

# FIVE WAYS TO TEACH CLIMATE CHANGE

By David G Kibble

This is an expanded version of David Kibble's article in *REtoday* magazine, September 2020.

Next year the city of Glasgow will host the biggest international conference ever to have taken place in the United Kingdom. The United Nations Climate Change Conference of the Parties (COP 26) will see 30,000 delegates meeting in the city. This will include heads of state, climate scientists and campaigners.<sup>1</sup> The conference's aim will be to encourage countries to commit to policies that will ensure that the effects of climate change will not run away on their own and damage further peoples and places around the globe. For many of us in northern Europe climate change is what might happen in the future but for many countries in the third world climate change is a present reality. The policies and practices that followed from the Paris conference in 2015 now need strengthening. After the relative failure of talks in Madrid in 2019, many see the Glasgow conference as our 'last chance.'

I taught about climate change as part of an RS GCSE syllabus for years before I retired. But it wasn't until a few months ago that I really became aware of the terrible consequences that lie ahead of us if we simply carry on as normal. The stimulus to my reading had come from watching the Extinction Rebellion demonstrations here in the UK and seeing how Greta Thunberg was making her point about climate change. So on a holiday to America I took with me a copy of Joseph Romm's *Climate Change: What Everyone Needs to Know*.<sup>2</sup> I started to read it on the plane to San Francisco, read more in San Francisco itself and then completed the book in San Diego. At the end I said to my wife, 'Why didn't we know about all this

For the classroom



## 5 ways to teach climate change

**David G. Kibble**, a retired RE teacher, suggests learning activities for your 11–16s. There is an extended version of this article on the RE Today members' website.

What follows are activities that can be used to build lessons on the subject of climate change. Teachers should feel free to use or adapt them as fits best with their syllabi and teaching preferences.

1. Who said what? Learning and applying quotations
2. Mapwork: higher temperatures
3. Producing a plan for the future of Lincolnshire or Miami: rising sea levels



Higher temperatures may have been welcomed by some, but in many parts of the world they can be disastrous. We have recently seen on our television screens how a rise in temperature helped to produce wildfires in Australia. Nearly 6,000 buildings were destroyed, with just under 3,000 of them being people's homes.

Using a blank outline of the world and an atlas, students should plot the different places and countries in the temperature list above together with their temperatures. What would it mean to be a Khalifa or steward of God's creation in this situation?

One of the effects of global warming is a rise in sea levels. How much the sea will rise will depend on how much we are able to reduce our CO2 emissions. Different scientists use different models to project how much the rise might be, but the International Panel on Climate Change has suggested that by 2100 there will be a rise in sea level of between 20 to 39 inches. Other studies that focus more on the projected melting of ice at the North and South poles suggest that the rise might be between 36 and 60 inches.

**1. Who said what? Learning and applying quotations**

Background

- 'The Lord God took the man [Adam] and put him in the garden of Eden to work it and take care of it.' (Genesis 2:15)
- 'The earth is the Lord's and everything in it.' (Psalm 24:1)
- 'I was hungry and you gave me something to eat.' (Matthew 25:35)
- 'The world is sweet ... and Allah has made you stewards in it.' (A saying of Muhammad reported by Muslims.) Students might like to use the Arabic word 'Khalifa', which means 'steward'.
- 'For you Europeans, climate change is a problem for the future. For us it is a problem of everyday survival.' (An Anglican archbishop from the developing world to Archbishop Justin Welby)
- 'The ecological crisis is also a summons to ... an "ecological conversion".' (Pope Francis in his encyclical, *Laudato Si'*)

Student activity

This activity might be done in a number of ways, but the objective is to have students verbally learn and rehearse some of the quotations. They can then be asked to apply these religious teachings to the scenarios and examples given in the next four classroom ideas below.

**2. Mapwork: higher temperatures**

Background

The year 2018 was a record-breaking one for summer temperatures, with Scotland seeing its own record of 31.9°C in Renfrewshire. Researchers at the universities of Oxford and Edinburgh found that in Scotland farmers experienced lower yields of broccoli, peas and cauliflower. The researchers concluded that with global warming, temperatures of this kind could become much more common in Scotland.

In the same year, 2018, a number of places experienced temperatures at a far higher level than that seen in Scotland:

- Iran 53.0°C
- Dubai, United Arab Emirates 51.6°C
- Pakistan 50.2°C
- Los Angeles, USA 48.9°C
- Oman 42.6°C
- Armenia 42.0°C
- Colorado, USA 40.5°C
- Glasgow 31.9°C

before?' Some of the information wasn't available of course but much of it was. Little of it seemed to have percolated down to the average man and woman in the street. Even with all the wonderful work being done by the BBC news and other media on the issue many people still know little of what might lie ahead unless we change our ways.

It is because of this that I am offering some ideas for the teaching of climate change. Some of what you read may be quite alarming: climate scientists tell us that 'there is still time' and students should not be afraid of the future. They should, however, be aware that we all do need to change. They should therefore be encouraged to talk about the issue with those with whom they live. Individuals, families, schools and other organisations can help to model that change.

What follows are not lessons: they are activities which can be used as part of a curriculum on the topic. Teachers should feel free to use or adapt them as fits best with their syllabi and teaching preferences.

## 1. MAPWORK: HIGHER TEMPERATURES

*Background.* 2018 was a record breaking year for summer temperatures with Scotland seeing its own record of 31.9C in Renfrewshire. For some in the UK this hot weather was welcome but such high temperatures do present problems.

Researchers at the universities of Oxford and Edinburgh found that in Scotland farmers experienced lower yields of broccoli, peas and cauliflowers. There was an increase in the number of pests including jellyfish, wasps and mosquitoes. The researchers concluded that with global warming temperatures of this kind could become much more common in Scotland.

In the same year, 2018, a number of countries experienced temperatures at a far higher level than that seen in Scotland:

• Colorado, USA	40.5C
• Glasgow	31.9C
• Armenia	42.0C
• Oman	42.6C
• Pakistan	50.2C
• Dubai, United Arab Emirates	51.6C
• Iran	53.0C
• Los Angeles, USA	48.9C

Higher temperatures of this kind may have been welcomed by some but in many parts of the world higher temperatures can be disastrous. We have recently seen on our television screens how a rise in temperature helped to produce wildfires in Australia. Nearly 6,000 buildings were destroyed with just under 3,000 of them being people's homes. It has been estimated that over a billion animals were killed. In January 2020 Canberra had the worst air quality of any city in the world with resulting health impacts.

A 2012 study by the American National Centre for Atmospheric research concluded that unless we are able to reduce our fossil

fuel emissions and reduce global warming in the 2060s large areas of the United States, Brazil, Africa, the Middle East, Australia, Southeast Asia and parts of Europe will experience droughts as a matter of routine. It concluded that by the 2090s 'most of southern Europe and about half of the United States is gripped by extreme drought' a great deal of the time.

An increase in temperature can lead to an increase in infections and diseases carried by insects such as malaria and to problems in growing sufficient food due to drought. It can also lead to a decrease in productivity because people do not work as effectively in higher temperatures. Japanese professor Solomon Hsiang found that for those working indoors every degree rise above 25C resulted in a 2% drop in productivity. For those who work outside, the problem is more acute: in El Salvador, for example, one fifth of the male population suffers from chronic kidney disease as a result of working in the sugarcane fields. 20 years ago working outdoors had no such consequences because the daily temperatures were lower.

*Student Activity.* Using a blank world map and an atlas, students should plot the different places and countries in the temperature list above together with their temperatures.<sup>3</sup>

## 2. PRODUCING A PLAN FOR THE FUTURE OF LINCOLNSHIRE OR MIAMI: RISING SEA LEVELS

*Background.* One of the effects of global warming is a rise in sea levels. How much the sea will rise will depend on how much we are able to reduce our CO<sub>2</sub> emissions. Different scientists use different models to project how much the rise might be but the International Panel on Climate Change has suggested that by 2100 there will be a rise in sea level of between 20 to 39 inches. Other studies which focus more on the projected melting of ice at the north and south poles

suggest that the rise might be between 36 and 60 inches.

The British Committee on Climate Change has predicted that parts of the south and east of England are at risk as a result of a rise in sea levels together with low lying areas of East Anglia, Lincolnshire, parts of Yorkshire and the coast between Liverpool and Blackpool. 520,000 properties are currently in areas at risk from coastal flooding and the committee suggested that this could rise to around 1.5 million by the 2080s unless action is taken.

Professor Andy Shepherd at the University of Leeds published a report at the end of 2019 which revealed that ice in Greenland is now melting seven times faster than it was in the 1990s and that its melt alone could result in a sea level rise of 7cm by the end of the century. On the day the report was published he said, 'The simple formula is that around the planet, six million people are brought into a flooding situation for every centimetre of sea-level rise.'

Outside of the UK capital cities such as Cairo and Jakarta will be at risk of flood. Particularly vulnerable are countries in south east Asia such as India, Sri Lanka and Pakistan. Bangladesh, which is also at risk, has 40 million people living around its coast and many of these are likely to be affected by coastal flooding. In the USA particularly at risk are the coastal cities of New Orleans and Miami. Harold Wanless, chair of Miami University's Geological Sciences Department, said, 'I cannot envision south eastern Florida having many people at the end of this century.' In 2014 he said, 'Miami, as we know it today, is doomed. It's not a question of if. It's a question of when.'

*Student Activity.* Students should work in small teams and imagine that they have been appointed as a member of a local government committee in either Lincolnshire or Miami.<sup>4</sup> Their brief is to decide how they

are going to inform their communities that some of them will be affected by rising sea levels. They should then continue and think of what questions local people will raise and how they are going to answer them. In order to do this they will need to come up with a plan which looks at how people might be re-housed, where that housing might be and who will build it. They will need to work out who pays for the loss of accommodation and farmland / industry / tourist sites, etc.

Each team should then present their findings to the class.

### 3. THE MINISTRY OF DEFENCE HUMANITARIAN AID TEAM: EXTREME WEATHER EVENTS

*Background.* 'This is the third time in seven years,' she said in exasperation to the television news team. The lady was referring to February's flooding of the Calder Valley in Yorkshire, where her home had been flooded yet again. Storm Ciara had affected around 500 homes and 400 local businesses. The previous November furious residents of South Yorkshire had confronted Boris Johnson when he visited areas that had been flooded in recent storms. The village of Fishlake, near Doncaster, received national attention when, because it had rained so much, it became an island with nearly all its properties flooded. The army were called in: 200 soldiers went to help the local residents. Climate scientists tell us that climate change will see Britain suffer more storms and more rainfall but can we say that these floods were caused by climate change? No, not directly, but we can say that this is the sort of thing we are going to see more and more of.

Scientists tell us that as the atmosphere warms there will be more extreme weather events. Most people are aware of the Australian firestorms but how many are aware of the devastation caused by the 2019 flooding in Africa? Here are the statistics:

- Ethiopia: 570,000 people affected with 23 deaths
- Somalia: 547,000 affected with 17 deaths
- South Sudan: 908,000 affected
- Sudan: 426,000 affected
- The Democratic Republic of the Congo: 200,000 affected with 40 deaths
- Kenya: 160,000 affected with 120 deaths.

Climate scientists tell us that the cause of the flooding was the Indian Dipole: changes in temperature in the Indian Ocean.

In 2005 the United States saw 1,200 people die in New Orleans as a result of Hurricane Katrina. Katrina, a category 5 hurricane, was the third hurricane of the 2005 hurricane season and the fourth most intense hurricane on record. In 2019 the Bahamas suffered Hurricane Dorian, the worst natural disaster in the country's history. The island suffered winds of 185 mph. 70,000 people were left homeless and 73 people are recorded killed. However, the death toll is likely to be much higher, possibly over 300 people, but figures are not yet accurate as it is unlikely that the full number of bodies have been found.

The British Royal Navy had *RFA Mounts Bay* on station near the Bahamas. *Mounts Bay* is a ship which has a number of landing craft within its hull: it can therefore deliver goods ashore which the ship itself cannot. It was able to deliver water and shelter kits and provide dumper trucks and diggers. Its helicopter flew missions to determine the extent of the damage. Sailors went ashore to help with a variety of tasks including medical care.

Climate scientists have shown that the warmer the earth's atmosphere gets its water holding capacity increases; so there's more rain on the way as the earth gets warmer. They have also shown that the intervals between storms will be longer but when they do hit landfall they will be stronger. Because sea levels are rising this

makes storm surges along the coast more ferocious. That ferocity is therefore due to a mixture of an increase in temperature, rising sea levels and an increase of power within the storm itself.

*Student Activity.* Students should start by dividing themselves into small groups; each group should suggest what the various consequences will be of a tropical storm on an island in the Caribbean. These should be fed back to the whole class and noted on a whiteboard. Then, in the same groups, students should imagine that they are members of a Ministry of Defence team, planning for disaster relief in the coming hurricane season. Student teams should produce a list of items that ships being deployed to the region for the purposes of disaster relief should have aboard, bearing in mind the list on the whiteboard. They should also decide on any specialist personnel. These might then be shared.

#### 4. THE CAMPAIGNER: FOOD SHORTAGES

*Background.* The United Nations has a target to end hunger by 2030. The target is worded as follows: 'By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.' Climate change is now hindering achieving that goal. In 2019 the Science Advisory Group reported that after historic improvements in feeding the world's population those improvements are now on the decline. In 2015 there were 785 million people undernourished whilst in 2018 there were 821 million. The United Nations concludes: 'Mounting evidence points to the fact that climate change is already affecting agriculture and food security, which will make the challenge of ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture more difficult.'

It doesn't take much imagination to understand why the improvement in feeding the world's poor is now under threat. Climate change is damaging food production. We have already seen how higher temperatures in Scotland have led to a decrease in yields in broccoli, peas and cauliflowers; around the world the same decrease can be seen in many different types of farming. Rising sea levels will mean that the rich agricultural areas around the river Ganges in India and the Nile in Egypt will become less able to produce their crops because of saltwater flowing onto farmland. Egyptian economists have predicted that by 2050 the country could lose up to 15 per cent of its agricultural land as a result of climate change. They suggest that its tomato crop will reduce by 50 per cent. Rising temperatures mean that inland the Nile has begun to dry up. Talaat al Sisi, an Egyptian farmer, complains that 'the Nile is shrinking. The water doesn't reach us any more.'

Storms and hurricanes will have similar effects. Oxfam reported on one family living in the Philippines who were affected by typhoon Haiyan in 2013. Twenty-three year old Mario Waniwan used to make a living from fishing and collecting mud crabs from the mangroves. 'I can't fish, my boat was destroyed and all my crab fishing equipment was washed away. The mangroves are totally washed out, so there are no crabs any more. It will be three to five years before the mangroves grow back and can be occupied by sea creatures. I'm married and have a ten-month-old son, Marvin. We ate three meals a day before the typhoon ... Now, there is no more fish, no more meat, and no more money. I have no other income so if the food aid stops we will have nothing to help us.' Severe weather events will see such stories being repeated around the world.

Oxfam has predicted that because of the effects of climate change on food production there will be food price shocks over the coming years. They concluded that wheat

prices could increase two fold by 2030 and corn prices five fold. These effects will affect not just people in poorer parts of the world but also elsewhere, including in Britain.

Growing sufficient food to feed the world's population will become increasingly difficult. But helping to solve climate change also involves food. Everyone knows that fossil fuels like petrol, diesel and gas contribute to global warming. This is why Britain's government will be banning the sale of petrol and diesel cars as from 2035. It is why we are being encouraged to regulate our use of gas and electricity and why we are being encouraged to fly less. But we now know that the food we eat also contributes to climate change. Particularly highlighted has been the eating of beef. In order to raise cattle farmers in some parts of the world have been using land that had previously been forest – and forest helps to 'soak up' levels of CO<sub>2</sub>. Cows exhale methane in their burps so there is a double problem here: a loss of forest and increased methane through the raising of cattle. In other areas forests have been turned into cereal farms, producing cereals for the cows to eat. It takes seven pound of cereal feed to produce one pound of beef.

Campaigners are therefore suggesting that we change what we eat so that we eat less meat and move towards a more plant based diet. Below is a chart which shows how different meats compare in terms of greenhouse gas production. The figures show how many kilograms of greenhouse gases are emitted to produce one serving.

- Beef: 3 - 15
- Lamb: 2 - 5
- Pork: 1 - 3.5
- Chicken: 0.5 - 3
- Fish: 0.5 - 3

Each meat has a lower and an upper figure: the precise amount of gases emitted will depend on precisely how the food was

produced. Beef produced by intensive farming, for example, with cattle eating cereals from deforested rainforest will produce more CO<sub>2</sub> than beef produced locally by farms in the UK where the cattle graze on grass. The amount of greenhouse gas emitted in food production depends also on whether the food was transported over a long distance and whether it was transported by land, sea or air.

#### *Student Activities.*

Activity 1. Students should put the figures above into a bar chart with an appropriate title, with each bar showing upper and lower values.

Activity 2. In pairs, students should act as campaigners and decide how we might persuade people to eat more vegetables and less meat. Campaigners generally agree that simply trying to ‘frighten people’ into doing things doesn’t work as well as other methods. Students could produce a poster to accompany their campaign.

## 5. WHO SAID WHAT? LEARNING QUOTATIONS

### *Quotations.*

- ‘The Lord God took the man [Adam] and put him in the garden of Eden to work it and take care of it.’ (Genesis 2: 15)
- ‘The earth is the Lord’s and everything in it.’ (Psalm 24: 1)
- ‘I was hungry and you gave me something to eat.’ (Matthew 25: 35)
- ‘The world is sweet... and Allah has made you stewards in it...’ (A saying of Muhammad reported by Muslim.)  
Students might like to use the Arabic word *khalifa* which means ‘steward.’
- ‘Corruption has appeared in the land and in the sea because of what man’s hands have earned so that he may let them taste the rewards of some of their deeds, that perhaps they will return [to Him].’ (Quran, 30: 41.) This is a long verse suggesting that things have gone wrong on earth because of man’s disobedience. Allah

hopes that people will see the error of their ways. Students might just learn ‘the gist’ of the text rather than learn it word for word.

- ‘Words, words and more words will not reverse environmental degradation... but our actions together can.’ (Archbishop Thabo Makgoba of Southern Africa.)
- ‘For you Europeans, climate change is a problem for the future. For us it is a problem of everyday survival.’ (An Anglican Archbishop from the third world to Archbishop Justin Welby)
- ‘The ecological crisis is also a summons to... an “ecological conversion.”’ (Pope Francis in his encyclical *Laudato Si.*)

*Student Activity.* This activity might be done in a number of ways but the objective is to have students verbally rehearse some of the quotations. Teachers might first like to go through some or all of the quotations ensuring that students know their meaning or significance. Then one method will be to have different sections of the class verbally rehearse different quotations together. Another would be to give students 10 minutes to learn as many as they can. They then individually walk round the classroom rehearsing one at each corner. Students listening will be helped to remember their own. Alternatively students might write individual quotations in boxes in their exercise books making up an appropriate cartoon to accompany each one.

## 6. ADDITIONAL ACTIVITIES

- Students could research fruit and vegetables in their local supermarket. Where did each come from? How might people eat so that fewer miles are involved in transport?
- Climate change will see people moving from countries where temperatures become too high in which to live and work. Students should discuss whether other countries should accept 'climate change refugees.' Should Britain play its part in this and how might it do so? How might we deal with those who tend to be afraid of refugees?
- Students could watch the BBC programme *Climate Change: The Facts* by David Attenborough. It's available on Youtube at <https://www.youtube.com/watch?v=q9WyLPgyuqo>
- Students could discuss with their families or those with whom they live what they might do together to help reduce the effects of climate change.

David Kibble was, prior to retirement, a Deputy Headteacher at Huntington School, York. As a Reader at St George's Church, Leeds, he is now involved in various inter-faith initiatives in the city.

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<sup>1</sup> The conference website can be found at <https://www.ukcop26.org/>

<sup>2</sup> Joseph Romm, *Climate Change: What Everyone Needs to Know* (New York: OUP, 2018)

<sup>3</sup> A template can be found at <https://www.freeworldmaps.net/pdf/world/miller-world.pdf>

<sup>4</sup> A picture of what part of Miami might look like with 2C of warming, also in RE Today this issue, can be found on the *Bulletin of the Atomic Scientists*, Feb 8, 2019 at <https://thebulletin.org/2019/02/hard-numbers-help-visualize-climate-change-and-its-not-pretty/>