CENTRE FOR CRIME
AND JUSTICE STUDIES

Crime is in the air :
air pollution and regulation in the UK

Professor Reece Walters

The Centre for Crime and Justice Studies (CCJS) at King's College London is an independent charity that informs and educates about all aspects of crime and criminal justice. We provide information, produce research and carry out policy analysis to encourage and facilitate an understanding of the complex nature of issues concerning crimes and related harms.

The *What is crime?* project aims to stimulate debate about what crime is, what it isn't and who gets to decide. The project is focused on the themes of violence, finance and the environment.

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King's College London
Strand
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Tel: 020 7848 1688
Fax: 020 7848 1689
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Editorial

This latest briefing by Professor Reece Walters in the *What is crime?* series, draws attention to an area of harm that is often absent from criminological debate. He highlights the human costs of air pollution and failed attempts to adequately regulate and control such harm. Arguing for a cross disciplinary 'eco-crime' narrative, the author calls for greater understanding of the far-reaching consequences of air pollution which could set in train changes which may lead to a 'more robust and meaningful system of justice'.

Describing current arrangements in place to control and regulate air pollution, Walters draws attention to the lack of neutrality in current arrangements and the bias 'towards the economic imperatives of free trade over and above the centrality of environmental protection'.

While attention is often given to direct and individualised instances of 'crime', the serious consequences of air pollution are frequently neglected. The negative effects of pollution on health and well-being are often borne by people already experiencing a range of other disadvantages. In a global and national context, it is often the poor who are affected most. Ultimately, political and economic imperatives have historically helped to shape legal and regulatory regimes. Whether this is an inherent flaw in current systems or something that can be overcome in favour of dealing with more wide-ranging harms is an area that requires further discussion and debate.

Rebecca Roberts is Senior Policy Associate and Will McMahon is Policy Director at the Centre for Crime and Justice Studies.

Introduction

The air we breathe is contaminated, polluted and, in some instances, toxic. The very substance that is essential for our existence is also responsible for widespread death and injury. The World Health Organization (WHO) estimates that air pollution causes the annual premature deaths of two million people worldwide (WHO, 2009). The majority of these deaths are caused by respiratory infections, heart disease and lung cancer – all accelerated by or the direct result of air pollution (COMEAP, 2004).

While the UK has been praised for its progressive legal mechanisms for controlling air pollution (Thornton and Beckwith, 2004), it is estimated that 24,000 British residents die prematurely every year because of air pollution and many thousands are hospitalised (COMEAP, 2009). Put another way, life expectancy in the UK is reduced by eight months

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as a direct result of air pollution at an annual cost of £20 billion (Defra, 2009a).

In May 2009, the cross-party London Assembly Environment Committee (LAEC) concluded that the UK was amongst the worst polluters in Europe for airborne particles and nitrogen dioxide (notably harmful pollutants to human health), with 'air quality in London amongst the worst in Europe' (LAEC, 2009: 2).

With the London Olympics 2012 pending, this is cause for serious concern. It is widely known that elite athletes such as the famous marathon runner Gebrseleassie withdrew from the Beijing Olympics because of air pollution (Thomas, 2008). Such a result for London might have widespread economic, political and sporting impact.

The unacceptable level of existing air pollution in London and other areas of the UK is a reality that is not being ignored by the European Commission. For example, in January 2009, it was widely reported that the European Union (EU) was preparing a legal case against the British government for repeatedly breaching air pollution laws (see Vidal, 2009). More than 20 UK towns and cities were found to be emitting air pollution at more than twice the levels specified in WHO standards, notably PM10 particles from diesel engines (CCAL, 2009). This latest action by the EU follows a previous infringement procedure against the UK in 2007 'for exceeding EU limits on ambient concentrations of sulphur dioxide (SO2), an air pollutant from industrial installations that can cause respiratory problems and aggravate cardiovascular disease' (Europa, 2007: 1).

The European Commission aims to reduce death and environmental degradation associated with particulate matter through its Thematic Strategy on Air Pollution:

> *'[B]y 2020 [the strategy aims] to cut the annual number of premature deaths from air pollution-related diseases by almost 40% from the 2000 level. It also aims to substantially reduce the area of forests and other ecosystems suffering damage from airborne pollutants.'*
> (Europa, 2006).

Yet the success of such approaches is contingent upon the participation and compliance of member states; in this respect, the UK has already been found wanting. In 1999, the UK was given until 2005 to ensure that it was meeting EU air pollution targets.

As mentioned above, in 2007, infringement notices were issued for failure to comply with EU standards. After a period of review, the installations in breach of air pollution regulations were deemed to be operating within limits and the UK government avoided prosecution.

The present situation is more serious and does not involve specific industry installations. Instead, levels of air pollution across the city of London require urgent remediation. The following correspondence, sent on behalf of the European environment commissioner, notes current actions against the UK government:

> *'The Commission has launched on 29 June 2009 another infringement procedure against the UK, due to its failure to respect daily and (for London) annual PM10 limit values … The reply by the UK authorities to the Letter of Formal Notice was received on 6 April 2009 and is currently being assessed together with the notification of the application of Article 22 of the Directive 2008/50/EC by the UK authorities in the beginning of May 2009. In the notification the UK requests more time to comply with PM10 limit values in particular areas.'*
> (Vanhoeyvelt, 2009)

The European Commission is expected to rule on the UK government's application by September 2009. The Commission may grant more time for compliance or it may reject the British government's argument and impose substantial fines for non-compliance.

This report explores the negative effects of air pollutants within a framework of 'eco-crime' and 'green criminology' (see Beirne and South, 2007; White, 2008; Walters 2009). Using original data on air pollution infringements, it critically examines the shortcomings of existing mechanisms of air pollution control, regulation and enforcement in the UK. In doing so, it identifies how criminology must continue to push new boundaries and engage with new horizons in relation to emerging harmful acts of both local and global concern.

Air pollution and its impacts

The link between air pollution and premature death has been widely established (Jerrett et al, 2005). People who live in less polluted cities experience longer and healthier lives than those exposed to air pollutants such as SO2 and PM10 (Pope et al, 2002). It is estimated that twice as many people today suffer from lung disease and asthmatic conditions caused by

air pollution than they did 20 years ago (Europa, 2009). Too often, the impetus for governments to address the dangers of air pollution is driven by commercial activities, such as the 2012 Olympic Games or the influence of property owners who perceive economic loss to their assets. As Budds (2009: 124) succinctly argues, 'Environmental issues that reach the top of urban agendas are often the result of inequalities in power in society, which can mean that environment issues that predominantly affect less powerful groups are overshadowed or completely neglected.' Not only are humans placed at risk, but wildlife, soils, water, agriculture, buildings and natural heritage are also damaged by air pollutants at great financial, cultural and environmental expense.

Defining air pollution

In 1970, the Royal Commission on Environmental Pollution (RCEP), an independent advisory body, was established to advise the Queen on issues relating to polluting emissions. It defines pollution as:

> *'The introduction by Man into the environment of substances or energy liable to cause hazard to human health, harm to living resources and ecological systems, damage to structure or amenity or interference with legitimate use of the environment.'*
> (RCEP, 2006)

It is therefore important to note that the legal regime in the UK and across Europe is not designed to monitor and regulate 'primary pollutants', or natural pollution such as carbon and sulphur produced from oceans, volcanoes, rainforests and so on, but is focused on 'secondary pollutants', notably chemically created emissions combined with atmospheric conditions (Bridgman, 1990).

Sources of air pollution

The UK's National Air Quality Archive monitors the impact of nine different forms of harmful air pollution.

Exposure to air pollutants such as those listed below have been widely reported to affect pulmonary and lung dysfunction as well as a range of neurological and vascular disorders (Ghio and Devin, 2001). Such pollutants are monitored on a daily basis using 1,500

Box 1. Pollutants

1 Sulphur dioxide – created from burning sulphur in fossil fuels and oil. Produces lung dysfunction when measured in moderate levels within atmospheric conditions.

2 Nitrogen oxides – produced from vehicle emission and the production of electricity. Nitrogen oxides compromise lung functions and cause respiratory and viral illness, notably in children.

3 Toxic organic micropollutants (TOMPS) – very dangerous chemicals caused from combustible activities including using fuels such waste from industry smokestacks, and vehicular and engine emissions. Carcinogenic chemicals such as dioxins, furans, polyaromatic hydrocarbons and polychlorinated biphenyls in small amounts are highly deleterious to human and lung breathing animals, causing cancer, lung disease, immune deficiency and cerebral dysfunction in young children.

4 Fine particles – dusts, sulphates and nitrates caused from combustible sources such as road traffic and atmospheric reactions. Fine particles are carcinogenic and enter the lungs and bloodstream, causing inflammation as well as more serious conditions such as heart and other disease.

5 Butadiene – a chemical released in the atmosphere from the industrial burning of rubber and synthetics and the emissions from petrol and diesel operated machinery. Butiadiene is responsible for a range of human health problems including birth defects, organ damage and reproductive disorders.

6 Carbon monoxide – a poisonous gas produced from petrol engines. Damages respiratory and circulatory body functions. Reduces oxygen supply to major organs including the heart and causes heart disease.

7 Lead and heavy metals – industrial areas emitting smoke and vapour waste create extremely dangerous leads that damage the neural and organ development of infants and young children as well as causing deformity in the unborn. This form of highly dangerous industrial pollution also causes mental, neurological and visual problems

8 Ozone and volatile organic compounds (VOLs) – VOLs react with sunlight and nitrogen oxide to create vapour that is capable of travelling thousands of miles. It causes damage to the natural environment as well as human health conditions such as asthma and lung disease.

This list is adapted from the UK's National Air Quality Archive. Please note that this is a conservative representation of the dangers and harms of air pollution constructed from government sponsored sources.

different monitoring facilities across the UK. The results are posted on the National Air Quality Archive for public consumption.

In the UK, notably London, diesel-propelled engines are the major cause of dangerous air pollution, where almost half of emissions result from road transport or industrial activities (LAEC, 2009).

The pollutants listed in Box 1 are often (not always) created by enterprises engaging in legal activities, such as transport, agriculture, building, engineering, trade, and so on. Even if such enterprises operate within the law, are the levels of air pollution caused harmful, necessary and/or acceptable? And what must be done to reduce emissions?

Crime, harm and air pollution

It is important to consider the harms created by air pollution in a broader global context. As mentioned above, it is often the poorest people on the planet that experience the worst effects of pollution. An estimated 65 per cent of all annual deaths resulting from air pollution occur within the slums and poverty stricken areas of developing countries (Cohen et al, 2005). The harms caused by air pollution have a pernicious reach: air pollution is a major source of global warming and climate change, reportedly killing 150 million people a year (Brown, 2003; Greenpeace, 2009). Such deaths often result from the increasing numbers of 'natural disasters' (UNISDR, 2008). Although, as UNESCO (2008) reports, 'natural disasters are not entirely "natural", for people are agents of disasters', the World Disasters Report identifies that devastating flooding in poor countries such as Bangladesh results *inter alia* from pollution from affluent and industrialising nations (see Muncie et al, 2009: 28).

The air polluting dangers associated with world trade provide substantial challenges for regulators all over the world. Yet the unlawful production of toxic discharge into the atmosphere remains of global concern. The illegal emission of air pollutants or the illegal acts, notably by states and corporations, that lead to harmful atmospheric contamination have been reported within various discourses. Criminological scholars have for some time documented how high-polluting transnational corporations flout national laws by relocating to developing countries where toxic chemicals are deliberately released into the environment to the detriment of surrounding flora and fauna (Michalowski and Kramer, 1987; South, 1998). Others have detailed the ways in which corporations unlawfully release toxic waste into the atmosphere and the devastating impact this has on the environment, children and the unborn, and people living in poverty (Pearce and Tombs, 1998). Moreover, acts of illegal logging, dumping of hazardous waste, illegal trade in ozone-depleting substances, unlawful trade in endangered species, corporate contamination of water and soil and fuel smuggling all contribute to the production of air pollution and other environmental damage (Hayman and Brack, 2002; White, 2008; Walters, 2009). As a result, 'industrial disasters', which often include wilful acts of corporate negligence, may involve toxic chemical release, oil spills and widespread environmental contamination resulting in air pollution and fatality (White, 2008; Carrabine et al, 2004). As mentioned above, it is important to recognise that a broad range of eco-crimes (discussed below) are linked to the poverty, social dislocation and the mental and physical debilitation of people who are victims of corporations and states that deliberately violate environmental agreements (Hauck, 2007). The impacts on human health, culture, flora and fauna are immeasurable. Studies that attempt to link specific aspects of air pollution to financial costs are often imprecise and fraught with methodological and data ambiguities (Watkiss et al, 2006). That said, the production, distribution and enforcement and consequences of air pollution are a multibillion pounds a year cost, with widespread social and environmental harm.

The Environmental Protection Agency in the USA (USEPA) provides a list of the top ten fines meted out by US courts for 'environmental crimes'. Two of the top three are for air pollution offences. For example, in 1998, the Louisiana Pacific Corporation, a timber mill, agreed to pay a '$31.5 million penalty for mail fraud and a $5.5 million fine for willfully conspiring to violate the Clean Air Act' (Siegal, 1998). In 2001, the Koch Petroleum Group was fined $20 million for deliberately covering up the disposal of toxic chemicals at its Texas oil refinery. This included the illegal release of ten tonnes of fumes from burning the highly dangerous and carcinogenic substance, benzene (New York Times, 2001).

More recently, in October 2008, Erler Industries was convicted for clean air crimes and fined $1 million by the district court of Northern Illinois for 'knowingly submitting false quarterly reports' (USEPA, 2008).

In December 2008, USEPA launched its 'most wanted' website, detailing a list of 'fugitives' at large for various environmental crimes. Many on the list included corporate entrepreneurs who had owned and operated installations that had deliberately released toxic waste into the atmosphere (USEPA, 2009). It should be noted that while the language of crime is used by US regulatory authorities, most matters are dealt with in civil jurisdictions. Indeed, a Senate Bill presented in March 2008 that attempted to try environmental offences within criminal proceedings was rejected (O'Malley, 2008).

The international increase in environmental offences has recently been reported as escalating rapidly. Illegal logging and trade in wildlife alone is estimated to be a £10 billion a year industry (Booth, 2008). Such is the expanding nature of illegal environmental acts internationally that Interpol has committed dedicated resources to what it calls wildlife crime and pollution crime. It describes the latter as 'the handling, transport, trading, possessing and disposal of hazardous wastes or resources in contravention of national and international laws' (Interpol, 2009a). In 2007, Interpol established the Pollution Crime Working Group which meets annually for the express purpose of sharing and consolidating databases and working in partnership with its 187 affiliated enforcement bodies to tackle the global challenges of illegal pollution (Interpol, 2009b). This international policing partnership comprises the latest enforcement initiative to uphold existing international, European and UK laws that regulate and control air pollution. Regulatory regimes to control and prevent air pollution have been implemented in Europe and the UK. These are described in detail in Box 2.

Measuring pollution

How is the success or failure of a regulatory regime measured? In relation to pollution control, it could be argued that reductions in polluting emissions are the key indicators of success. However, such measures are fraught with uncertainty and ambiguity. The accurate measurement of air pollution is complex and contested. It is the process of administration which has previously been criticised for its lack of objectivity (Thornton and Beckwith, 2004). As a result, the regulation of air pollution in the UK is not a transparent process conducted by a detached and dispassionate regulatory agency, but one that relies on trust, partnership and negotiation between the operator and the regulator. There is no public involvement or public scrutiny of regulator decisions. The enforcement agency relies upon the technical assistance of 'the regulated' in reaching its decisions.

It is clear that the UK provides an extensive system of air pollution monitoring through its Air Quality Archive. Yet the processes of enforcing the regulations identified above are negotiated by the authorities and the polluters. This 'partnership model' is very much industry-led and relies on compliance and corporate good practice. When corporations exceed legal air pollution emission, the language of 'crime', 'offences', 'violation' and 'breach' is not used. Instead, we witness the use of the term 'exceedence' to describe unlawful levels of air pollution. Repeated exceedence often results in warning letters, and when operators face prosecution the fines available to the courts are very low. The partnership model of air pollution control in the UK is designed to enhance and facilitate trade while protecting the environment.

Air pollution offences in the UK

Defra regularly publishes statistical releases on air quality in the UK. These news releases provide a selectively favourable interpretation of existing air quality data in the UK. Indeed, there is a sense that even the slightest good news is rushed to print in a seemingly desperate attempt to convey compliance on with EU standards on air quality. However, what such updates fail to acknowledge is that existing levels of air contaminates continue to breach EU targets (Defra, 2009b). Moreover, there is an unhelpful and misleading language that underestimates the seriousness of exposure to air pollution: for example, comments such as 'long-term exposure to even low levels of particulates (PM10) *may* have a significant effect on public health' (Defra, 2009c, emphasis added). There is no 'may' about it. The use of this defensive terminology serves to neutralise criticism of bland and unflattering government statistics. Moreover, in its January 2009 update, Defra concluded that 'both particulate and ozone concentrations are strongly influenced by weather, which will contribute to the fluctuations seen across the time series' (p.3). This 'good news' air quality update by Defra, released on 29 January 2009, coincided with the day that the European Commission issued an infringement notice against the UK government for failure to respect repeated exceedence of particulate air pollution.

Box 2. Air pollution-regulations and preventions

The EU and IPPC Directive

In 1996, the European Council adopted the IPPC Directive, which was integrated into the UK through the *Pollution Prevention and Control (PPC) Act 1999* and the *PPC (England and Wales) Regulations 2000*. The PPC Act 1999 did not replace the *Environmental Protection (EP) Act 1990*, but was seen to embellish and complement existing mechanisms. Britain's Integrated System of Pollution Control (IPC) regime was therefore in a state of transition until full implementation of the EU Directive in 2007. The new EU-led air pollution regulation now in place in the UK (see below) differs significantly from its predecessor. Notably, it has more expansive coverage of pollution, which includes waste management, landfill, farming and the food service industry. It also regulates 'installations', not just processes, and it requires best available techniques (BAT) irrespective of cost.

The IPPC Directive attempts to harmonise pollution control mechanisms across the EU. As of October 1999, the directive applies to all new installations in Britain. It imposes more stringent BAT requirements and, because these enhanced standards may jeopardise employment markets across Europe, 'grants these installations an 11 year long transition period counting from the day that the Directive entered into force' to conform to new guidelines (Europa, 2006: 1). The IPPC Directive involves a number of organisations that ensure that it is implemented. For example, licensing agencies across the EU must issue permits and oversee regulation, and the European Commission monitors the directive's integration into member state legislation. In addition, industry experts, environmental organisations, the Information Exchange Forum, the European IPPC Bureau and the IPPC Expert Group are charged with various responsibilities to ensure that the IPPC Directive is integrated into domestic laws across the EU (Europa, 2006).

The *PPC (England and Wales) Regulations 2000* provide a three-tier system of pollution control. Installations must apply to the UK Environment Agency for permits to operate. Permit applications provide non-technical information about the operations of the proposed installation and the various mechanisms to be put in place to prevent or limit emissions. Permits may carry specified conditions that may be reviewed or varied. Moreover, revocation notices can be issued to operators that fail to fulfil the conditions of the permits. It should be noted that installations are entrusted with the reasonability to self-regulate and manage the conditions of their designated permit. For example, the UK Environment Agency guidelines to business and industry on applying for a PPC permit stipulate that 'you [the operators] are responsible for designing and managing your installation using the best available technique (BAT) to prevent or minimise pollution. You also have to minimise waste and return the site to a satisfactory state on completion of your activities' (Environment Agency, 2006: 1).

It is an offence for an operator in the UK to engage in a commercial activity that causes air pollution without a permit. In addition, the Environment Agency often uses administrative orders as a means of enforcing pollution control laws. These regulatory offences under the IPPC Directive can be referred to a criminal court if the operator fails to comply with the conditions of an enforcement notice (*PPC Regulations (England and Wales) 2000*, regulation 24).

Corporate executives may be prosecuted and imprisoned for breaching permits; however, this rarely occurs. That said, existing pollution control laws in the UK, similar to those in the USA, are not focused solely on criminal sanction and deterrence, but also on legal and environmental compliance. A non-punitive system of governance therefore relies on partnership between operator and regulator to negotiate and jointly resolve contentious issues within a culture of dispute resolution and environmental management rather than prosecution.

In June 2008, the EU Directive 2008/50/EC on ambient air quality and cleaner air for Europe came into force. It must be integrated into UK law by June 2010. This directive consolidates previous EU air quality law (with the exception of 2004/107/EC, which will be integrated within a further EU directive in 2010). The new directive requires member states to reduce PM2.5 in urban areas by 20 per cent by 2020 based on 2010 levels, and permits member states to submit applications for time extensions to comply (Europa, 2008).

The challenge that faces the European Commission is how to integrate environmental concerns into a model that has prioritised trade and economic prosperity for five decades (see Sands, 2002).

Air pollution control in the UK

The earliest known form of air pollution regulation in the UK dates back to the Royal Proclamations of the late thirteenth century that recognised the problems caused by burning sea coal (see Thornton and Beckwith, 2004: 292). Other pollution control laws in Britain have their origins in the post-industrial revolution regulations based on the best practicable means (BPM) and the subsequent *Alkali Works Regulation Act 1906* and the *Clean Air Acts* of 1956 and 1968. However, it was the *Environmental Protection Act (EPA) 1990* that created an integrated system of pollution control (IPC). IPC was underpinned by a 'scheme of authorisation, control and enforcement of processes capable of causing pollution of the environment' (Garbutt, 2000: 23). The processes subject to regulation included those that may cause harm to the environment and to any living organism (see EPA Act, section 1). IPC adopted a holistic approach and drew upon established pollution control principles in creating a system based on 'best practicable environmental option (BPEO)' and 'best available techniques not entailing excessive costs (BATNEEC)' (National Society for Clean Air and Environmental Protection, 2005: 3). This approach has since been integrated into Prevention and Pollution Control (PPC) which became part of the new regulatory regime under Environmental Permitting Regulation (EPR) which came into force in the UK on 6 April 2008 (Defra, 2009a).

The EP Act 1990 provided a dual system of regulation involving two governing bodies, namely the Environment Agency and local authorities. The Environment Agency controls industrial and commercial activities causing serious or heavy pollution, while local authorities through Local Authority Air Pollution Control (LAAPC) regulate less polluting activities.

The enforcing agency also exercises powers of enforcement through issuing prohibition or enforcement notices. Section 13 of the *EP Act 1990* identifies that an enforcement notice may be issued by the authority if an authorisation is contravened or about to be contravened. The prohibition notice constitutes a more serious process and is issued when the authority is of the opinion that the activity is at risk of causing 'serious pollution' (section 14). Furthermore, offences under section 23 of the *EP Act 1990* and section 110 of the *EA Act 1995* provide a list of penalties of up to £20,000 for a summary conviction. The IPC relies on operators to be self-regulatory. The ratio of licensed sites to Environment Agency inspectors is such that regulation relies upon operators to report incidents that breach or affect authorisation.

UK air pollution control laws are governed by common law principles of nuisance. The laws of statutory nuisance are referred to in part 3 of the *EP Act 1990*. The statutory nuisance regime covers numerous non-commercial activities as well as those pollutants emitted by industry. For example, it regulates smoke, fumes and gases from premises as well as dust, steam or smell from industry deemed to be harmful to health or a nuisance.

As an integrated system of regulation, pollution control in the UK intersects with transport policy and air quality strategies. For example, the *Environment Act 1995* requires the Secretary of State to establish a National Air Quality Strategy (NAQS) and for local authorities to review the standards and objectives of the strategy. The NAQS serves to provide an overview of pollution-causing activities in Britain and to identify the policies and practices in place to control and prevent air pollution. In doing so, it acts as a reference point and guide to regulators and sets targets and objectives for reducing emissions. Such targets provide a framework in which regulation operates: notably, to achieve, or be seen to be achieving, outcomes designed to improve air quality and enhance the protection of the environment. Local authorities are increasingly playing a more active role through the review of air quality and declare specified regions as air quality management areas.

British authorities point to the importance of the 'weather' in understanding variance in air pollution readings. Will this be the British government's defence when pending proceedings are taken to the ECJ? Rather than piecemeal presentation of manipulated 'successes', what is needed is an open and honest account of all statistical trends with comparable data on EU compliance and future projections.

There is an increasing amount of statistical data on air pollution released online. But the voluminous amount of facts and figures serves to skew and confound rather than provide a consistent picture of the realities of air pollution in the UK. This research encountered particular difficulty in obtaining data, notably relating to air pollution offences.[1] As mentioned above, the more serious air pollution offences in England and Wales are dealt with by the Environment Agency, in Scotland by the Scottish Environment Protection Agency (SEPA) and in Northern Ireland by the Industrial Pollution and Radiochemical Inspectorate within the Northern Ireland Environment Agency (NIEA).

England and Wales

Data about air pollutions incidents was obtained from the Environment Agency for the year 2006–2007. The total number of air pollution incidents brought to the attention of, and investigated by, the UK Environment Agency was 161 in 2006 and 151 in 2007 (Doran, 2009).

In 2006, court proceedings were initiated against 17 offending parties (12 companies and six individuals). Two of the defendants were acquitted, a further six were cautioned, eight were given fines totalling £96,500, and one individual received an unspecific custodial sentence.

Overall, the fines are very small, notably for industries with multimillion pound annual turnovers. It is also surprising that numerous offences identified by the Environment Agency as causing 'significant' air pollution were treated with a caution. For example, one case involving the deliberate release of kerosene and aviation fuel into a controlled waterway resulted in a caution. Most of the matters taken to court were breaches of licences or cases involving the illegal burning or disposal of waste.

In 2007, a further 17 defendants (11 companies and seven individuals) were taken to court – six outcomes resulted in cautions, one case was acquitted, and for another no penalty was recorded.

Only nine defendants were convicted of air pollution offences. In the same year, within magistrates' courts in England and Wales, 1.74 million offenders appeared and were fined more than £255 million (Ministry of Justice, 2007).

Scotland

During the past five years (2004 – May 2009), there were 9,990 air pollution incidents brought to the attention of and investigated by the Scottish Environment Protection Agency (SEPA). While the SEPA database does not provide details on outcomes for all cases (such a task requires manually searching all files), it does indicate the number of prosecutions. During the five years, three prosecutions were successfully made. The courts ordered a total of £15,900 in fines for 'failing to contain offensive odours' (Everitt, 2009).

Northern Ireland

Between 1 April 2004 and 31 March 2009, a total of 537 air pollution incidents were brought to the attention of the Northern Ireland Environment Agency (NIEA). In total, nine enforcement notices were issued and two prosecutions brought. All other complaints were 'dealt with by discussion and/or correspondence' (Doherty, 2009). The two successful prosecutions involved a poultry farm that was fined £6,000 and a company operating three illegal incinerators without permits which was convicted on eight counts and fined £1,000. The case is still subject to an appeal.

From exceedance to eco-crime

Repeated air pollution exceedence often results in warning letters, and when operators face prosecution the fines available to the courts are very low. Indeed, the data identify that individuals illegally disposing of pollution-causing waste are more likely to be successfully prosecuted than large corporations who often negotiate the complexities of existing regulations.

The partnership model of air pollution control in the UK is designed to enhance and facilitate trade while protecting the environment. It is argued that this model fails to capture the deleterious and dangerous effects that air pollution has on human and non-human health, and as such we should begin to move beyond the rhetoric of exceedence to eco-crime. As Tombs and Whyte (2009: 143) state, 'it can be assumed with confidence that the most deadly environmental pollution is caused directly by corporations'. Yet, at

[1] Repeated unsuccessful attempts to obtain statistical data on air pollution offences under the Freedom of Information Act from the Environment Agency necessitated a formal complaint to the Office of Information Commissioner that resulted in the expeditious release of the requested information.

present, corporations are seen as partners who exceed air pollution levels, rather than eco-criminals.

Contemporary discourses in green criminology continue to engage with and critique acts that damage and destroy the environment (Beirne and South, 2007; White, 2008). Such debates seek to focus the criminological lens on ways in which environmental harm is relevant to issues of crime and justice. The ongoing protection and regulation of the environment continues to witness a global increase in law and policy. Such developments have provided a new language for environmental harm, including 'precaution', liability', 'responsibility' and 'assessment'. The rapidly expanding body of environment law that seeks to develop, protect and conserve the environment sometimes refers to 'breaches' or 'violations' of acceptable standards, but the language of crime is noticeably absent (see Bodansky et al, 2007).

Eco-crime is an emerging term which describes acts of environmental degradation including air pollution (Walters, 2009). When eco-crime is situated within notions of harm we observe a broadening of the gaze beyond legal definitions to include discourses on risk, rights and regulation. As a result, eco-crime extends the existing use of the government term 'environmental crime' to include licensed or lawful acts of ecological degradation committed by states and corporations. For Westra (2004: 309) eco-crime is unprovoked aggression, 'committed in the pursuit of other goals and "necessities" such as economic advantage'. Westra's work broadens the definition of eco-crime to include issues of human health, global security and justice. She suggests that harmful environmental actions committed in pursuit of free trade or progress are 'attacks on the human person' that deprive civilians of the social, cultural and economic benefits of their environment. As a result, such actions are 'violent' and should be viewed as akin to human rights violations. Such a view is important because it locates environmental harms within broader notions of social justice and exclusion.

This thinking opens up debate over whether certain harms should be criminalised. It questions the moral and ethical bases upon which contemporary laws permit the exploitation of nature and examines the conditions in which co-existence and interspecies co-operation can be achieved. In that sense, air pollution becomes a subject of criminological inquiry, drawing upon different academic narratives such as law, science, sociology and development studies, and embellishes such understanding with social movements and citizen participation. Shifting the discourse from exceedence to eco-crime captures the serious harms caused by air pollution and, in doing so, may precipitate a more robust and meaningful system of justice.

Conclusion

There are numerous measures proposed, or being implemented, to reduce air pollution. These include the introduction of biofuels, vehicle retrofit schemes, the creation of low-emission zones, solar housing and renewable resources in building schemes, and educational initiatives and government incentives to encourage lifestyle changes that promote low energy outputs (LAEC, 2009). All approaches are important and worthwhile ventures. However, innovative efforts to reduce emissions must be accompanied by dynamic and effective regulatory arrangements.

Air pollution control in the UK remains a model based on trust, partnership and operator self-regulation. The involvement of operator-appointed scientific expertise to assess and process permits raises serious questions that challenge the regime's ability to make impartial judgments. The existing regime regulating air pollution in the UK lacks neutrality. It is a process that remains biased towards the economic imperatives of free trade over and above the centrality of environmental protection. The penalties imposed for operators' breaching permits are minor in comparison to corporate profits. The more severe penalties are rarely imposed. Thus, the system of regulation and control is not founded on deterrence, but on incentive, partnership and dispute resolution.

Moreover, the existing regime must inculcate greater independence and public visibility. The use of autonomous scientific expertise coupled with civilian oversight should comprise a key component of future air pollution regulation in the UK. When air pollution offences are viewed as eco-crimes, the severity of such acts becomes subject to great public, political and subsequently prosecutorial scrutiny. While such life-threatening offences are portrayed as mere exceedence by government, within an industry/polluter dominated partnership built on trust and trade, it is difficult to envisage a decline in the harms caused by air pollution. It is argued that this model fails to capture the deleterious and dangerous effects that air pollution has on human and non-human health and, as such, we should begin to move beyond the rhetoric of exceedence to eco-crime.

Finally, regulators must be given greater resources to investigate installations to facilitate a proactive approach that sees breaches identified before damage to the environment occurs. It is clear that those responsible for the investigation and enforcement of air pollution regulation in the UK operate with inadequate resources. An increase in personnel (for investigation, prosecution, research and knowledge transfer), the sophistication of databases (for collaborating and co-ordinating existing information across regulators and relevant bodies) and the production of research and new forms of information (to assist the development of policy for improving practices) are urgently required.

Reece Walters is Professor of Criminology at The Open University

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