay was quite costly but fortunately not disastrous. Global warming, on the other hand, is a much more complex problem in which all countries of the world are involved. So far, the IPCC has been entangled in the political process of the COP meetings that delays a speedy transition to lower carbon emissions. Indeed, with hindsight, the creation of the IPCC and the COP framework may appear as an excuse for delaying swift action over the past 20 years. The steps toward legally binding treaties to reduce greenhouse gas emissions have been incremental and bogged down in discussions rooted in the economic self-interest of the nations involved. What would have happened if decisive international action had been taken in 1988 leading to the reduction of greenhouse gas emissions to levels that the earth could cope with? In this scenario it would have been possible to continue to use fossil fuels, although at much lower levels, while buying humanity time to develop alternative forms of 'clean' or renewable energy.. Even then, we must keep in mind that it would have been necessary to take precautions against the warming that was already in the pipeline and could not have been avoided.

Perhaps all three cases of atmospheric pollution underscore that this is a story of delays to act which in turn are deeply consequent on issues of self-interest and political inertia.

STUDENT-CENTRED EXERCISE

DEBATING AIR POLLUTION AND CLIMATE CHANGE

Below are five statements referring to the history of smog, the ozone hole and climate change. Groups of students will debate these statements by either defending them or refuting. First divide the class in eight to ten groups, depending on the class size, and assign a statement to each of them. This means that one group argues 'in favour' of a statement and one 'against'. Groups may sign up on a first come, first served basis, by specifying both the debate topic and the position desired (Pro or Con).

Debate topics and position statements are outlined below. All group members are expected to participate in the research, development, and presentation of your debate position. Preparation will require substantial research using some of the suggested resources and reading and additional literature found in the library or online.

The debate will take the form of timed individual and group presentations and responses separated by timed group work periods.

Prior to the beginning of the class period, both teams are to position their chairs facing each other at the front of the room. Each team is to write its team name, debate position, and debate position statement on the blackboard/whiteboard behind them.

DEBATE FORMAT

The debate is divided into three sections:

Opening Statements (5 minutes for each side)
One or two persons (preferably two) on each side should establish the key points of their side. Approach of the end of the time slot will be signalled. Five minutes will be complete cut-off.

Five minutes will be given to both sides to consider the opening statements and plan their rebuttal responses.

Rebuttal/ Supporting Statements (up to 10 minutes)
This is the core of the debate. Roughly equal time will be given to both sides, though the nature of debate is such that the exchange has a constant flow. Any team member may speak and wide participation from within a team based on areas of expertise is very helpful. All speakers must respect the chair's decision to stop a speaker to allow the opposing side to respond.

Five minutes will be given to both sides to modify or reinforce their concluding statements in light of the arguments made during the debate.

Concluding Statements (5 minutes for each side)
One or two persons (ideally two) from each side will summarise the key points and effective counter-arguments of their side. Approach of the end of the time slot will be signalled. Five minutes will be complete cut-off.

Debate 'Winners' will be selected in two ways, as follows:

Audience Vote: Class members in the audience will vote by secret ballot for a debate winner. At the conclusion of the debate, class members will put to the ballot if the Con or the Pro team has won. After all ballots are collected, the number of votes for each team will be announced. Whichever team has more votes will be the winner, and the team will receive 10 bonus points in addition to the 30 for basic preparation. In the event of a tie, the instructor's vote will decide the winner.

Instructors' Vote: The instructor will also evaluate both teams based on criteria such as presentation, quality of arguments, quality of research, collaboration within the group etc. The instructor's vote is 50% of the number of points, adding up to 100.

DEBATING STATEMENTS

1. The London smog disappeared in the decades after 1956 due to the implementation of the Clean Air Act.

2. The Great London Smog, the hole in the ozone layer and global warming persisted or continue to persist because, social, political and economic self-interest have sabotaged effective action.

3. The international response to the ozone hole could be a blueprint of how to tackle global warming.

4. The damage to the ozone hole could be successfully limited because there were technological solutions available. In the case of global warming we do not yet have the technology to deal successfully with this problem.

5. The developed countries are largely to blame for global warming and should reduce greenhouse gas much more drastically than developing countries.

Resources

London Smog

Laura de Angelo, 'London smog disaster, England', *The Encyclopedia of Earth*, http://www.eoearth.org/article/London_smog_disaster,_England

'Clean Air Acts', *Encyclopaedia of the Atmospheric Environment*, http://www.ace.mmu.ac.uk/eae/Air_Quality/Older/Clean_Air_Acts.html

Video: Air Pollution in a Historical Perspective, *Environmental History Resources*, http://www.eh-resources.org/vodcast/index.html#4

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'Climate Change', *The Natural History Museum*, http://www.nhm.ac.uk/nature-online/environmental-change/index.html

'Climate Change Timeline', *The Met Office*, http://www.metoffice.gov.uk/climatechange/guide/timeline/

'Research Methods: Climate History', *Environmental History Resources*, http://www.eh-resources.org/climate1.html

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P.T. Zeleza, 'The Predictable Failure of the Copenhagen Climate Change Conference', *The Zeleza Post*, http://www.zeleza.com/blogging/global-affairs/predictable-failure-copenhagen-climate-change-conference

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