

Learning to see climate change

High-carbon societies, which contribute most to climate change, suffer from a 'carbon cover-up', and our failure to see the links in the carbon chain makes joined-up thinking more difficult. David suggests that identifying the key visual indicators of a high-carbon society makes the links visible and more open to interrogation.

'It's not just a geography topic,' said a colleague of mine recently, 'it's a fact of life'. What she was talking about was the role of schools, and geography in particular, in helping young people learn how to live with climate change. It was a timely comment both because 2014 was recognised as the warmest year on record and because the British public is now beginning to wake up to the challenge. A recent research study reported that close to 9 in 10 people in the UK agree that the world's climate is changing; 76 % of respondents said they had personally noticed signs of climate change and 72 % agreed that last year's floods were a sign of things to come (Cardiff University, 2015). The tide of UK public opinion is turning.

Learning to see

In a mere century or so we have burnt half of all the carbon accumulated and buried in the Carboniferous period and pumped it into the air as CO₂. But although many of the things we aspire to equate with high carbon, we are in the habit of putting our comfort and convenience before other people and the environment. In high-carbon societies, one might argue, there is a 'carbon cover-up' in which we see the carbon chain, if at all, as a series of unconnected bits, rather than a connected cycle in which we are all inextricably involved. How, therefore, do we help learners to see changing climate as a fact of life rather than just as something one has to learn about in geography? The examples used here are drawn from Stephen Sheppard's book *Visualising Climate Change* (2012), in which he encourages learners to 'see' carbon more clearly in the local and global community. He identifies key 'visual indicators' of a high-carbon lifestyle and illustrates them with dramatic visual imagery, such as 3D and 4D visualizations of future landscapes. Taken together, these provide a carbon recognition scheme for what is largely invisible in our lives.

Seeing carbon

There are several types of visual indicator of a high-carbon lifestyle which can help draw learners' attention to the links in the carbon chain:

- offshore oil rigs (Figure 1), the Alberta tar sands, fossil fuel-fired power stations: these visual indicators are often sited in remote places
- petrol/diesel-powered vehicles, most TV car ads, plastic products and packaging, leaving lights and computers on at night: these visual indicators are much closer to home
- gas explosions, the Gulf of Mexico oil disaster, televised oil clean-ups: these extreme events are all visual indicators of our high-carbon lifestyle.

Using appropriate visual images to make carbon visible makes it easier for both teachers and learners to understand the various ways the carbon chain works in high-carbon societies. In turn, this makes it easier to investigate how the links in that chain came about; their effects (both positive and negative) on our daily lives; and the action that is needed to move on from this socio-cultural, economic and political phase of history. Photographs can be supplied, or students challenged to find their own; then they can be categorised under the main headings below.

Seeing its impacts

There are various environmental visual indicators of the impact created by high-carbon societies. For example, changes in the growing seasons, the pattern of birds nesting and migrating, the frequency and duration of weather outside the usual variation, unpredictable or unprecedented changes in weather, premature deaths. Each school can develop its own local 'climate change impact profile.' Environmental visual indicators include:

- melting ice-floes, retreating glaciers, island communities threatened by rising sea levels, dust storms
- torrential rain and flooding, fiercer bush fires, prolonged drought, windstorm damage
- backyard ice rinks, spring coming earlier, new birds at the bird table, water restriction signs, forest die-back
- beach-level tourist development, buildings and infrastructure close to streams and rivers, fire risk for heaths and woodland.

Students can be asked to collect and annotate photos of these and other examples of high-carbon impact.

The affective impact of climate change

Once identified, it is the actual and probable impacts of climate change that cause concern. Common responses include anxiety, anger, resignation and denial, troubled feelings which go against our social and cultural norms. This is why a number of key organisations internationally have drawn attention to the present and future impact of climate change on mental health (Australian Psychological Society, 2014). It is important, therefore, to pay attention to the affective impact of climate change, often not fully acknowledged in the classroom. Learners should be given the opportunity, in pairs or small groups, to discuss their feelings, but this is only possible in a safe and supportive setting in which feelings are acknowledged by both peer group and teacher and not subjected to judgement (Hicks, 2014). As students' understanding grows their feelings may change.

By acknowledging their feelings and sharing them with like-minded others students can begin to develop a sense of agency – belief in one’s ability to make a difference – and a desire to find others with similar interests. This, plus an appetite to learn more, makes it possible to engage with others in considered action for change, in both the school and the local community (Randall and Brown, 2015). In the context of climate change, such responsible citizenship takes two main forms – adaptation and mitigation.

Adaptation

This means learning how to live with changing weather conditions, in particular higher temperatures, shifting seasons, rising sea-levels, more floods, drought and extreme weather. This will require many changes to the way we live and work, for example how schools and other buildings are designed, where they are located, how we travel, how we farm, the jobs we do. Adapting to climate change is about being prepared in advance for situations that will affect our schools, communities, livelihood and natural environment.

Long ago, geography textbooks used to talk about ‘difficult climates’ and the hazards local people had to face if they had the bad luck to live in the Arctic or the Sahara. While such climates may have seemed difficult to westerners it is unlikely that the locals considered their weather anything other than normal. The weather that we grow up with as children becomes our norm, and weather which adults experience as different or extreme will not necessarily be seen as such by young people. However, teachers should help students to be fully prepared for torrential rain, unexpected flooding and periodic drought, for example. This means having appropriate clothing and agreed safety rules. A sense of normality is important: this is what we do in these circumstances; this is why we do it. Visual indicators of adaptation include:

- strengthening buildings, fire-smart interfaces, urban heat islands, painting roofs white
- sea walls, stream channel reconstruction, beach restoration, storm water swales, retention basins
- water harvesting, intensive food production, backyard vegetable plots, community gardens, farmers’ markets, village shops, volunteer organisations.

Students can be asked to collect and annotate photos illustrating adaptation to climate change. There is some useful material published by the Institution of Civil Engineers, for example, which talks of ‘turning a negative into a positive’ (Institution of Civil Engineers, 2010). Three possible responses to rising sea-level are examined:

- retreat (the sea is allowed to flood some low-level coastal areas)
- defend (building flood defences to keep the sea out)
- attack (moving offshore with buildings floating or on stilts).



Figure 1: North Cormorant offshore platform, constructed in 1980, is in the East Shetland Basin of the northern North Sea. This visual indicator of a high-carbon lifestyle is in a remote location, approximately 110 miles north-east of Lerwick in the Shetland in water 161 metres deep.

Each of these options is explored in relation to Hull and Portsmouth.

Farmers will have to adapt to changing weather conditions, which may mean growing different crops and changing the way they do things (Farming Futures, 2015). UK food security will become more important, probably with less emphasis on the global food chain because this too will be under stress. Food miles will be more important and more food may be grown locally.

Mitigation

Mitigation means examining all aspects of life and work in our schools, homes and communities to see how we can reduce the carbon emissions they create. Unless we do this global warming will continue to increase. Mitigation involves rethinking how much energy we use and how it is generated, how energy efficient buildings are (both new and old), how we travel and in what type of vehicle, as well as what our overall carbon footprint is (Carbon Footprint Calculator, 2014). Visual indicators of mitigation include:

- prioritising people and bikes over vehicles, electric and hybrid vehicles, light rail transit, umbrellas and wellington boots



Figure 2: This three-bed detached house in Denby Dale, West Yorkshire is the first UK Passivhaus to be built with cavity wall construction. Its design relies on a simple tea cosy effect: with maximum use of super insulation and stringent levels of air-tightness. By combining this with optimum levels of ‘passive solar gain’ (heat from the sun) and Mechanical Ventilation with Heat Recovery systems, Passivhaus design can create healthy and comfortable buildings that require minimal heating. **Photo:** www.denbydalepassivhaus.co.uk

- energy-efficient buildings, rooftop solar panels, outside insulation, wood-burning stoves
- community district heating, higher density housing, co-owned wind farms, grass verges, solar panels on traffic lights.

Students can be asked to collect and annotate photos of these and other examples of carbon mitigation.

The Denby Dale Passivhaus, for example, uses 90% less energy for heating than the average house (Green Building Store, 2015). It was designed as a template for low-energy housing using familiar materials and techniques that any building company could take up (Figure 2). In Aberdare there is a fifteen-year low-carbon project taking place, including solar PV and water heating, heat pumps and low energy street lighting. In terms of transport there needs to be a greater emphasis on bus and rail. There is also increasing availability of electric, hybrid (electricity/petrol), and low CO₂ vehicles (recharging electric batteries, of course, from renewable sources).

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Historically it is the world’s richer countries which have been responsible for most CO₂ emissions so they should also bear the greatest burden for mitigation. As a result of recent campaigning some investors have begun to move away from fossil fuels, for example the Rockefeller Foundation, the World Council of Churches and Glasgow University, the first university to do so in Europe (*The Guardian*, 2015).

Telling new stories

Stories, it has been said, whether fiction, myths or true accounts, help us hold the beginnings, middles and ends of our lives together. Without inspiring stories we will not have hope: to share and cherish such stories is to maintain hope.

Stories (economic, political, social and cultural) do indeed hold our lives together. They influence much that we do and take for granted because they are so deeply embedded in our subconscious that we often don’t know that they’re there. Fictional stories, real life stories and success stories can also help us find our way in troubled times. They provide something to hold on to so that we don’t give up hope or get lost. They give direction. In the face of climate change the high carbon story now has to be seen as dangerous and therefore redundant. It is not a story that leads to human or planetary wellbeing. What we now need to give us direction are new and exciting narratives of low-carbon change in our schools, homes and communities (Porritt, 2014; Ashden Awards, 2015).

If learners can bring our high-carbon chain into focus then the nature of the old story becomes more visible. It is a story which brought us to this place in history but which no longer serves us well. The new story is one of working towards a cleaner, healthier and safer low-carbon future. If geography is committed to developing a critical futures perspective then there could be interesting times ahead. | **TG**

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