UK National Security and Environmental Change

A policy brief for the ippr Commission on National Security for the 21st Century

by Cleo Paskal

Associate Fellow, Energy, Environment and Development Programme, Chatham House

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Introduction

The world is undergoing simultaneous upheavals in three major areas: geopolitical, geo-economic and environmental. The geopolitical and geo-economic shifts raise obvious national security concerns. The implications of the third, environmental change, are more difficult to quantify but are just as critical.

From a security perspective, our environment is the infrastructure upon which we graft all other infrastructure. In the UK the transport systems, cities, defensive capabilities, agriculture, power generation, water supply and more are all designed for the specific parameters of the physical environment – or, more often, the physical environment of the Victorian or post-WWII periods in which they were originally built. This is why unplanned environmental change almost always has a negative effect. In the case of a change in precipitation patterns, for example, the drainage systems, reservoirs and hydro installations can all fail not because they were poorly engineered, but because they were engineered for different conditions. We are literally not designed for environmental change.

The challenges of environmental change are complex and far-reaching. This paper can serve only as an introduction. It is divided into five sections: the what, where, when, who and how of the security threats of environmental change. Each section is accompanied by a descriptive scenario, meant to be illustrations rather than forecasts. The sections also include a short summary of some of the ways to promote not only stability and growth but, just as important in a time of major change, limit disruption and loss.

WHAT is the threat?

Facing up to environmental change, and not just climate change

To understand the upcoming threats to global security and the challenge for policymakers, it is not enough just to focus on climate change. Climate change is one component, albeit a central one, of the larger problem of uncontrolled environmental change.

Humans regularly make direct and substantial alterations to the physical environment. Sometimes it is for the better. Irrigation (which substantially changes regional environments) made early large-scale civilization possible. More recently, the Hoover Dam supported the development of the western United States. More often than not, however, the effects are not as beneficial. The past century alone has seen a substantial population increase, which has put stress on global resources. In 1900 there were around 1.65 billion people on the planet, by 2000 there were around 6 billion, and the figure is currently closing in on 7 billion. That scale of population growth has resulted in major environmental changes such as groundwater depletion, deforestation, exhausted farmland, stress on urban infrastructure, overfishing and developments in marginal areas such as flood plains. To understand the complex challenges to global stability, these other aspects of environmental change must be factored in as well.

Incorporating the other causes of change into assessments is particularly important because, as humans push the boundaries of the carrying capacity of the planet by, say, increasing population while decreasing arable land and building on flood plains, there is less of a margin for error and a smaller degree of climate variation has larger implications. In many current problem areas there was already weakened resilience due to other environmental change factors before climate change brought the situation to the brink.

Scenario

Concern over carbon emissions is used to justify tariffs on certain foods from the developing world without examining how the tariffs might affect the exporting nations. Possible outcomes:

→ The developing nation finds few buyers for its product and impoverished farmers are no longer able to afford to farm. There is added environmental stress as arable land degrades and farmers cut down trees to use for fuel (cancelling out the emissions savings). Some members of farming families are forced into urban areas where they resort to illegal activity to survive. Tensions increase with the poverty and displacement, possibly to the point where the implications are global.

And/or

→ With access to UK markets restricted, agricultural nations in the developing world put in place long-term country-to-country export deals with other nations. As a result the emissions are not avoided and the UK finds itself in a difficult position when trying to secure food supplies on the open market during years of crop failures.

While climate change may highlight and exacerbate existing problems, if there were no climate change, some substantial current problems would still exist. The textbook example of this is the political, social, economic and security crisis in the United States created by Hurricane Katrina in August 2005. The Katrina strike was well within expected parameters. When Katrina hit the New Orleans region, it was only a Category 3 hurricane (out of a scale of 5), in a known hurricane zone. However, its impact was amplified because the naturally dynamic US Gulf Coast was already undergoing a period of direct man-made environmental change, including large-scale subsidence (in one area of New Orleans by about a metre in three decades). This subsidence was probably caused, at least in part, by the draining of wetlands, the extraction of groundwater, and inappropriately designed waterways (Burkett et al 2003, Dixon et al 2006). This geophysical instability was compounded by, among other factors, faulty levee design and implementation on the part of the US Army Corps of Engineers, poor town planning, a failure of emergency services, and a breakdown in the chain of command at a time of crisis (Hoar 2006, Ahlers 2006).

The devastation caused by Katrina can be used to show how poor regulations, planning and emergency response can aggravate the crises that will almost certainly increase as a result of climate change, but one cannot say that the tragedy in New Orleans was caused by climate change alone. Curbing climate change without also addressing the myriad ways natural and built infrastructure interact will not stop other 'Katrinas' (though it may keep the number from accelerating).

By broadly labelling most environmental change-related security issues as solely the result of 'global warming' or 'climate change', the military, Government, United Nations and others are inadvertently limiting the range of possible responses, and potentially laying the groundwork for even greater crises. The result of the focus on climate change to the exclusion of other factors is that cutting greenhouse gas emissions appears as the magic wand that will make most of our problems go away. Unfortunately, that is not the case.

Urgent measures are needed to combat climate change. Fortunately, we are capable of doing more than one thing at a time and it is also critical to accurately assess the causes of specific threats, and to understand how they relate to larger, multidimensional risks. While it is possible to parse out challenges that are directly caused by climate change, such as a melting Arctic, it is vital to remember that even should the advance of climate change be halted, there is a whole other suite of dangers, such as those that caused the disaster on the US Gulf Coast, which will need different solutions requiring a broader focus.

When looking for solutions, the entire environmental change constellation must be taken into account or there is a risk of, at best, failing in the objective and, at worse, creating new threats to stability.

WHERE do we build?

The vulnerability of global infrastructure

Scenario

The permafrost melt causes some of the Russian pipelines to become unstable, disrupting supply and resulting in costly upkeep. Russia starts to shift increasingly towards tanker delivery, allowing for a more flexible (and potentially more politically motivated) choice of customers, as well as giving it increased ability to generate revenues outside the European market. As tanker delivery to Asian buyers would involve transiting through the Bering Strait chokepoint, there is added impetus for Russia to reinforce its already dominant Arctic military capacity. The build-up helps consolidate Russia's position in the Arctic and vis-à-vis the region's increasingly accessible strategic shipping lanes.

Domestic UK infrastructure, as well as the infrastructure of key allies and economic partners (and, of course, every other nation on Earth) will be affected by environmental change. Britain is starting to assess specific impacts. A major study by the Greater London Authority (GLA 2005) confirmed that, due to the heat island effect, urban areas heat up more than the countryside; the centre of London is already at times up to 6° Celsius hotter than the surrounding countryside. Also, over the last century, there has been an increase in precipitation of 11 per cent in winter and a decrease of 10 per cent in summer. By 2050, winter rains are predicted to increase by 10 to 20 per cent, and summer rains to decrease by 20 to 40 per cent. When the rains do come, at any time of the year, they are likely to be heavy (ibid).

What does this mean for infrastructure? Between 1992 and 2003, the London Underground network flooded over 1,200 times, causing 200 station closures, about half of which were due to flash floods, something that is expected to become more common (GLA 2005). The increased heat affects train tracks and train safety, and is already causing more slow-downs and buckled rails. That will also become more usual. Roads are expected to see more embankment subsidence, deterioration of concrete, problems with expansion joints and reduction in skid resistance. Temperature-related increases in the shrinkage and expansion of the clays in London's soil will affect the water pipes, which could then burst, creating a whole new set of problems (ibid).

The effects of heat and drought aside, storm surges, coastal erosion and flooding alone will likely cause increasingly costly and dangerous damage to infrastructure. England's summer floods of 2007 shut a water treatment plant servicing 150,000 people and came perilously close to swamping an electricity substation feeding half a million homes (Higham 2007). There will be more to come. According to the Environment Agency, in England and Wales approximately five million people in two million properties are at risk of flooding (Environment Agency 2009). Several key elements of UK infrastructure and defence capabilities are in flood zones, and the Thames Barrier protects London from only one type of flooding – tidal. That still leaves four other factors that could flood parts of London: heavy rainfall, river swells, an overwhelmed sewer system and rising

groundwater (GLA 2008). The Government's Foresight *Flood and Coastal Defence* report came to two main conclusions: that if we continue with existing policies, the risks grow 'very substantially' in nearly every scenario, and that the risks need to be tackled 'across a broad front' (Foresight 2004).

Action is blunted by a form of Developed Country Complacency Syndrome, in which the assumption is that the nation is already 'developed' in terms of infrastructure and just needs a bit of tinkering around the edges. Unfortunately, the infrastructure is not 'developed' for the new conditions. Additionally, the population of the UK is used to, and depends on economically, a certain quality and reliability of infrastructure. This is especially true in financially difficult times.

Existing infrastructure needs to be reinforced and adapted. And the lexicon of mitigation and adaptation should be supplemented by the concept of integration, in which planning is not simply 'adapted' to environmental change, but change is 'integrated' into the plans from the start, potentially changing the whole nature of the project. Otherwise, the shocks to the system and the increasingly regular strain on the military, social services, insurance industry, local councils, business community and others could create a destabilising effect and, at the very least, a loss in confidence in the Government.

The economic, social and security challenges created by the UK's vulnerable infrastructure are compounded by the shaky state of the global infrastructure. For example, the US Gulf Coast states refine around 30 per cent of the US oil supply and the Gulf itself produces around 25 per cent of domestic oil supply and 15 per cent of natural gas supplies. In 2005 Hurricane Katrina shut down nine of the 17 oil refineries in the hurricane zone, causing a spike in global prices (SpiegelOnline 2005, Sanjai 2005, BBC 2005). In summer 2008, Hurricanes Gustav and Ike caused the shutting down of much of the US Gulf offshore production. Ike alone destroyed 49 offshore oil platforms and shut 12 of 31 oil refineries in Texas and Louisiana (Minerals Management Service 2008).

These sorts of disruptions to global supplies and markets are likely to increase in frequency. The US Department of Transportation found 'a vast portion of the Gulf Coast from Houston to Mobile may be inundated over the next 50 to 100 years' (Potter *et al* 2008). That falls within the expected lifespan of infrastructure being put in place today (after Katrina, infrastructure was largely rebuilt back in exactly the same vulnerable locations, resulting in some areas being hit again this past summer). The UK cannot afford to make mistakes like these.

Current 'environmental impact assessments' look almost exclusively at a construction's impact on the environment. That must now be expanded to include the other half of the equation: the impact of a changing environment on the structure. As a bluntly expressed example, there is no point building a zero-emissions house if you erect it in a flood zone. Ensuring this sort of folly is avoided can be done at several stages, for example by requiring assessments when applying for insurance, planning permission, and/or government support.

WHEN will this be a problem?

The effects of legal systems, regulations and subsidies

Just as our physical infrastructure is ill-prepared to deal with environmental change, so, too, is our legal infrastructure. Very few regulations, legislations, international laws, subsidies and

the like incorporate the effects of environmental change. At best this renders them inadequate; at worst it can cause unnecessary conflict.

A case in point is the United Nations Convention on the Law of the Sea ('the Convention'), a new legal mechanism that is supposed to guide nations safely through the troubled waters of international maritime law (United Nations 2009). Currently the only major power left to ratify the Convention is the US, though there are indications that it may soon sign.

The Convention states that, aside from continental shelf claims (such as those in the Arctic), a country's maritime Exclusive Economic Zone (EEZ) extends 200 miles off its coastline. This takes for granted that coastlines are largely fixed, which will not be the case as environmental change floods and erodes shorelines.

The Convention was not designed for dramatically changing coastlines. It freezes coastlines (and so borders) at a specific point in time – until revised or challenged. According to the procedure, nations submit their claim, which, once accepted, stands until they submit a new map or another country challenges the accuracy of the claim. A nation like Tuvalu might be under two metres of water but, unless it admits it in writing or is challenged, it will legally exist. This leaves nations open to geopolitical blackmail and makes it more likely that force will be used to back up contested claims. As a result, offshore platforms and pipelines could end up in another territory (or in international waters), regional solutions could take precedence over international law and borders could be contested and re-contested on a regular basis

There are many illustrations of the sort of geopolitical quagmires that could be created by the Convention in a time of environmental change. For example, according to the Convention, if a country's EEZ overlaps with another country's EEZ, the two countries normally split the difference. So, if two nations are around 80 kilometres apart, as with the US (Florida) and Cuba, each country gets a 40-kilometre EEZ off its coastline and they meet in the middle. In a world of rising seas, this means that if low-lying Southern Florida floods, the new maritime zone of the US would be measured from the new coastline, possibly north of Miami. Meanwhile, relatively mountainous Cuba would not lose that much ground. In theory, Cuba's maritime zone could expand because the American one, against which it was abutting, had retreated and Cuba could eventually be drilling for oil where Miami used to be.

Scenario

The low-lying Pacific nation of Tuvalu floods, becomes uninhabitable and the entire population is evacuated, leaving an empty patch of ocean where the country used to be.

The world is suddenly thrust into an unprecedented jurisdictional dilemma. Does Tuvalu cease to exist as a legal state? Does it lose its seat at the UN? Do its waters become international waters? Can the Tuvaluans move to New Zealand, or India, or China and award the host country custodianship over their erstwhile Exclusive Economic Zone in exchange for taking them in? If the islands were to reappear, would their descendants have the right to return? If the area of ocean that was Tuvalu became international waters, would that compromise the UK's claim on the equally low-lying atolls of Diego Garcia? And what would that do to the complex and fraught overlapping claims such as those in the South China Sea (which are often based on soon-to-be submerged islets)?

International law that is not designed to incorporate environmental change risks being unable to resolve increasingly complex disputes. That increases the likelihood of disputes being resolved on a bilateral basis, through power politics or by force.

This is highly improbable as that particular maritime boundary is decided by a regularly renewed bilateral agreement. It is unlikely that the US would agree to change the terms of the agreement, and it is equally unlikely that Cuba would have the political clout to force a change. It illustrates that, when international law fails, politics step in. And if politics fail, it could come to force, as has been seen with the disputed islands (some barely above sea level as it is) in the South China Sea.

The issue of equidistant borders also affects the UK. Offshore hydrocarbon companies are reportedly already sparring over what may happen if there is a shift in the UK/Norway border.

The Convention just one example of how, by not incorporating environmental change into legal mechanisms, the possibility of conflict is increased. There are also myriad examples of legislation creating problems at the regional and national level. In the US, for example, the Government's National Flood Insurance Program (NFIP) actively contributes to putting people and infrastructure in harm's way, by insuring the uninsurable. When private insurers deem areas too risky to be eligible for coverage, the NFIP can step in and insure, making it possible to build in what are most often flood zones. The reason is, beachfront property tends to have a high value, and so is attractive to politically influential developers. Also, as local governments rely on property-value-based tax revenue, they lobby federal-level representatives to continue the NFIP so that high-end houses can continue to be built, generating an increased local tax base.

The result is that some places, such as Dauphin Island, Alabama, homes have been rebuilt each time that hurricanes have struck (Dauphin Island has been hit multiple times since 1979), in part with cash infusions from the NFIP. More than two thirds of all flood payments the town received went to properties that had been damaged repeatedly. Not surprisingly, the NFIP is a money loser that needs to be regularly bailed out by the federal Treasury (Gaul 2005).

Below are three further examples of agreements that may cause more damage than they prevent:

- Water-sharing agreements based on a litre amount (rather than percentage of flow). This will become problematic as water levels alter dramatically.
- Fisheries-sharing agreements. Many will be thrown into chaos as fish shift to other regions due to climate change and as overfishing takes it toll (a current problem in the European Union).
- Hydropower-sharing agreements. This will be a major problem, especially in glacier regions, such as the Alps, where there will be above-average flows as the glaciers melt, followed by droughts, resulting in wildly fluctuating production.

In many cases, these pieces of legislation and agreements can be adapted to environmental change. In the case of the Convention on the Law of the Sea, for example, all it takes is a rider that fixes coastlines as per satellite imagery from the year 2000 (disagreements would still exist, but they could be worked out based on that data). As all coastal nations risk losing territory if this is not agreed, it might be possible to solve the Convention problem before it arises. We are heading into increasingly difficult and complex times. It is reckless to write and accept rules and regulations that make them even more difficult and complex.

Currently, legislation, agreements, subsidies and so on often do not take into account environmental change, thereby creating a vast array of artificial and unnecessary vulnerabilities at a time when we are facing real physical challenges. It is imperative to assess existing and new frameworks in order to understand if they create strengths or vulnerabilities. If they are found to create vulnerabilities, they must be adapted or abandoned.

WHO can help provide stability in a time of change?

Reexamining the global relationships needed to weather the coming storm

While the west is just beginning to grapple with resource scarcity caused by environmental change, China, for one, has been planning for this for decades. In a microcosm of the global situation, the Chinese Communist Party (CCP) long ago decided that China is not environmentally able to support its growing population. The one-child policy was designed to help with resource demand, but not with supply. For that, resources had to be found outside the country. This is one of the driving forces behind China's expansion of investment into Asia, Latin America, the Pacific and Africa.

Products such as grain that the west considers commodities, China (and others) considers strategic assets. For the sake of civil order, the Chinese Communist Party (CCP) needs to ensure food is affordable. It cannot allow the market to dictate access if doing so risked compromising domestic stability. As a result, China, for one, is working towards creating a major geo-economic shift that will help it secure supply of various strategic essentials, including food.

Scenario

While the west continues to rely on global markets and international law, other nations focus on bilateral deals that bypass the open market and promote regional organisations that bypass the international system.

With dwindling global leverage, the economies of the west find themselves increasingly vulnerable to speculators. Wildly fluctuating food and fuel prices compound western domestic pressures, while other countries, such as China, secure supplies through long-term fixed price deals with Asian, African and South America partners. Meanwhile western geopolitical influence wanes as individual western countries undercut each other in the process of manoeuvring for narrow national advantage. All of this contributes to making the west even less economically and geopolitically resilient as environmental change takes it toll.

Typically, countries have two parallel economic policies, a domestic one and an international one. For example, when it comes to its domestic market, the US may tend towards subsidies, especially in areas like agriculture, but internationally it pushes for open markets.

Conversely, domestically China is a bit of an economic Wild West (there is a lot of latitude as long as the CCP does not disapprove), but internationally most major Chinese companies work with the Chinese government (sometimes at a loss) in order to advance China's national strategic interests. When it comes to international deals, China practises capitalism, but it is nationalistic capitalism.

Countries practising nationalistic capitalism can sign nation-to-nation package deals that cut out the open market and overtly link much needed resources to wide-ranging deals, including military equipment. For example, while many in the west were trying to isolate the Sudanese government, China was taking advantage of the lack of competition and busily crafting comprehensive trade deals with those in power. As of 2007, China was the biggest foreign investor in Sudan, buying much of its oil and, according to an Amnesty International report, supplying the government with weaponry, training and infrastructure (Goodman 2004). As a result, China secured Sudanese oil before it reached the market.

In an era of food supply scarcity, where authoritarian regimes in particular need to make sure their populations are well fed in order to keep them placated (democracies have the safety valve of elections), crops will increasingly be included in the nation-to-nation package deals. For example, one would expect China to start including food crops in its growing number of deals with African nations, which could explain part of China's long-standing support for Robert Mugabe in that potential breadbasket, Zimbabwe.

Already in countries such as Laos, Congo, Indonesia and Cambodia, Chinese companies are farming products that will go straight to China. What that means is large quantities of wheat, corn, rice and so on will never reach the open market, making it even more expensive for those relying on the marketplace, such as many in the west, to feed themselves. Countries that simply rely on the market and regional partners for resources could find themselves suddenly caught short.

As an added challenge to the west, some countries with surplus resources are practising nationalistic capitalism with the goal of creating new nodes of power. This is clearly seen in the way Russia, for example, is using its hydrocarbon reserves for geopolitical advantage. Russia's excess of supplies, combined with China's need, and their mutual desire to limit western influence in Central Asia, spawned the Shanghai Cooperation Organization (SCO), founded in 2001.

While not explicitly (or effectively) a counter to NATO, SCO member countries are China, Russia, Kazakhstan, Tajikistan, Uzbekistan and Kyrgyzstan. Iran, Pakistan, Mongolia and India are observers. They have a shared goal of regional stability and economic cooperation. Both Beijing and Moscow define such stability as the removal, or at least the diminution, of western influence in the region. Russia, for one, is also touting the SCO as a potential energy cartel (Blagov 2006). As access to food and water become even more strategic, it is likely they would be included in the SCO remit as well, tying the neighbours even closer together.

In this new reality, countries in which policymakers do not have control over strategic assets are potentially at a geopolitical disadvantage when it comes to trying to out-negotiate countries practising nationalistic capitalism. This is not a statement on the relative morality of varied economic approaches – it is a statement of the obvious. A Russian government that has the ability to cut off energy supplies to Europe must be taken much more seriously than one that simply gets a drilling fee from transiting multinationals.

Given the current environmental, geo-economic and geopolitical changes, the UK must reassess what are commodities and what are strategic assets, and act accordingly. New, and renewed, strong relationships must be forged globally in order to secure varied supply lines. Collaborations should be fostered with existing democracies that have compatible and complementary economies, such as India. The world is heading into a resource-scarce, multipolar era. The rules of the game are changing. And the west is not the one changing them.

If care is not taken, environmental change could speed up a deepening of an economic and political gulf between the west and the rest of the world, leaving the west more subject to geopolitical isolation and wild price fluctuations. Resilience can be built through a consolidation of domestic strengths, a deepening of existing alliances and a diversification of global partnerships.

HOW can the UK prepare for environmental change?

Imagining resilience

A critical component of creating resilience to environmental change is adapting to new conditions. Many current policies and proposals seem to be focused on changing behaviour by punishing 'bad' deeds, primarily through taxation, rather than making resilience-enhancing options more attractive. In its most basic form this means congestion charges and higher taxes for vehicles with higher emissions. While these can be effective aversion tools, they risk primarily adding to the already increasing pressures on the poor and middle classes unless alternatives, such as affordable public transport, are also made available.

The same is true in a range of sectors. For example, small-scale, local renewable energies and a decentralised power grid cut carbon emissions, develop new industries, contribute to regional employment and aid national security by building redundancy into the system, yet they tend to be more expensive for the consumer to purchase and are not supported or promoted by government to the same extent as other energy types.

Unless there is a marked shift in practices, due to environmental change and other factors the cost of living in the UK is likely to increase, and infrastructure is likely to degrade. For the sake of stability, the burden on citizens needs to be lifted, not increased. Positive schemes such as reduced VAT on energy-saving materials and government cooperation with the insurance industry on flood defences are a good beginning. That approach now needs to be expanded across the board to motivate civil society, academia, business and government to find and implement viable, long-term solutions.

Scenario

The UK continues with business as usual and finds itself increasingly stricken by crises beyond its control, such as floods, agricultural failures, disrupted transport systems, epidemics of heat-related illness, and mounting fuel, food and water prices. Standards of living drop. Costs of living rise.

There is a crisis of confidence in central government and growing fragmentation as regions try to gain more control. As the UK tries to manage its decline, it becomes increasingly marginalised in world affairs, and finds its options increasingly limited.

In these difficult and uncertain times, if industry, local councils, consumers and others are going to be nudged down a more resilient road quickly and relatively painlessly, it would be helpful to use more carrot and less stick. As it is, it will take enormous efforts to avoid being badly bruised by environmental change. It would be best to avoid adding unnecessary self-flagellation to the mix.

In terms of international action, to date much of the UK's engagement has been focused on highlighting the importance of climate change mitigation through the cutting of carbon emissions. This is often an unpopular message. Many in countries feel that the west, which benefited from unbridled emissions during its development, is now using climate change as

an excuse to hamper global competition from those who are still trying to develop. It does not matter if that is true or not; what matters is that they believe it. Perceived lecturing may be counter-productive.

What may be more effective is increased partnerships between the scientific communities. The UK is a global leader in climate and environmental science. Flagship UK research institutions, such as the Hadley Centre, should be better funded so that they can work more closely with international researchers. Once international partners have a better understanding of the potential impacts on their nations, there will be more internal political momentum and they will be better equipped to try to counter the coming disruptions. Increased scientific engagement will also help the UK to better gauge the true strengths and weaknesses in our highly interconnected world.

Scientific collaborations could also help to fill in some of the knowledge gaps necessary for building domestic resilience. The UK will need to better understand the implications of the complex interplay between climate change and other forms of environmental change. It will also need to assess how best to adapt to those changes (ideally through collaboration between expert sectors such as climate scientists, engineers, insurers, and developers) and formulate methods to integrate them into planning and policy. And it will also need to devise resilience techniques.

Through international partnerships, the UK may also find some solutions to domestic challenges. Given that many developing nations are subject to regular natural disasters, some have developed pioneering, low-cost methods for dealing with crises. Bangladesh, for example, has been living with flooding for centuries and has refined several innovative evacuation and safety methods. In finding a way forward, everyone has something to learn from others.

Once an accurate assessment of the actual threats of environmental change are made, it is key to build sustainable resilience to those threats through a better balanced domestic carrot and stick approach, and by engaging equitably with the international scientific community.

Conclusion

As the environment changes, the UK will face a wide range of challenges. These will include problems with infrastructure (especially along flooded and eroding coastlines), legal complexities (including lawsuits against emitters, and over land and water use), potential shifts in boundaries and territory, failing agriculture, increasing cost and decreasing availability of insurance, water scarcity, spreading animal and crop disease, an increase in external and internal refugees, and floods.

These challenges can be met, but it will take a re-evaluation of the way Britain works. Infrastructure, laws, international partnerships, supply lines, incentives, research priorities, the role of military and more will all have to be examined and, in some cases tweaked, in others dramatically altered. As the environment shifts the UK will have to keep one step ahead to stay stable. These are, unfortunately, interesting times.

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