Chapter 3
Risk Compensation in Cities at Risk

John Adams

Abstract Cities face many risks. This book focuses mainly on natural hazards. This chapter explores what perceptions of, and responses to, natural hazards have in common with society's way of coping with risk more generally. It proffers four *framing devices*. First a categorisation of risk: is it directly perceptible, perceptible only with the help of scientific instruments and statistical surveys, or is it 'virtual' – perceptible only with the assistance of unquantifiable imagination? Second, the *risk thermostat* introduces the concept of *risk compensation*: this presents the idea that risk perceptions influence behaviour in predictable ways. Third, *Cultural Theory* introduces a framework for organizing the biases that one encounters when trying to understand diverse responses to what appear to be statistically similar risks. Finally, the significance of *voluntary versus imposed* risks: why are there such enormous differences in responses to statistically similar risks?

3.1 The Risks We Face

A few years ago I was in Amsterdam for a conference on road safety. I was waiting to meet someone in the lobby of a modern hotel in the outskirts of the city. I felt safe. No one in the lobby looked threatening: no robbers, terrorists or psychopaths. The building felt safe. I was sitting next to a massive concrete pillar that appeared to my non-expert eye more than sufficient to hold the building up. But then I tipped back in my chair to look at the ceiling – I was bored, the person for whom I was waiting was late. On the concrete pillar some feet above my head was a wavy line inscribed with the words 'sea level'.

J. Adams (✉)
Department of Geography, University College London,
Gower Street, London WC1E 6BT, UK
e-mail: john.adams@ucl.ac.uk

T. Rossetto et al. (eds.), *Cities at Risk: Living with Perils in the 21st Century*,
Advances in Natural and Technological Hazards Research 33,
DOI 10.1007/978-94-007-6184-1_3,

Suddenly, if briefly, I was alarmed. As a student of risk I am practiced at imagining disasters: what if the flood defences were breached by a storm or, perhaps, by accident or malign intent? I had heard about the great flood of 1953 in which over 1,800 people in the Netherlands died. But I knew, rather vaguely, that much had been done since then to strengthen the flood defences and, much more important in calming my nerves, was the sight of normal life going on all around me. I relaxed.

Subsequent inquiry revealed that since 1953 a great deal had been done. Twenty days after the flood the Delta Commission was inaugurated. In 1959 a plan to build extra flood defences, the Delta Project, was enshrined in the Delta Law. It was a scheme of such ambition that the American Society of Civil Engineers proclaimed it one of the Seven Wonders of the Modern World (Deltawerken Online 2011)

About 20% of the area of the Netherlands (including Amsterdam and large parts of Rotterdam) is below sea level (Schenau et al. 2009). About two thirds of the population–more than 10 million people–live in areas vulnerable to flooding (van Alphen 2009). For such large numbers, a total evacuation in the face of a flood threat is not a realistic option. So, how to defend them? And at what cost?

According to one account, the Commission initially set the 'acceptable risk' of catastrophic flooding at once every 125,000 years (Jonkman et al. 2005). This, however, was deemed too expensive and the acceptable risk around which it was ultimately planned was increased to once every 10,000 years. How were such numbers arrived at? The Delta Works Wikipedia entry claims that:

> The cost of flooding is assessed using a statistical model involving damage to property, lost production and given amount per human life lost. For the purpose of this model a human life is valued at €2.2 million (2008 data). The chances of a significant flood within the given area are calculated. This is done using data from a purpose-built flood simulation lab as well as empirical statistical data regarding water wave properties and distribution. Storm behaviour and spring tide distribution are also taken into account. (Wikipedia 2012)

What kind of risk is the Netherlands dealing with? The Venn diagram of Fig. 3.1 identifies three different types of risk with which we all, as risk managers, wrestle. The diagram could, of course, be overlaid with a multitude of other circles – health risk, emotional risk, enterprise risk, financial risk, reputational risk, value at risk, fraud risk, political risk, military risk, security risk, traffic risk, environmental risk – but the three in the diagram capture essential attributes of all the others.

Some risks are visible to the naked eye, that is 'directly perceived'. We manage them using judgment; we do not undertake a formal probabilistic risk assessment before crossing the road. Some combination of instinct, intuition and experience usually gets us safely to the other side.

Others are perceptible only to those armed with the tools of science – microscopes, telescopes, scanners and other measuring devices, surveys, and the data they produce. This is the realm of quantified risk management. In this realm uncertainty is qualified by probability.

Finally, 'virtual risk' may or may not be 'real' – scientists disagree – but they have real consequences. For some the uncertainty is liberating; if science cannot settle the issue they feel free to argue from their beliefs, convictions, prejudices or superstitions. Here we are thrown back, as in the first circle, on judgments that cannot be objectively validated.

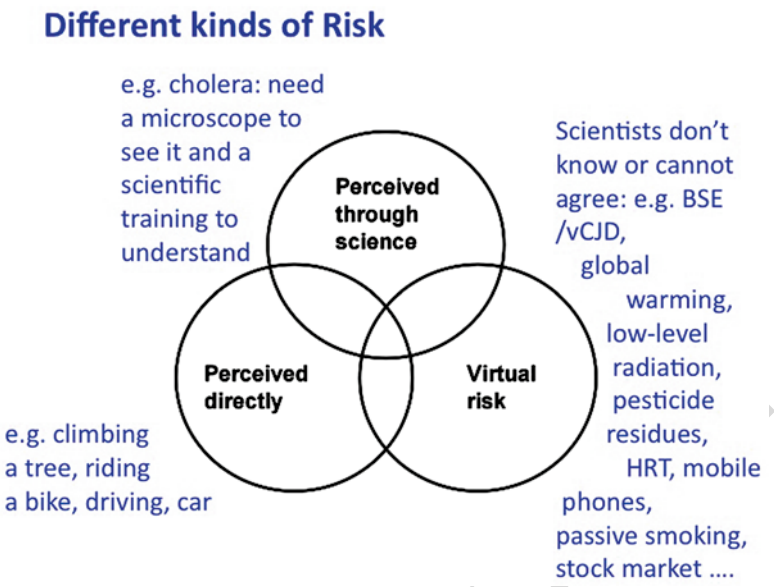

Fig. 3.1 Different kinds of risk

The Dutch history of flooding illustrates all three types. The 1953 flood was far from the worst. The Grote Mandrenke flood of 1362 is reported to have killed over 25,000 people and the 1,530 St. Felix's Flood over 100,000 (Moss 2011; Borthwick 2011). The individual or local response to the directly perceived risk is guided by centuries of experience and mythology. My favourite example I picked up at conference in Delft on the risks of nuclear energy. The conference being in the Netherlands, the discussion amongst the assembled risk experts soon turned from nuclear risks to flood risks. One participant described an intriguing practice from an earlier century: when the closely monitored flood reached a certain height the men of the village, armed with picks and shovels, would row across the river and breach the dyke on the other side. Mythology or not it sounded a plausible, if morally dubious, response to a directly perceptible risk.

Much of modern Dutch flood-control practice can be assigned to the second circle of Fig. 3.1. Little responsibility is now left to the individual citizen, or village. The scale of the threat is seen as so great that a collective response is required. The risk is perceived through science and managed by the state; and, as illustrated above through the Delta Commission, whose management is guided by large databases and computer models.

However, the greater part of current flood control planning takes place in the virtual risk circle of Fig. 3.1. How might the managers decide between defences that protect against a 125,000 year flood and a 10,000 year flood? The €2.2 million value placed by the modellers on a human life in 2008 is highly contentious, as is whatever discount rate that they might use to project it thousands of years into the future. Although numbers are paraded in justification of the proposals, they are wild speculation in the

case of numbers of fatalities that would result from the 10,000 year flood. And the €2.2 million value of a life (adjusted for inflation and the then current exchange rate) is an arbitrary number that serves as the multiplier of an arbitrary number (number killed) whose product convinces only the economists who invented it (Adams 1974).

3.2 Risk Compensation

'Risk compensation' is the name given to a universally observed phenomenon: changes in perceived risk influence behaviour.[1] It is central to an understanding of the process of risk (mis)management. Underlying the concept of risk compensation is the idea that, given a person's accepted level of risk taking (propensity to take risks), changes in the perceived dangerousness of a situation (e.g. driving with or without a seatbelt) may render attempts at increasing the 'objective' dangerousness of that situation (e.g. by enforcing the wearing of a seatbelt when driving) negligible, because the newly modified level of risk does not change a person's accepted level of risk taking. Hence, a person will adjust their behaviour in accord with changes in perceived risk, essentially maintaining their level of danger. As a concrete example, laws enforcing the wearing of a seatbelt may make the event of a car *crash* safer, yet the number of road deaths may remain constant, or even increase. In terms of risk compensation, this can be explained because the enforcement neglects the changes in driving behaviour engendered by the sense of safety that wearing a seatbelt might produce. Figure 3.2 proffers the essence of the process. It describes the 'risk thermostat' that every one of us employs in the face of uncertainty. 'Propensity' in this diagram represents the setting of the thermostat. Some thermostats are set high, others low. I have yet to meet anyone with a zero setting; life would be unutterably boring.

Propensity in this model leads to risk taking behaviour that leads, by definition, to accidents. To take a risk is to do something that carries with it a probability of an adverse outcome. Through surviving accidents and learning from them, or seeing them on television, or being warned by mother, we acquire our perception of safety and danger. The model postulates that when propensity and perception get out of balance we behave in a way that seeks to restore the balance. Why do we take risks? There are rewards, and the model proposes that the magnitude of the reward influences propensity.

Unlike individual risk managers crossing roads or riding bicycles, most institutional risk managers, outside the offices of venture capitalists, hedge funds managers and sub-prime mortgage brokers, are dedicated to the prevention of bad things happening. They are focused on the bottom loop of Fig. 3.2. They are risk-averse. But as people or societies become more risk-averse they do not necessarily become safer or more resilient.

[1] The term was coined by Canadian psychologist Gerald Wilde (1976) and elaborated in Adams (1985) and Adams (1995).

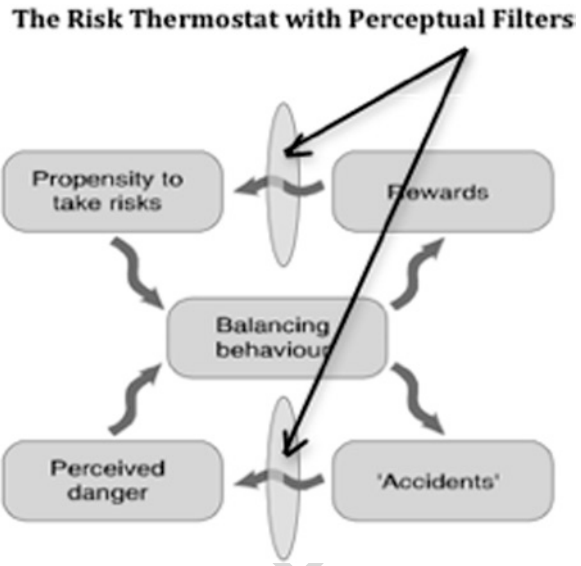

Fig. 3.2 The risk compensation process: The risk thermostat with perceptual filters (see Sect. 3.4 below for discussion of the perceptual filters)

3.3 Risk and Resilience

Increased resilience is the objective of all disaster planning, whether individual or societal. It is a relative quality. There are no agreed units by which it can be measured[2] but some people, and societies, have more of it than others. The ability to prevent bad things happening, to mitigate their consequences and to speed recovery when they do, is not equitably distributed.

It is also limited. Ultimately the pursuit of it ends in failure. Empires collapse, companies go out of business, everyone dies. On a geological time scale tectonic plates shift, ice ages come and go, asteroids impact, the sun goes cold. On a human time scale tsunamis, earthquakes, credit crunches, diseases and simple traffic accidents[3] can overwhelm the most resilient of individuals. But still we strive to prevent bad things happening, mitigate their consequences and speed recovery.

Resilience requires command over resources. Building flood defences and earthquake resistant buildings, accident and emergency services, and post-disaster

[2] Costs and benefits measured in various currencies are sometimes suggested but are not helpful metrics for low frequency high impact events such as 125,000-year, or even 10,000-year, floods. Leaving aside the intractable problems of discount rates, fluctuating currencies, and agreeing the current cash value of human lives, such time spans pre-date all known currencies and exceed the survival prospects of any existing currencies.

[3] Deaths caused by traffic accidents and terrorism illustrate the measurement problem. Resilience is often a term encountered in discussions about the efficacy of anti-terrorism measures, but never in my experience in discussions about the efficacy of measures to curb road accidents, which kill far more people.

continuity planning are all luxuries that the poor cannot afford. The single-minded pursuit of accident avoidance *at all costs* severely constrains the pursuit of the rewards of risk – i.e. the creation of the resources that ultimately make resilience affordable. Achieving resilience is a balancing act. Too little caution can lead to disaster; too much can kill the enterprise. In one company I know, the (overly?) enthusiastic health and safety team is referred to as "the sales prevention department."

Much of the wealthy resilient world now appears to be becoming less resilient. It is suffering simultaneously from under-regulation and over-regulation. The deregulation of the financial markets has given a relatively small number of financiers free rein to contrive incentive structures that pay them fabulous rewards for taking risk-free risks with other people's money – and in the process putting the entire global economy at risk. Meanwhile, other spheres of activity are being suffocated by an excess of regulation. The most egregious example in Britain at the time of writing is the Independent Safeguarding Authority. This new bureaucracy was created as a response to a sensationalist media outcry over the murder of two young girls (the Soham murders in 2002). It is now charged with vetting an estimated 9 million people before they will be permitted to work or volunteer with children or 'vulnerable' adults. The vetting involves a Criminal Records Bureau (CRB) check on all 9 million after which, according to the Home Office website, case workers will "decide on a case-by-case basis whether a person poses a potential on-going risk and if necessary, bar an individual from working with vulnerable groups" (Home Office 2012). Many people must be vetted more than once since the checks relate not just to individuals but to the particular situations in which they might encounter 'vulnerable' people. Between 2002 and 2012, 32 million CRB checks were reportedly conducted at a cost of some £1.5 billion (Beckford 2012).

Leaving aside the mind-boggling expense and bureaucracy required to perform this feat, its effect is almost certain to be perverse. The bureaucratization of the protection of children shifts responsibility. A Criminal Records Bureau check will be seen as an insurance policy; behaviour that might previously have aroused suspicion is now less likely to be questioned, or acted upon, because some superior authority has certified the suspect as 'safe'. But much worse is the damage that will be done by this extraordinarily disproportionate reaction to an extremely rare event. It is already having an impact on volunteering, in a wide range of activities requiring adult involvement. From music and drama to sports, scouting, field trips and educational exchanges, reports suggest a massive withdrawal of adults unwilling to subject themselves to the cost, inconvenience or indignity of the vetting process (Paton 2009).

But still worse, resilience is a skill acquired through experience. Over recent decades in the United States, Britain and many other wealthy countries, the pursuit of zero risk to children has led to their increasing confinement under adult supervision. Now the loss of adult supervisors is restricting still further the range of activities in which they can engage, leaving them to grow increasingly obese in front of their TVs and PlayStations. Learning through experience, the balancing act that underpins resilience, is increasingly denied them.

Resilience has a social dimension. In the aftermath of natural disasters, when emergency services and the forces of law and order are overwhelmed, how people

behave will depend on their expectations of the behaviour of others. Members of societies that enjoy a high level of mutual trust are likely to respond cooperatively and altruistically. A society so paranoid that it treats every adult as a potential paedophile until proven otherwise is more likely to respond defensively and selfishly.

Hurricane Katrina provided examples of both types of response. Most 'ordinary people' responded selflessly and in many cases heroically. Reports of raping and looting were subsequently revealed to have been grossly exaggerated. But enormous suffering was caused by the paranoia of the official custodians of law and order who impeded, sometimes at gunpoint, informal rescue and evacuation efforts because their default assumption was that the anonymous victims could not be trusted (Solnit 2009).

3.4 Perceptual Filters

The Risk Thermostat of Fig. 3.2 comes equipped with perceptual filters. Cultures and individuals vary widely in their perceptions of the dangers and rewards encountered in the pursuit of resilience. Figure 3.3 proffers a cartoon version of a typology of commonly encountered responses to risk developed in a branch of anthropology called Cultural Theory (Adams 1995).

The *Hierarchist* represents the institutional risk manager, the maker and enforcer of the rules to which society is expected to conform. The ultra-cautious *Egalitarian* in the guise of defender of the environment, or its vulnerable inhabitants, commonly argues that the hierarchy is not doing enough to protect us, whereas the *Individualist*

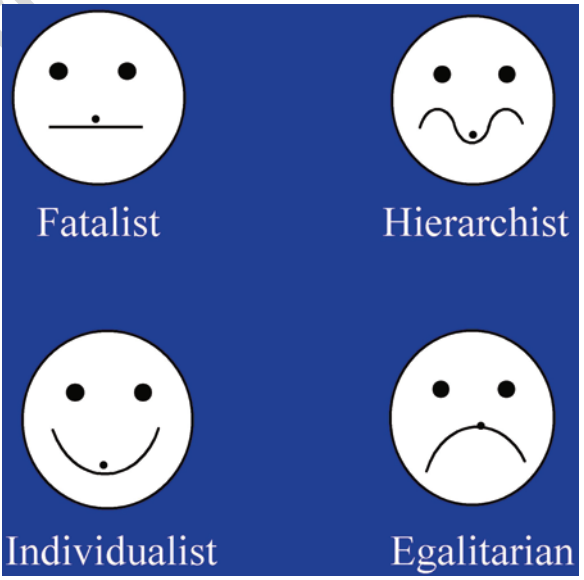

Fig. 3.3 A typology of perceptual filters

complains that the hierarchy is over-regulating and suffocating enterprise and individual liberty. Most of us most of the time are *Fatalists*, conscious of the minimal control that we have over the physical and economic threats that hover over us. We buy lottery tickets and duck if we see something about to hit us.

So far I have proposed that the manner in which individuals and societies respond to risk will depend on what sort of risk they are confronting (Fig. 3.1) and their propensity to take risks (Fig. 3.2) which will depend in turn on their perceptual filters (Fig. 3.3). There is a further complication: the way individuals and societies relate to each other.

3.5 Risk Is an Interactive Phenomenon

We all have a risk thermostat; we all monitor our environment for signs of safety and danger, and adjust our behaviour in response to what we observe. Figure 3.2 can serve as a description of the behaviour of the driver of a single car going around a bend on an empty road. His speed will be influenced by his perception of the rewards of risk: these might range from getting to the church on time, to impressing his friends with his skill or courage. His speed will also be influenced by his perception of the danger: his fears might range from death, through the cost of repairs and loss of his license, to mere embarrassment. His speed will also depend on his judgment about the road conditions – is there ice or oil on the road? How sharp is the bend and how high the camber? It will also be contingent on his perception of the capability of his car – how good are the brakes, suspension, steering, and tires?

Overestimating the capability of the car or the speed at which the bend can be safely negotiated can lead to an accident. Underestimating those things will reduce the rewards gained. The consequences, in either direction, can range from the trivial to the catastrophic. The balancing act described by this illustration is analogous to the behaviour of a thermostatically controlled system. The setting of the thermostat varies from one individual to another, from one group to another, from one culture to another, and for all of these, over time. Some like it hot – a Hell's Angel or a Grand Prix racing driver, for example – others like it cool – a Caspar Milquetoast or a little old lady named Prudence. But no one wants absolute zero.

Figure 3.4 introduces a second (smaller) vehicle to the road to make the point that risk is usually an interactive phenomenon. One person's balancing behaviour has consequences for others. On the road one road user can impinge on another's 'rewards' by getting in his way and slowing him down, or help him by giving way. One is also concerned to avoid hitting other road users or being hit by them. Driving in traffic involves monitoring the behaviour of others, speculating about their intentions, and estimating the consequences of a misjudgement. Drivers who see another vehicle approaching at high speed and wandering from one side of the road to the other are likely to take evasive action, unless perhaps they place a very high value on their dignity and rights as road users and fear a loss of esteem if they are seen giving way. During this interaction enormous amounts of information are processed.

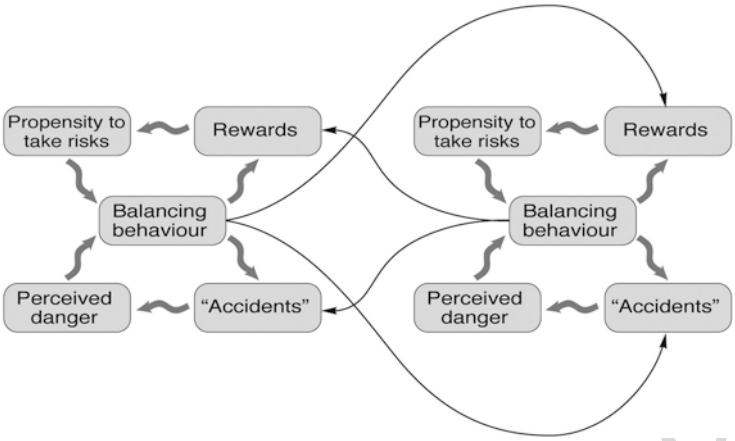

Fig. 3.4 Risk as an interactive phenomenon: the truck driver and the cyclist

Moment by moment, each motorist acts upon information received, thereby creating a new situation to which the other responds.

Figure 3.4 also illustrates a further complication. On the road and in life generally, risky interactions frequently take place on terms of gross inequality. The damage that a heavy truck can inflict on a small car, cyclist or pedestrian is great; the physical damage that a cyclist or pedestrian might inflict on the truck is small. The truck driver in this illustration can represent the controllers of large risks of all sorts. Institutional risk managers who determine the safety of consumer goods, working conditions, or large construction projects are, like the truck driver, usually personally well insulated from the consequences of their decisions. The consumers, workers, or users of their constructions, like the cyclist, are in a position to suffer great harm, but usually not inflict it.

3.6 What Kills You Matters[4]

Whether risks are seen as voluntary or imposed has an enormous influence on the way people respond to them. The terrorist bombs in London on the 7th of July 2005 killed 52 people – the equivalent of 6 days of death on the roads of Britain – but 10,000 people do not gather every weekend in Trafalgar Square to manifest their outrage at the previous week's road death toll with a 3-min silence.

What kills you matters. Figure 3.5 represents an attempt by the author to put in rank order different causes of death according to their acceptability or amplification.

[4] An extended version of this section can be found in Adams (2005).

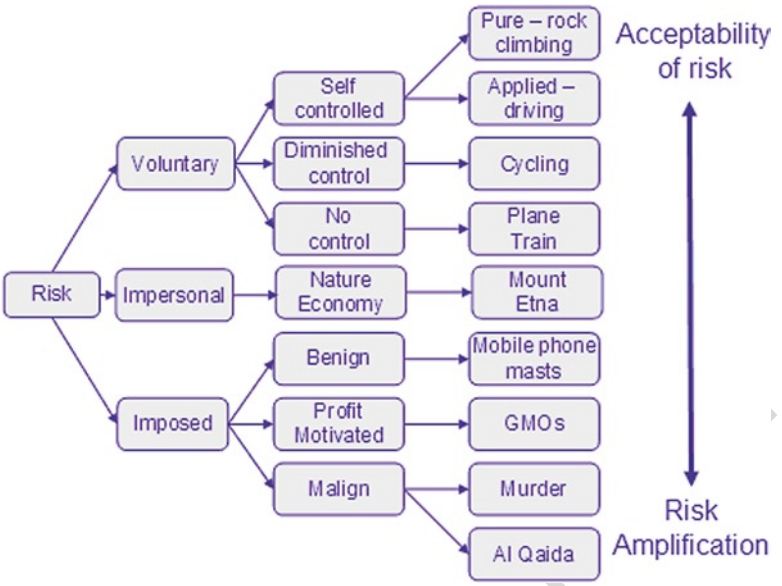

Fig. 3.5 What kills you matters

With 'pure' voluntary risks, the risk itself, with its associated challenge and rush of adrenaline, is the reward. Most climbers on Mount Everest know that it is dangerous and willingly take the risk.

With a voluntary, self-controlled, 'applied' risk, such as driving, the reward is getting expeditiously from A to B. But the sense of control that drivers have over their fates appears to encourage a high level of tolerance of the risks involved.

Cycling from A to B (I write as a London cyclist) is done with a diminished sense of control over one's fate. This sense is supported by statistics that show that per kilometre travelled a cyclist is 14 times more likely to die than someone in a car. This is a good example of the importance of distinguishing between relative and absolute risk. Although 14 times greater, the absolute risk of cycling is still small – one fatality in 25 million kilometres cycled; not even a Tour de France champion can begin to cover that distance in a lifetime of cycling. Moreover, numerous studies (e.g. de Hartog et al. 2010) have demonstrated that the extra relative risk is more than offset by the health benefits of regular cycling; regular cyclists live longer. In some circumstances this risk can be relocated to the 'imposed' part of this diagram. Campaigns for safer cycling are usually based on the perceived injustice of the risks imposed on cyclists by heedless motorists and highway authorities heedless of their 'rights'. Classification in Fig. 3.5 depends on the perspective of the classifier.

While people may voluntarily board planes, buses and trains, the popular reaction to crashes in which passengers are passive victims, suggests that the public demand a higher standard of safety in circumstances in which people voluntarily hand over control of their safety to pilots, or to bus or train drivers.

Imposed risks are less tolerated. Consider mobile phones. The risk associated with handsets is either non-existent or very small (Burgess 2004). The risk associated with the base stations, measured by radiation dose, is orders of magnitude less, unless one is up the mast with an ear to the transmitter. Yet all round the world billions of people are queuing up to take the voluntary risk, and almost all the opposition is focussed on the base stations, which are seen by objectors as impositions. Because the radiation dose received from the handset increases with distance from the base station, to the extent that campaigns against the base stations are successful, they will increase the distance from the base station to the average handset, and thus the radiation dose. The base station risk, if it exists, might be labelled a benignly imposed risk; no one supposes that the phone company wishes to harm all those in the neighbourhood.

Less tolerated are risks whose imposers are perceived as motivated by profit or greed. In Europe, big biotech companies such as Monsanto are routinely denounced by environmentalist opponents for being more concerned with profits than the welfare of the environment or the consumers of its products.

Less tolerated still are malignly imposed risks – crimes ranging from mugging to rape and murder. In most countries in the world the number of deaths on the road far exceeds the numbers of murders, but far more people are sent to jail for murder than for causing death by dangerous driving. In the United States in 2002, the year after 9/11, 16,000 people were murdered – a statistic that evoked far more popular concern than the 42,000 killed on the road but far less concern than for the 25 killed that year by terrorists.

This brings us to terrorism and al-Qaeda. How do we account for the massive scale, worldwide, of the outpourings of grief and anger attached to its victims, whose numbers are dwarfed by those of other causes of violent death? Up to this point we have been discussing individual responses to a range of risks. Terrorism targets *governments*. Terrorists pose a threat not just to individuals but to the social order – *and* to those who purport to maintain it. Murderers and careless drivers are not seen as threats to the ability of the government (the Hierarchy) to govern. And governments have multitudes of press officers and IT experts to amplify their anxieties.

In the middle of this scale are 'impersonal risks', risks imposed by nature or impersonal economic forces. They are commonly considered to be neither voluntary nor imposed. High impact, low frequency risks such as the 2004 Indian Ocean Tsunami or asteroid impact are seen as beyond the control of individuals or governments and responded to fatalistically.[5]

But often the impersonal risks become personal. Mount Etna was chosen to represent such risks in Fig. 3.5 because the diagram was originally prepared for a conference in Sicily. However, I was politely informed by Sicilians at the conference that Mount Etna was a very friendly volcano. Over thousands of years, I was told, only 77 deaths had been attributed to its activity, and most of these could be assigned to the voluntary

[5] Although reports appear from time to time of rocket scientists proposing that with sufficient funding they could devise ways of deflecting them (e.g. Matson 2009).

risk category: either viticulturists and farmers exploiting the rich volcanic soils, or curious tourists and geologists venturing too close to the edge.

On closer inspection many 'impersonal' economic risks, while beyond the control of individuals or governments, also turn out to be not impersonal at all. The sub-prime crunch which began with the bursting of house price bubble in 2007 triggered a worldwide recession and devastated the economies of smaller countries such as Iceland, Ireland and Greece. The response has ranged from impotent rage against 'the bonus culture' to, in a few cases, criminal prosecutions.

3.7 The Dance of the Risk Thermostats

Figure 3.6 is an attempt to bring together all the complications discussed above. The world contains more than 7 billion (and growing) risk thermostats. Some are large – presidents with fingers on buttons; most are tiny – children chasing balls across streets or shepherds in Afghanistan. Governments and big businesses make decisions that affect millions if not billions of people. Individuals for the most part adapt as best they can to the consequences of those decisions. The damage that they individually can inflict in return, through the ballot box or market, is insignificant, although in aggregate they can become forces to reckon with.

The broken line symbolizes the uncertain impact of human behaviour on nature. Overhanging everything are the forces of nature – floods, earthquakes, hurricanes, plagues – which even governments cannot control, although they sometimes try to build defences against them. And fluttering about the dance floor are the Beijing butterflies beloved of chaos theorists: they ensure that the best laid plans of mice and men 'gang aft agley'.

The small winged creature at the top left of Fig. 3.6 was added in response to a survey in *Time* magazine (23 December 1993) that revealed that 69% of Americans

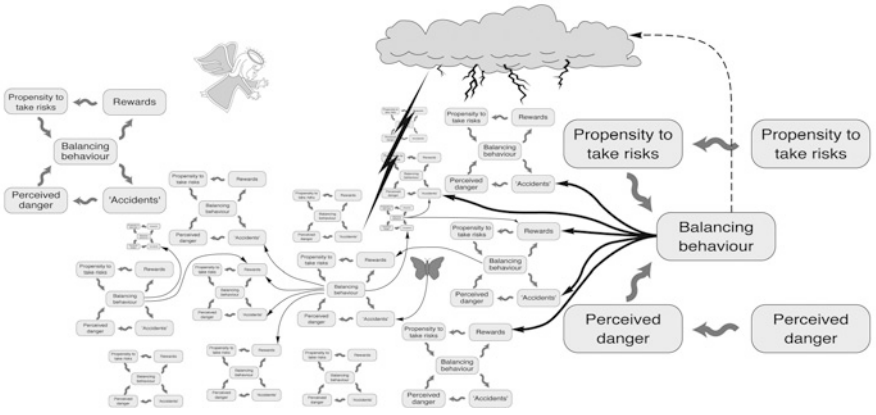

Fig. 3.6 The dance of the risk thermostats

believed in angels and 46% believed they had their own guardian angel. The 'angel factor' must influence many risk-taking decisions – in mysterious ways. At the time that I added the angel I thought she was amusing. Subsequently, pondering the role of religious filters, God and his angels appear to be assuming growing salience. In the War on Terror, God appears to intercede on both sides with devastating effect.

Amongst the 7 billion thermostats, all the different perceptual filters discussed above in Fig. 3.3 will be represented, all the categories of relationship described in Fig. 3.4 will be found, and they will all be forced to confront the different types of risk presented in Fig. 3.1. Figure 3.6 shows but a minute fraction of the possible interactions between all the world's risk thermostats, and the complexity of these relationships is increasing rapidly. As the world's population increases and grows more mobile, both physically and electronically, the number and length of the connections linking thermostats increases.

Can such a system be 'managed'? In the worlds of commerce and industry there is a spreading fashion amongst large companies, especially in the financial sector, to appoint CROs – Chief Risk Officers. This new office appears to have been created in response to the perceived failings of other Chiefs: Chief Financial Officers, Chief Compliance Officers and Chief Audit Officers. Collectively these predecessors in financial institutions failed spectacularly to prevent the recent sub-prime crunch – despite the demands and exhortations in the financial sector of the Turnbull Report, the Basle Accords, Sarbanes Oxley and an army of regulators. Will Chief Risk Officers fare any better? All the previous Chiefs implicated in the Crunch were charged with reducing or preventing 'accidents' – mostly in the form of non-compliance with the rules. By general agreement they have been failed 'bottom-loopers' – i.e. risk managers concerned exclusively with managing the bottom loop of Fig. 3.2; they failed to warn of, or prevent, the 'accident' known as the Crunch.

The discussions taking place about the reforms now needed to make the financial sector more resilient have much wider implications. The Crunch is commonly attributed to the failure of the Hierarchist quadrant (the regulators) to contain the 'irrational exuberance' of the Individualist quadrant. In terms of the balancing act described by Fig. 3.2, the frenetic pursuit of the rewards of sub-prime lending overwhelmed contemplation of the possibility of an 'accident' in the form of a collapse of the real estate market. Post-earthquake inquiries routinely reveal examples of the physical collapse of real estate attributable to the pursuit of profit, especially in the form of corruption, overriding investment in more robust construction standards. Ambraseys and Bilham (2011, p. 153) have estimated that "83% of all deaths from building collapse in earthquakes over the past 30 years occurred in countries that are anomalously corrupt".

3.8 A Sudden Shift of Focus

At 11 p.m. London time on the 12 January 2010, while I was fretting about the way that the rich world was (mis)managing risk, my radio, which was playing in the background, reported an earthquake in Haiti – a poor faraway country about which

I knew almost nothing. Slowly, over the next few hours and days, the magnitude of the devastation unfolded.

Earlier in the chapter, I noted that:

> Resilience requires command over resources. Building flood defences and earthquake resistant buildings, accident and emergency services, and post-disaster continuity planning are all luxuries that the poor cannot afford.

Haiti was clearly a country that could afford little in the way of earthquake resistant buildings – not even, it turned out, the Presidential Palace – or accident and emergency services, or post-disaster continuity provision.

Can a connection be made between the risk management systems put in place in rich countries to protect children from the statistically negligible risk posed by murderous paedophiles and the systems that exist in poor countries to protect people from risks that are many orders of magnitude greater? Do Amsterdam and Port-au-Prince have anything in common? Despite their different circumstances, do rich and poor countries have common lessons to impart?

All of the inhabitants of Amsterdam and Port-au-Prince – and the rest of the world – are participants in the dance illustrated by Fig. 3.6. All the biases depicted in Fig. 3.3 can be found on the dance floor. Individualists are dancing to tunes of their own choice conveyed through earphones from their iPods; they display a preference for raucous authority-challenging punk rock. The more communally inspired Egalitarians might be engaged in square dancing or line dancing. The Hierarchy is suspicious of dancing and bans it completely in some theocratic cultures; where permitted they display a preference for music appropriate to marching rather than dancing. The poor Fatalists can be recognized by their slow despondent shuffle.

Over different parts of the global dance floor the proportions of the participants exhibiting these biases vary greatly. I insisted above that there is no agreed numerical measure of resilience. There are, however, some helpful pointers. On a rank-order resilience scale the Netherlands would be close to the top and Haiti close to the bottom. Life expectancy at birth in Haiti is 62.5 years and in the Netherlands 80.9 years (CIA 2012a). On a daily basis some combination of accident, disease, malnutrition, accident and occasional disaster is depriving the average Haitian of over 18 years of life. Judged by this indicator, Haiti must be less resilient.

In the discussion above of Figs. 3.4 and 3.6 it was observed that the interactions between individual risk managers often take place on terms of gross disparity. The Haiti tourism industry provides an extreme example. A few days after the earthquake, a Royal Caribbean cruise liner arrived at the private resort of Labadee, 85 miles from Port-au-Prince. There was much discussion in the press about the unseemly nature of rich tourists disporting themselves in such close proximity to tragedy (Sequera 2010). But a spokesman for the travel agency justified the visit: "Anything you can do to continue normalcy in Haiti is helpful… People will feel they're doing more by going there than not." (Miami 2010). What "normalcy" means in Labadee when tourist meets Haitian is nicely captured by a tourist's travel diary posted on the Internet before the earthquake:

> There is a small section for kids with floating fake icebergs to climb and water slides but they charge an admission fee. Flotation mattresses are also available for rent for those who

> just want to float in the ocean. There are also locals who help with getting beach chairs for you but they expect tips. So things here are a money grabber (…) One big difference between this port compared to others is that since it is pretty well being used as a private beach, you will not be hassled by locals. The vendors coming around with drinks at the beach locations are actually Royal Caribbean staff so if one wishes to buy a drink, the cruiseship passcard is all that is required. As for concerns about being in Haiti given the poverty and political situation, Labadee was not a problem because the entire site is enclosed by a high steel fence. Other passengers later told us that they wandered off near the perimeter of the site and saw many Haitians along the fence begging for handouts and food. The fencing was mostly concealed in the distance from the main tourist areas (CruiseJournals 2005, comment posted 2005).

There exist two further international scales by which Haiti and the Netherlands might be compared that have a bearing on resilience. One is corruption. A resilient society will be cooperative; people will be prepared to help each other. In corrupt societies assistance is for sale, not freely given. For most of its history the *hierarchy* ruling Haiti has been a corrupt tyranny. In Transparency International's (2010) survey of corruption the Netherlands ranked 7th least corrupt nation in the world. Haiti tied with seven other countries at 146.

A second relevant indicator is economic equality. Billionaire bankers and shop floor workers or 'slum dogs' do not have many reasons to pull together in the face of adversity. Various international comparisons of income distribution produce different rankings, but most of north-western Europe, despite bankers' bonuses, can be found at the equitable end of the international equality scales while Haiti sits at the bottom, along with a group of African kleptocracies (CIA 2012b).

In post-earthquake Haiti, religious belief (represented by the angel in Fig. 3.6) appears to have played a significant role in helping many Haitians, condemned to fatalism by their poverty, to cope with the devastation in which they found themselves. Television and other reports of prayer meetings, the singing of hymns, and voodoo observances suggest that various forms of faith can be the basis of a form of resilience. How might a population of impoverished atheists cope with the devastation inflicted on Haiti? Do such populations exist? Or does the struggle for continued existence in the face of disaster and desperate poverty support, or induce, belief in the supernatural? Such questions are beyond the competence of the author of this chapter, but they do serve to illustrate the dense complexity confronting an investigation of resilience.

Figure 3.2 was proffered above as an example of the risk-decision making process of a driver going around a bend in the road. It was deployed as an example from a rich country in which most people ride around in cars. Can it be applied to Haiti? Everyone in Haiti, as I write, is a risk manager. Whether they have just crawled out from the ruins of a home, office, hotel, factory, school or shop, whether they are a policeman, government minister or aid worker, they are all peering into a desperately uncertain future wondering what to do next. The decision about the speed at which to negotiate a bend in the road is exchanged in Haiti for a decision about whether to scrabble through the ruins of a local shop to acquire life-sustaining food and drink at the risk of being shot as a looter.

The driver or 'looter' in deciding what to do is compelled to anticipate a reaction to their behaviour. The population of Haiti is about the same size as the population of

that part of the Netherlands susceptible to flooding. Both populations are vulnerable to natural and human-made hazards. Every individual inhabitant is a risk manager with a risk thermostat that has a perceptual filter.

Who should be in charge of the *societal* balancing act? Moreover, how is the societal risk thermostat set, and what sort of risk should the thermostat setter contemplate?

3.8.1 Who Is in Charge?

In rich or middle-income countries in the case of flood or earthquake risks, it is those branches of government responsible for flood defences, building codes and emergency services. Insurers also have a role to play in the financing of reconstruction. In Haiti, there were no building codes relevant to earthquake risk and no emergency services that could make a perceptible impression on the disaster. Both the presidential palace and any semblance of central control collapsed. Initial efforts by international aid agencies and the 9,000 uniformed UN personnel present in the country to impose some sort of order were seriously undermined by large numbers of escaped prisoners, and the lack of any effective policing.

In 1989, the San Francisco Bay area was struck by a magnitude 7 earthquake, the same magnitude as the quake that killed 250,000 people[6] and devastated the economy of Haiti. It killed only 63 and left barely an economic ripple (Eberhart-Phillips et al. 1994). The *insured* losses were much greater in California because few in Haiti could afford insurance and the monetary value of the properties destroyed was negligible in the eyes of international insurance companies. In Chile, on 27 February 2010, a much stronger earthquake accompanied by a tsunami killed only an estimated 500, and the president was promptly on the streets and on television clearly in command of rescue operations.

3.8.2 How Is the Thermostat Set?

With great difficulty. In addition to the problems of poverty and corruption discussed above there is the unresolved problem of deciding the magnitude of the resources that should be committed to preparing for extremely low frequency, high impact events. In California and Chile, earthquakes are not only high impact events, they are also frequent events. In Haiti the last earthquake of similar magnitude is reported to have occurred 250 years ago (Bajak 2010). For a desperately poor country, planning for such a rare event is understandably not a high priority.

[6] This is a widely reported estimate. The true number will never be known because large numbers were buried in mass graves with no one keeping count.

3.9 Whose Appetite for Risk?

Commenting on the aftermath of the Haiti earthquake in *The Telegraph* (2010), Elisabeth Byrs, spokeswoman of the UN Office for the Coordination of Humanitarian Affairs, stated, "This is a historic disaster. We have never been confronted with such a disaster in the UN memory. It is like no other". However, as noted above, poverty kills, and those hit hardest by the recession triggered by the sub-prime credit crunch of 2007 are the poorest. The reckless risk-taking of so-called financial risk managers may yet be credited with causing more deaths than those caused directly by the Haiti earthquake.

Financial risk managers like to trade slogans such as 'no risk, no reward' and 'no pain, no gain' and to advise each other that they should 'manage risk within their organisation's risk appetite'. They are right. A risk-free world is not possible and, as we have seen above, excessive risk aversion incurs costs in the form of potential rewards foregone. The key to a fair system of societal risk management is to ensure that those who collect the rewards share the pain when things go wrong. Some financial risk managers, still collecting their bonuses, appear, like the tourist on the cruise liner introduced above, to be well insulated from the pain suffered by those less fortunate.

3.10 Where Are the Keys?

A final note of caution. The mythical drunk notoriously searches for his keys not in the dark where he dropped them, but under the lamppost where he can see (Fig. 3.7). This is an apt metaphor for much of what is written on the subjects of resilience and risk management.

Lord Kelvin famously said, "Anything that exists, exists in some quantity and can therefore be measured" (as quoted in Beer 1967, p. 14). This dictum sits challengingly alongside that of another famous scientist, Peter Medawar (1967, p. 11) who observed, "If politics is the art of the possible, research is the art of the soluble. Both are immensely practical minded affairs. Good scientists study the most important *problems they think they can solve* [my italics]. It is, after all, their professional business to solve problems, not merely to grapple with them".

Risk is a word that refers to the future. The future has no objective existence. It exists only in the imagination. There are some risks for which science can provide useful guidance to the imagination. The risk that the sun will not rise tomorrow can (I hope) be assigned a very low probability by science. Actuarial science can estimate with a high degree of confidence that the number of people killed in road accidents in Britain next year will be 2,000, plus or minus a hundred or so. But these are predictions, not facts. Such predictions rest on assumptions: that tomorrow will be like yesterday; that next year will be like last year; that future events can be foretold by reading the runes of the past. Sadly, the history of prediction contains many

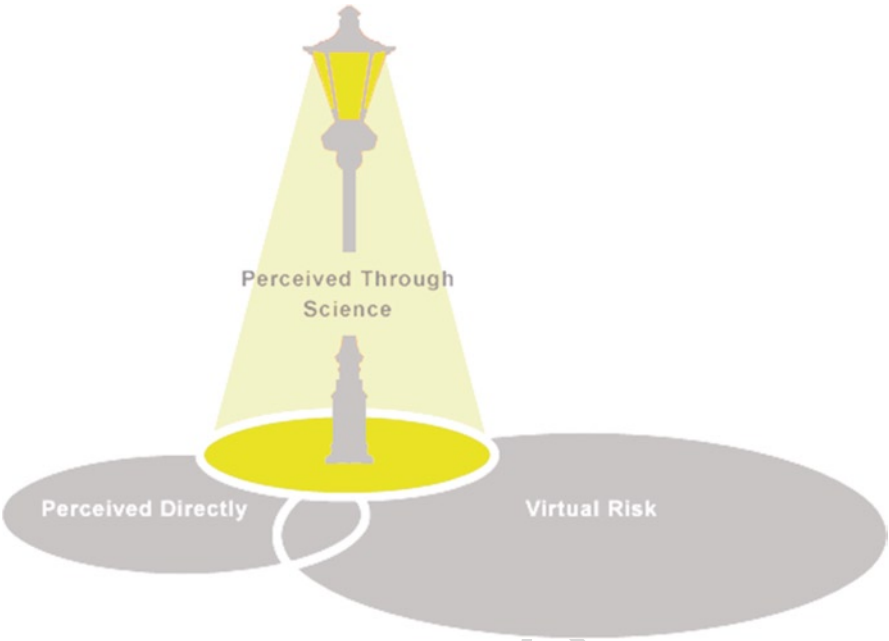

Fig. 3.7 The pursuit of resilience. Where are the keys?

failures – from those of stock market tipsters to those of scientists seeking to predict eruptions, earthquakes and tsunamis.

In the area lit by the lamp of science, one finds risk management problems that are potentially soluble by science. Such problems are capable of clear definition relating cause to effect and characterised by identifiable statistical regularities. On the margins of this circle one finds problems framed as hypotheses, and methods of reasoning, such as Bayesian statistics, which guide the collection and analysis of further evidence. As the light grows dimmer, the ratio of speculation to evidence increases. In the outer darkness lurk unknown unknowns. Here lie problems with which, to use Medawar's word, we are destined to 'grapple'.

References

Adams J (1974) …and how much for your grandmother? Envir Plan A 6(6):619–626 [AU1]
Adams J (1985) Risk and freedom: the record of road safety regulation. Transport Publishing Projects, London
Adams J (1995) Risk. UCL Press, London
Adams J (2005) What kills you matters, not numbers, the social affairs unit. http://www.socialaffairsunit.org.uk/blog/archives/000512.php. Accessed 7 Aug 2012
Ambraseys N, Bilham R (2011) Corruption kills. Nature 469:153–155
Bajak F (2010) Chile-Haiti earthquake comparison: Chile was more prepared. http://www.huffingtonpost.com/2010/02/27/chile-haiti-earthquake-co_n_479705.html. Accessed 29 Mar 2011

Beckford M (2012) CRB checks top 30 million but create 'atmosphere of mistrust'. The Telegraph, 23 Apr 2012. http://www.telegraph.co.uk/news/uknews/law-and-order/9219430/CRB-checks-top-30million-but-create-atmosphere-of-mistrust.html. Accessed 9 Aug 2012

Beer S (1967) Management science. Aldus, London

Borthwick A (2011) Coastal flood risk – from storm surge and waves to inundation. http://web.sbe.hw.ac.uk/frmrc/downloads/Coastal_Flood_Risk_London/Alistair%20Borthwick.pdf. Accessed 7 Aug 2012

Burgess A (2004) Cellular phones, public fears, and a culture of precaution. Cambridge University Press, Cambridge

CIA (2012a) Country comparison: life expectancy at birth. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2102rank.html. Accessed 7 Aug 2012

CIA (2012b) Distribution of family income: GINI index. https://www.cia.gov/library/publications/the-world-factbook/rankorder/2172rank.html. Accessed 7 Aug 2012

CruiseJournals (2005) A day in Labadee at Hispaniola, Haiti. http://www.cruisejournals.com/readarticle.php?article_id=22. Accessed 1 June 2012

de Hartog JJ, Boogaard H, Nijland H, Hoek G (2010) Do the health benefits of cycling outweigh the risks? Environ Health Perspect 118:1109–1116

Deltawerken Online (2011) The delta works. http://www.deltawerken.com/23. Accessed 29 Mar 2011

Eberhart-Phillips JE, Saunders TM, Robinson AL, Hatch DL, Parrish RG (1994) Profile of mortality from the 1989 Loma Prieta earthquake using coroner and medical examiner reports. Disasters 18:160–170

Home Office (2012) The independent safeguarding authority. http://www.homeoffice.gov.uk/agencies-public-bodies/crb/partners-reg-bodies/isa/. Accessed 9 Aug 2012

Jonkman SN, Stive MJS, Vrijling JK (2005) New Orleans is a lesson to the Dutch. J Coast Res 21(6):11–12

Matson J (2009) Russian space chief makes vague threat to vaguely threatening asteroid. http://www.scientificamerican.com/blog/post.cfm?id=russian-space-chief-makes-vague-thr-2009-12-30. Retrieved 29 Mar 2011

Medawar PB (1967) The art of the soluble: creativity and originality in science. Methuen, London

[AU2] Miami Herald (2010, 16 January) Haiti cruise stops: 'without this, we don't eat'

Moss S (2011) Weatherwatch: the grote mandrenke. http://www.guardian.co.uk/news/2011/jan/20/weatherwatch-grote-mandrenke. Accessed 7 Aug 2012

Paton G (2009) CRB checks 'deterring school volunteers.' http://www.telegraph.co.uk/education/6281842/CRB-checks-deterring-school-volunteers.html. Accessed 7 Aug 2012

Schenau S, Delahaye R, Edens B, van Geloof I, Graveland C, van Rossum M, Wolswinkel KJ (2009) Milieurekeningen 2008. Centraal Bureau voor de Statistiek. http://www.cbs.nl/nl-NL/menu/themas/natuur-milieu/publicaties/publicaties/archief/2009/2008-c167-pub.htm. Accessed 7 Aug 2012

Sequera V (2010) Haiti cruise stops: 'without this, we don't eat'. The Guardian, 23 Jan 2010. http://www.guardian.co.uk/world/feedarticle/8912655. Accessed 9 Aug 2012

Solnit R (2009) A paradise built in hell: the extraordinary communities that arise in disaster. Viking, New York

The Telegraph (2010) Haiti earthquake: police open fire on looters. http://www.telegraph.co.uk/news/worldnews/centralamericaandthecaribbean/haiti/7005853/Haiti-earthquake-police-open-fire-on-looters.html. Accessed 7 Aug 2010

Transparency International (2007) Corruption perceptions index. http://www.transparency.org/policy_research/surveys_indices/cpi/2007. Accessed 29 Mar 2012

Transparency International (2010) Corruption perceptions index 2010 results. http://archive.transparency.org/policy_research/surveys_indices/cpi/2010/results. Accessed 7 Aug 2012

van Alphen J (2009) Flood risk management in the Netherlands. Organisation, legislation and governance. http://www.nfrmp.us/ifrma/docs/pre/governance/NetherlandsGovernancePaper.pdf. Accessed 7 Aug 2012

Wikipedia (2012) Delta works. http://en.wikipedia.org/wiki/Delta_Works. Accessed 9 Aug 2012

Wilde G (1976) The risk compensation hypothesis theory of accident causation and its practical consequences for accident prevention. Paper presented at annual meeting of Österreichische Gesellschaft für Unfallchirurgie, Salzburg, 1976