

# Travelling first class on the Titanic

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## Environment on the Edge

I always like to quote Sir Crispin Tickell when he was Ambassador to the United Nations: ‘If we are travelling on the Titanic perhaps we should all go first class.’ Well, I doubt if he really feels we should party our way to disaster (he is, of course, a good environmentalist), but he raised an important point. I would like to outline why, in fact, the option of us all travelling first class simply does not exist. I shall not talk about climate change per se because I think most people are pretty convinced – as indeed are 99 per cent of the scientific community. Climate change is real, human-influenced and, indeed, is already beginning to show some effects.

The theory that I would like to put forward is also largely accepted, and that is that even if we were to stop greenhouse gas emissions now, there is enough carbon dioxide and other greenhouse gases already out there to have serious consequences for the way in which we live. There has been an increasing focus – political, public and in scientific policy terms – on the issue of reducing emissions. But there has been rather less on our need to adapt, so I would like to concentrate on some of the major impacts of climate change in the United Kingdom and how we need to think ahead.

The UK Environment Agency has a particular interest in three major water-related areas: scarcity driven by an increasingly warm climate, which stimulates greater demand for water both inland and in coastal areas; flood risk driven by changed weather patterns and sea-level rise; and the consequences of local and global temperature change for freshwater species and habitats. In addition, there is an overall concern that these and other effects are likely to hit those in the United Kingdom who are least able to cope.

Let’s start with the basic resource. The most recent research has confirmed that greenhouse gas emissions are resulting in increased rainfall in and around Europe. There has been a significant rise in mean precipitation in the United Kingdom during the winter months as well as more intense rain. The UK Climate Change Programme has established that by the 2080s winters are likely to be as much as 30 per cent wetter than the norm, especially in some regions. At the same time, summers will be up to 50 per cent drier, particularly in the south and the east. So though we do not expect to see a huge change in overall annual rainfall, shifts in seasonal weather patterns are going to be critical.

We are also likely to see more intense events, with rain falling faster and more water running off to be lost as floodwater, with the accompanying problems of pollution and erosion. Strangely enough, flooding

at certain times will compound the problems of drought at others, as faster run-off also means that our aquifers will be less effectively recharged. There will also be big changes in some of our river flows, with impacts on both the availability and quality of water for human use as well as on biodiversity. Those effects will be very particular to individual regions. Rivers form differently depending on how and where they flow, so it is only on a catchment basis that some of the impacts can be predicted.

At the same time as having a change in the availability of water we are going to see increased pressures on water. On average, domestic water use in the United Kingdom is now 150 litres of water per capita per day. In addition to overall population growth, we are also in that strange state that Michael Meacher once described as ‘refugees from marriage’. There are more single-person households than ever before and, of course, people in single-person households use more water individually than they would collectively. As we get richer, we take more showers, and often have power showers; we have bigger baths; and we water our gardens and fill our swimming pools. The per capita demand for water thus rose by 11 per cent between 1992 and 2003 – a pretty steep rise at a time when we have been increasingly short of water.

It is very likely that the UK population will continue to grow with the effects of climate change, putting ever greater demand on resources. This is a difficult issue to raise – even if you are known to be a good non-racist liberal. The idea of limiting the population is hotly political, and the minute anyone questions whether there is an ecological limit to human numbers in these tightly packed isles, other pieces of political philosophy that are far from liberal come into play. So population growth is something of a minefield in terms of the availability of natural resources – with water being one of them.

Like it or not, if we do see greater desertification and an increase in the barren zones of the tropical and sub-tropical parts of the world – as indeed is expected – the pressure on people to drift further north and further south is quite intense. One of the biggest issues for the future in terms of environmental pressure is just what level of population can be accommodated here. Of course there is plenty of room in Aberdeenshire, and it may indeed be that climate change is the only thing that would make Aberdeenshire comfortably inhabitable. But most of the people who come to live in Britain show little interest in moving to the north, preferring to settle in the midlands and the southeast. So we are going to have some geographically differential pressures.



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As we said, consumption is increasing and almost half of all water abstractions are for public use. About 55 per cent of that is sensibly used in a domestic setting and about a third is effectively flushed down the lavatory. But there are also peak-time issues. Domestic use can double or even treble during the hotter months, while water for agriculture goes from a small to a very large proportion of overall demand in the summer, just at a time when there is least water around.

It is quite difficult to have a conversation with members of the public about reducing their demand for water because they immediately ask why they are being pressurized into using it more efficiently when the water companies' leakage rates are so high. And there is some truth in this – 40 litres per property per day, or more than a quarter of an individual's daily consumption, is lost in leakage. So there are issues not only in how domestic water is used but also how water providers are going to take action to become more efficient.

The UK Department for Environment, Food and Rural Affairs (Defra) has looked at what the impact of climate change on water use will be if nothing is done to restrain demand. By the 2050s we could see the requirement for agriculture going up by 25 per cent as the need for irrigation intensifies; we could see further increases in domestic demand (in spite of our already high level of use) of as much as 4 per cent; and there is a predicted increase of 6 per cent for industry and commerce, even though these sectors have made considerable progress in water efficiency over the last two decades.

So the demand for water is continuing to rise at a time when there is going to be rather less usable water around. Already, some parts of the country have lower water availability per person than in Sudan. Of course all this is further complicated by ongoing development, particularly in the south and the east. These are the most water-stressed regions of the United Kingdom, as well as the country's major growth points – both traditional and with an eye to creating ecotowns. So development is going to put huge pressure on our already stressed water systems.

One of the tasks that we are currently undertaking with the government is to predict the environmental impact of all these new developments in order to determine where they should be allowed to go ahead, and where there should be measures to control water demand and thereby avoid the associated infrastructure.



The pressure of 3 million new homes by 2020 will put very big demands on water supply, and the solution requires a twin-track approach. One side involves demand management, while the other is about developing new water resources, all of which needs a long-term planning framework. We currently have statutory 25-year water plans coming forward from water companies, but we now need to anticipate much longer time frames of 50 or even 75 years, because that is the sort of period that will see climate change play out. We need to start preparing now, and we need to take account of demographics and development alongside climate change impacts. Of course any measures that seek to satisfy water demand must also look at their own contribution to climate change. Many improvements in both water supply and water purification treatment result in heavier energy use, and there is absolutely no point in bringing more water 'on tap' at the cost of emitting substantial amounts of carbon that will exacerbate the climate problem.

All of that makes the efficiency of the way in which we use water even more important. The more intelligently we use it, the easier it is both to supply and to treat, and the less carbon intensive it is in terms of piping, pumping and so on.

Now let me just talk about demand management. It might sound rather abstract, but is really about how each individual actually uses water. The average Londoner uses 160 litres per person per day, and the average Berliner 110 litres per person per day. Yet the average Berliner appears to suffer no greater lack of hygiene than the average Londoner. And if they can do it, then so can we. There are simple ways in which water efficiency could bring our average usage down to the levels of other developed countries.

The Environment Agency estimates that around 50 per cent of planned growth in population and housing in the southeast could be catered for by demand-management measures. First of all we are talking about design, making sure that buildings are not intrinsically water inefficient, with fixtures and fittings that meet regulatory water efficiency standards. I have been struck when going to look at birds of paradise in Papua New Guinea – one of the wettest countries in the world – that all the lavatories there are dual flush. This is because they import them from Australia, which will allow only dual flush installations. Here in the southeast of England, however, which is a severely water-stressed area, there is absolutely no statutory requirement for water-efficient systems at DIY outlets or through plumbers. The government has now acknowledged that we cannot go on like this, so we hope to see ambitious new standards for water-using appliances as well as an improvement in the standards of fixtures and fittings required by building



regulations. At present, the government strategy for all new homes sets a level of 125 litres of water per person per day as regulatory, but this also needs to be tightened up considerably.

There are other ways of reducing water demand. Metering can reduce total domestic water use by between 10 and 15 per cent, with a considerably larger reduction of around 20 per cent during peak demand. If such a reduction were achieved, all of the new reservoirs currently proposed by the water companies would come under serious question. Perhaps they are not required at all. The Environment Agency is currently consulting on designating a whole range of water-stressed areas in the south and east of England for compulsory metering over the next 10 years. Such measures mean we could start to see these savings being achieved.

An educated public can also do a great deal to help. Simple things like turning off the tap while washing your hands, or not letting your teenage daughter spend 45 minutes in the shower, can make a huge difference. It is of course highly commendable if you also siphon your bath water into the garden.

The Agency has been examining what water neutrality would look like in the Thames Gateway, one of the drier parts of the country, if the planned housing developments take place. We are expecting 120,000 new homes in the area over the coming years, and it would not be unreasonable to set the challenge of achieving that level of construction without increasing water demand at all. That means building the new houses in a very water-efficient way, but also ensuring that measures are put into the area's existing housing stock to reduce demand. There are various options, such as obliging the developers to retrofit existing stock while installing the most efficient possible systems in the new build. If we can do this in the Gateway, we can learn a considerable amount about how to tackle the countrywide problem of water inefficiency in our existing housing stock. The retrofit could be fairly simple, for example low-flow showerheads and taps, and dual flush systems. Manufacturers of fixtures and fittings are at long last recognizing that they are going to have to be quite innovative in looking at new ways of bringing forward water efficiency.

Water efficiency can go a long way to alleviating the problem, but we also need to look at the resource itself. Essex and Suffolk Water is hoping to extend one of its reservoirs; Thames Water would like to build a completely new reservoir in Oxfordshire. But the Agency is not wholly enthusiastic about this. We really

want to use water scarcity as a driver for water efficiency before further disrupting water flows and habitats. I am always slightly jaundiced when water companies tell me that reservoirs are good for ducks, because, as many of the ornithologists here could also tell you, we are not short of ducks in this country. There are other things that we are more short of. So the twin-track approach is genuinely a means to a track, not just an excuse to build more reservoirs. And let's not build desalination plants either, because they are incredibly heavy in energy as well as in effluents.

I would now like to turn to flooding. Just at a time when we worry about not having enough water, we suddenly discover that we've got too much. I once got the Guardian award for the most ridiculous remark of the year: the accolade came when I launched a water-saving campaign while standing up to the waist in ice-cold water in my waders during a flood. We did it deliberately because we knew it was the only way to get coverage – and it certainly worked.

Both the underlying risk and the costs of flooding are on the rise, with the rate of insurance claims increasing by about 2 to 4 per cent per annum. This is expected to persist as climate change continues to bite. The government-sponsored foresight study calculated that annual flood damage would rise from £1.4 billion, the average in 2002, to over £20 billion in 2080 in a 'business-as-usual' scenario. The number of people at risk of flooding will rise from 1.5 million to 3.5 million. The next flood risk assessment, which will take place following the 2008 publication of the UK climate impact predictions, will take full account of those predictions and may well produce a much gloomier picture.

We are currently building allowances for climate change into the flood defence measures of the riverine environment, but these measures only anticipate the average effects of climate change – not the very great extremes that we are now beginning to see. Meanwhile, climate change impacts on the coast are compounded by the way in which the land is dropping. Sea-level rise is already under way, with around a metre of rise expected by the end of the century. And we are seeing increased coastal storm surges. In November 2007, areas of pressure produced a great dome of water channelling down the North Sea, funnelling up the estuaries and threatening eastern towns such as Great Yarmouth and Ipswich, and coming within a hair's breadth of overtopping our sea defences. The combination of sea-level rise, coastal deterioration and storm surge is now threatening a very major flood on the east coast, where erosion is at its worst.



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At the moment we have about 100,000 properties – worth £130 billion – at risk of coastal flooding, so there is a major need for adaptation even under moderate predictions of sea-level rise. Add to that the fact that we are also getting wealthier, and the annual economic damage could be as much as a quarter of a per cent of GDP by the 2080s. That would be a two- to four-fold increase on the losses that we saw in the summer floods of 2007, and we can expect it to happen every year, so it is really quite serious.

Issues related to floods impacts are multiple. The highest-risk floodplain in the United Kingdom carries an average risk of flood once in 75 years, and communities can cope with this, but to be flooded out twice in as many weeks – as happened last summer around Tewkesbury – is disastrous. The water treatment plant went under water, leaving many with no supply for quite some time, and the electricity substation almost went the same way. Now had it done so, I think we might have seen the government fall. Some 750,000 people would have been without energy for more than two weeks. This time it didn't happen, but the flood was severe enough for people to begin to think about what it might mean. We rely so heavily on electronic instruments for our daily lives and work that practically nothing of importance happens without electricity. If it becomes unavailable for extended periods our entire support system collapses. And of course it is not just about power and water: railways and roads, hospitals, old peoples' homes and care homes, schools and food outlets all cease to function. So we need to make sure that those who have responsibility for running such establishments take climate change into account, think about the long-term future and start putting adaptation measures in place. Of course heat can be as much of a problem for our power infrastructure as floods. Most of our electricity substations would cease to function under sustained summer temperatures of 31°C, and we are not far from experiencing such temperatures. So our infrastructure providers need to address the problem with both flood and heat in mind.

Adaptation measures also have to take account of the variability of rainfall. Summer is now seeing increasingly intense bursts of rain concentrated in small areas, while winter is more prone to steady and widespread rain over longer periods. One might see sudden flood from above-average run-off; the other might see rivers and reservoirs gradually filling beyond their capacity. Each can cause floods.

Surface-water run-off is a key issue that nobody seems to want to deal with, partly because of the many factors involved. After a heavy downpour, it runs off the roads in torrents if these are badly planned; it pours off farmlands if these have not been managed and tilled in ways that hold water back; it can come

up from the sewers that belong to the water company; it runs out of people's driveways; and of course rapidly overloaded rivers can burst their banks, so the Environment Agency is responsible too.

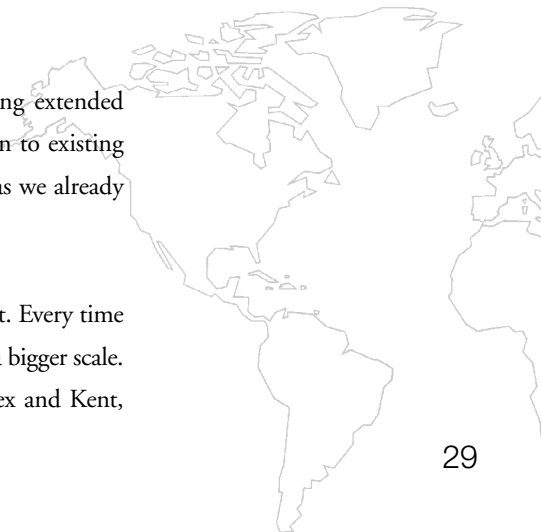
We currently have a Climate Change Bill going through the House of Lords that aims to put greater focus on adapting to climate change rather than just measures for reducing greenhouse gas emissions. This would impose a statutory duty on the providers of critical infrastructure to take climate change into account in their plans for the future. Government recognizes that this is a real issue, and the Agency is being given a major role in fully coordinating all involved. This will require working on a local basis with all relevant organizations: urban planners; road builders; water companies and sewerage works; and the agricultural sector.

The Mayor of London worked out that an area eight times the size of Hyde Park has been paved over by people putting tarmac on their front gardens because they need to park their cars somewhere to avoid congestion charges. The congestion charge is an extremely good idea in carbon terms, but the downside is an increased risk of flooding as people seek to avoid it. We shall have to think very inclusively to take such things into account.

Sustainable urban drainage systems (known as SUDS) will involve more porous surfaces that reduce water flow and harvest rainwater for other purposes. The provision of ponds, lakes and wetlands in city areas can also facilitate drainage and slow the water's route to overloaded rivers. There are plenty of possibilities, but they will all need maintenance in the future and it is unclear who will take ownership and responsibility.

We also need longer-term plans for our sewerage systems, as currently they are being extended beyond their capacity. At present, any new developments just add more sewerage pipes on to existing Victorian infrastructures. But we need 25-year forward planning for our wastewater just as we already have for our freshwater supply.

Short-term solutions aren't a solution. Take, for example, the Thames flood embankment. Every time there has been a major flood in London there has been a decision to rebuild the defences on a bigger scale. As recently as the 1953 floods, when there was huge loss of life along the Thames in Essex and Kent,



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additions were made to the flood embankment. But we cannot just continue building walls, as very shortly you will not be able to see the river at all. And, of course, if an enormous surge does pour over the top of a large defence, it will do even more damage to an area than if there had been no defence at all.

We need to take a much more holistic approach in the way we manage estuaries and catchments so that the land itself can be used for water storage. We are looking at a wide variety of solutions for protecting the banks of the Thames. Some strengthening of defences is expected, but over the next three or four decades we also plan to provide very large-scale wetlands in the outer Thames. These will have a variety of functions including supporting biodiversity and providing for recreation, and when a really big flood occurs they can also be allowed to fill up with water – a much more successful way of reducing flood risk in London than building huge concrete barriers across our estuaries.

There are two more issues to take into account with the question of increasing flood risk – putting things in the wrong place or designing them in the wrong way. Take, for example, the caravan park at Hunstanton, which is home to largely retired elderly people and particularly prone to flooding. This is quite simply the wrong place for elderly people to live. If we have to carry the old ladies of Hunstanton Caravan Park out of their homes one more time I think they will go crazy.

We need to make sure that strategic processes are applied to ensure the right location for a particular development. Regional authorities must use strategic flood risk assessments in order to make individual development control decisions, and only permit development in a floodplain if all other avenues have been exhausted and if the development itself is not going to create additional flood risk.

It is fair to say that the majority of local authorities make responsible decisions about the location of new developments. But there are still a few rogues who seem intent on building things in the wrong place. One that instantly comes to mind is Lincoln City Council, which wants to build 6,000 houses on a site called Swamp Pool. I think there is a bit of a clue in the title.

On the coast we have big challenges, and increasing pressure to find innovative ways of looking at risk management. Here it is a case of using rising ground as a natural defence and wetland habitats as a means of buffering the sea. A programme on 'Making Space for Water' that we are currently running with Defra

provides some answers, even though it is still very small scale. A number of demonstration sites have been created around the coast, where salt marshes have been recreated to function alongside coastal retreat programmes. It is on this type of solution that we should increasingly be focusing, making the best possible use of natural ecosystem services rather than just trying to block the forces of nature. The decision to abandon coastland is not an easy one. Suffolk MP, John Gummer, has said that for as long as he is an MP no English soil will be under water. King Canute? I rest my case.

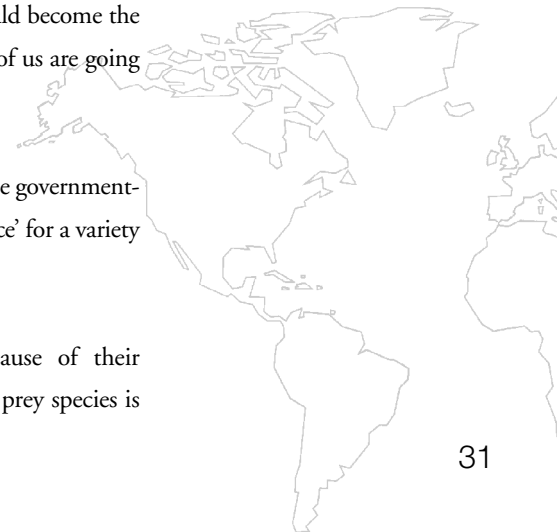
In reality the sea is making its own decisions. There are settlements at the Blythe Estuary that it will simply not be possible to protect, either economically or practically. Very few communities are comfortable with that thought, but we hope that by giving them a reasonably long time horizon to adapt, they will develop strategies to move back from the coast. Some in fact are already making plans. Mablethorpe in Lincolnshire has recognized that the first two streets running along the coast are simply not defensible, and are planning developments back from the sea and up the hill.

Let us go back to ‘travelling first class on the Titanic’. Climate change will not affect all parts of the UK population equally. The poor inevitably come off worst, as many are underinsured or not insured at all. A stunning 90 per cent of the people who suffered flood damage in Hull last summer had no insurance; in excess of 10,000 people lost everything.

And of course climate change is not just about water issues. Certain groups are more at risk during heat waves, particularly older people, babies, and people with heart conditions or respiratory problems. The summer of 2003 resulted in 2,000 extra deaths, yet the temperatures that caused them could become the norm by the 2050s, and by the 2080s might even be considered cool. I do not think any of us are going to be able to travel first class.

Let me just finish with species because we are not the only ones who will be affected. The government-sponsored Monarch report maps the changes we might expect to what is called ‘climate space’ for a variety of our species.

We have much to learn about what happens to assemblages of species, because of their interdependency. There may theoretically be climate space for a certain species, but if its prey species is



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not available at critical points of its breeding or feeding cycles it will not be able to raise its young. Some – including certain birds and butterflies – are capable of moving, but others are more sedentary. We need to create environments that give these species the greatest possible opportunity to move as and where they need to, including conservation landscapes and large tracts of land that enable them to adapt. We also need to learn to spot the species that are going to be in deeper trouble and decide whether we can do translocations. This involves the establishment of captive breeding populations to make sure that they do not die out.

New coastal habitats must be created to replace those lost through coastal squeeze. Some are already under way: 4,000 hectares of standard arable farmland between Huntingdon and Peterborough, for example, is being purchased by a consortium of partners to create a big new fenland in Cambridgeshire. This will join up two small remnant areas of fen, bringing true fenland back to this part of the world for the first time in a long while. I am really pleased to be on the fundraising committee.

Last but not least, a word about our sponsors, the government. At long last the government has got the message that all this adaptation stuff is pretty important, and is going to draw up a national adaptation programme. Two particular things are needed. One is the Climate Change Bill, which will firmly establish the national adaptation programme so that mechanisms are in place to determine the respective responsibilities of infrastructure and service providers. The second is an independent adaptation scrutiny committee. The government is currently working on a climate change committee to scrutinize emissions reductions programmes, and adaptation to climate change impacts is sufficiently important to necessitate something similar. We know that our efforts to reduce carbon dioxide and other greenhouse gas emissions are way off track, something of which the government is well aware, but this makes the imperative for adaptation even greater. We need to go further and faster.

We do not have the option of choosing first class or steerage. The reality is that we are in this together and the impact is going to hit us all. We have got to work to reduce emissions at the same time as taking account of the need to adapt. If we do a good job on reducing emissions the impacts will be lessened, but some are unavoidable, and we must be ready for them.

Barbara Young, Chief Executive of the UK Environment Agency