

# Fair Game?

## Animal Vulnerability and Disasters in a Globalized World

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'It has been remarked that the Nuer might be called parasites of the cow, but it might be said with equal force that the cow is a parasite of the Nuer, whose lives are spent in ensuring its welfare. They build byres, kindle fires, and clean kraals for its comfort; move from villages to camps, from camp to camp, and from camp back to villages, for its health; defy wild beasts for its protection; fashion ornaments for its adornment. It lives its gentle, indolent, sluggish life thanks to the Nuer's devotion. In truth the relationship is symbiotic: cattle and men sustain life by their reciprocal services to one another. In this intimate symbiotic relationship men and beasts form a single community of the closest kind'

E. E. Evans-Pritchard *The Nuer* (1940:36)

The tsunami that hit twelve coastal states around the Indian Ocean on 26 December 2004 received a degree of international attention not seen since the telegraph made the eruption of Krakatoa in 1883 world headlines within minutes (Winchester 2003). It was not so much the human death toll: there have been calamities with commensurate mortalities or even ones that have claimed more lives during the last century. The tidal surge associated with the East Bengal cyclone of 1970 left up to half a million dead and the official death toll of nearly a quarter million people in the Tangshan (China) earthquake of 1976 may have been exceeded by a factor of three. It was not the number of dead so much as the scale of the disaster, affecting so many people in so many countries in such diverse predicaments: from western tourists about the beach resorts of Thailand to ‘stone age’ tribal populations on the Andaman and Nicobar Islands. The Indian Ocean Tsunami was in fact a very uncommon disaster but not for the reasons usually associated with it. Part of its distinctiveness lies in the apparently few reports of animal fatalities (Mott 2005).

Why so few animals died in the tsunami is not immediately apparent; commentaries abound of a “sixth sense” that warns them of impending danger. About elephants that “cried” and ran for higher ground, dogs who refused their daily walks, flamingos who abandoned their low-lying breeding grounds and zoo animals who rushed for the security of their shelters (Nelson 2004, Mott 2005). One particularly sensational account spoke of the elephants at Khao Lak beach in Thailand whose sudden wilfulness in refusing to obey their mahouts saved not only their own lives but those of the tourists fortunate enough to be on their backs (Bendeich 2005). Ethologists were quoted at length ascribing to animals such innate abilities as infrasound, detecting low frequency noise levels below the human threshold of hearing or the faculty to recognise ‘ground signatures’, sensations caused by vibrations in the soil (Acoustic Senses 2005). Similar capacities were attributed to the several remaining hunter-gatherer tribes on the Andaman Islands in the Bay of Bengal whose miraculous survival, in deference to their humanity, was credited instead to ‘ancient lore’ (National Geographic News 2005). In the event, such reports were rather misleading: much more livestock perished in the tsunami than was initially thought and animal fatalities are generally a major feature in most disasters.<sup>1</sup> It is simply that the fate of animals is not usually fully documented, most often considered inconsequential in relation to the human tragedy, and rarely commands publicity apart from the “human-animal interest” survival stories.

The extensive reportage of human suffering often serves to obscure the fact that non-human actors are also adversely affected. Countless thousands of animal lives are lost in such events or in their aftermaths. This paper takes a look at how animals fare under different hazardous conditions and whether the emergency management cycle applies in the same measure to them as to humans. In particular, it examines the respective exposure of animals to risk grouped respectively as domesticated, ‘caged’ and wild to show that they have very different vulnerabilities according to an array of determining factors. Using data from recent major disasters, lastly it considers whether what are loosely termed the forces of globalisation are changing the nature of disasters as much and maybe even more for animal as for human populations.

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<sup>1</sup> Initial estimates of livestock losses amounted to 20,000 cattle and carabao, 20,000 small ruminants and nearly 2.5 million poultry in Northern Sumatra and 2,000 livestock and half a million poultry in Thailand (FAO 2005).

## **Animals and disasters**

Animals like humans are exposed to much the same kinds of risks as humans. They frequently suffer and die in huge numbers as a result of natural or physical phenomena, in epizootics and as a result of anthropogenic or human-induced hazards. Natural hazards include those events that have their origins in either geophysical or climatic occurrences. Volcanoes are often fatal to animals within the immediate eruption zone and contaminate food sources for survivors in surrounding areas. Their effects, however, are geographically limited and felt only locally. Typhoons and their accompanying floods, on the other hand, may be less uniformly lethal but their consequences are felt over a wide region, while the impact of droughts extends across national and even international boundaries. The severe drought that hit Southern Africa in 1992, the worst in living memory was responsible for the death of over a million cattle or 23 per cent of the national herd in Zimbabwe alone. As wells and perennial rivers run dry, smaller livestock such as goats were also severely affected and poultry numbers plummeted from the combined effect of lack of water and the concurrent outbreak of Newcastle's disease (Eldridge 2002). Similarly, the long winter of 1997-1998 in the Tibetan Autonomous Region, the severest in recent history buried grazing lands under a metre of late snowfall and prevented animals from reaching forage. Yaks, sheep, goats and horses started to die with perhaps as many as three million perishing.<sup>2</sup> Areas in the north and west of the region were particularly badly affected with losses in Nagchu Prefecture alone estimated at over a million animals or about 15 per cent of total livestock. Losses in some counties and townships were even higher: about 30 per cent in Nyerong County and as high as 70 per cent in some of its townships (Miller 1998). A better idea of the impact that animal fatalities on this scale can have is seen in East Bengal with the cyclone of 1970. The devastation caused by the massive tidal bore that hit the southern coastal regions of what is now Bangladesh on the night of 12-13 November killed on average about 60 per cent of all draft animals, the Asian water buffalo or carabao (*Bubalus bubalis*) though in some districts (*thanas*) the figure climbed to as high as 80 per cent. Subsequent surveys of land usage showed that the area under cultivation in the cyclone affected districts shrank from 21 to 6.4 per cent, a striking measure of the magnitude of the loss (Sommer and Mosley 1972).

Epizootics, too, should be considered as hazards and are often associated with natural phenomena, especially climatic ones (Heath, Kenyon and Zepeda Sein 1999:258). African Swine Fever (ASF), a contagious usually fatal viral disease spread throughout Haiti and the Dominican Republic in 1978. Once established among a region's tick population (*Ornithodoros spp.*), only animals reared in the controlled environments of capital-intensive production facilities usually survive. The sole practical means known for controlling the disease is to cull the infected population; an earlier outbreak in Cuba had led to the slaughter of 400,000 animals in 1971. Given the difficult political and topographical conditions on Hispaniola, it was decided to eradicate the entire stock and then reintroduce the species. In the process, the entire population of over a million native black pigs first introduced by the Spanish in the early sixteenth century were destroyed and replaced by disease free stock whose suitability to tropical conditions has proven controversial (Council on Hemispheric Affairs 1978, Gaertner 1990). The outbreak of Rift Valley Fever in East Africa in 1997-1998, on the other hand, was closely associated with climatic hazards. Torrential rains associated with

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<sup>2</sup> Some estimates range as high as ten million animals (O'Kane 1998:7).

the El Niño Southern Oscillation led to the worst flooding in the area since 1961 with rainfall 60-100 times the seasonal average. The primary vector and reservoir of the virus are mosquitoes (*Aedes sp.*) that breed in flood-filled natural depressions. While the disease is usually a mild febrile illness in humans only occasionally proving fatal, it is much more lethal in animals. Hundreds of thousands of livestock were affected with owners reporting losses of approximately 70 per cent of sheep and goats and 20-30 per cent of cattle and camels (MMWR 1998).

Animals are also subject to anthropogenic or human-induced hazards as well as natural and epizootic ones including warfare (here regarded as a type of event in its own right) and those caused through technological accidents or pollution. War may be waged by humans upon fellow humans but animals are seen as both legitimate targets whose destruction undermines an enemy's food production and as acceptable collateral damage.<sup>3</sup> Huge numbers of animals die in such conflicts. The cattle population of Afghanistan was reduced from about five million to fewer than four million and from 27 million to 15 million smaller ruminants during the years of endemic warfare after 1988. Reproduction rates fell to such low levels, an average of 0.6 ewes per year for sheep and 37 months calving intervals for cattle that remaining numbers often proved insufficient to rebuild livestock populations (Veterinary Record 2005:626). Many animals simply die inadvertently under wartime conditions through lack of consideration and oversight. Refugees from the present Darfur conflict in the Sudan fled taking their donkeys with them, their most prized possession used for transport, haulage and firewood collection. Emergency personnel's preoccupation with preserving human life meant that no provisions were made for feeding or accommodating livestock. In one refugee camp, over 10,000 donkeys died and only 1,500 beasts remain to cater to a human population of approximately 70,000 people (Veterinary Record 2005:625). Nor are animals unaffected by technogenic disasters. The explosion of a nuclear reactor in the Ukraine at Chernobyl on 26 April 1986, the largest radioactive accident of this kind led to the establishment of a 30-kilometre exclusion zone around the power plant and to the evacuation of at least 35,000 cattle and 9,000 pigs. The ultimate fate of these animals and a further 10,000 domestic dogs is unclear but it is widely believed they were slaughtered (Mycio 2005:23). Similarly many animals were affected by the Union Carbide disaster at Bhopal in India in which 40 metric tons of methyl-isocyanate used in the manufacture of pesticide was released into the atmosphere. Some 4,000 animals died within minutes of the gas's release and another 15,000 suffered from various degrees of morbidity that mainly resulted in death within the following month (Sen and Chander 2003:924).

Just as animals are very much 'victims' of disasters, so, too, they should be the focus of emergency management. Unfortunately, this is not always the case: 'Experience has shown that during disasters, the prime concern of everyone...is to help people; although animals are severely affected, people must take priority' (Sen and Chandler 2003:916). Nevertheless, the same four phases of the emergency management cycle apply as much to animal populations as they do to human ones, namely mitigation, preparedness, response and recovery, though they may manifest themselves in somewhat different ways.<sup>4</sup> Strengthening the existing veterinary services and

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<sup>3</sup> On whether warfare constitutes a disaster, see the discussion in Kenneth Hewitt 'Place Annihilation: Area Bombing and the Fate of Urban Places' (1983).

<sup>4</sup> The following discussion of the emergency management cycle as applied to animals is adapted from 'Emergency Management of Disasters Involving Livestock in Developing Countries' (Heath, Kenyon

ensuring that they are available throughout the national territory is probably the single most effective mitigation measure any country can adopt. A particular feature of this phase is to prevent the spread of trans-boundary diseases both at port of entry and as carried by infected material. Other important animal mitigation schemes include the creation of early warning systems for flood and the establishment of food banks against drought. Preparedness like its human counterpart mainly takes the form of education and the rapid dissemination of information, advising farmers of impending threats and the optimal time and routes to move livestock to safety. In the response phase to disasters, evacuation centres need to provide facilities not only for displaced persons but for their animals as well. These amenities need to be close at hand but separate from their human equivalents with animals receiving vaccination on arrival to minimise the spread of disease. The often large number of dead animals also creates a potential health risk though the threat is frequently overstated as the 'risks to health posed by the living greatly outweigh the risks to health posed by the dead' (Veterinary Record 2005:628). Short or longer-term damage to pasture and spoliation of grazing lands may also require a decrease in stock numbers either through dispersal or downsizing. Recovery programmes often necessitate restocking from sources external to the affected area or even from overseas. In the latter case, care must always be taken to ensure that replacement livestock is adapted to local conditions so that animals do not succumb to endemic diseases, experience low fertility rates, or suffer decline in their productivity rates.

The effectiveness of these measures, however, depends largely on a well developed veterinary service that is adequately supported and regulated by the state even if its practitioners are largely self-employed professionals. In the USA, livestock management in disasters is covered by emergency planning that ranges from the national scale right down to the state and municipal levels.<sup>5</sup> Despite the importance of agro-pastoral activities in most developing countries, however, veterinary services have often seen their budgets slashed as a result of severe financial constraints and what money remains largely absorbed by salaries. Consequently disaster mitigation or preparedness programmes, especially the surveillance and control of disease have been weakened or even discontinued, and access to and familiarity with current diagnostic and monitoring techniques neglected (Heath, Kenyon and Zepeda Sein 1999:264). While large commercial concerns can afford access to veterinary services, the vast majority of livestock raisers are small-scale and are unable to avail themselves of their services. Just how important this latter sector is in developing countries is illustrated by the case of India where 70 per cent of all livestock is owned by small and marginal farmers or landless people. Moreover, the small-scale sector contributes significantly to gross domestic product accounting for 62 per cent of all milk production and 70 per cent of all poultry (Sen and Chander 2003:916). The emergency management of animals is as much a reflection of intra- and international realities as any other aspect of the global political economy.

While the phases of the emergency management cycle may be the same for both animals and humans, the disparity in the power relationship between the two

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and Zepeda Sein 1999:263-267). For a fuller discussion, see Sebastian Heath *Animal Management in Disasters* (1999).

<sup>5</sup> For information on resource links for disaster and emergency management plans for animals in the USA, see the appendix of the leaflet published by the American Association of Equine Practitioners, *Emergency and Disaster Preparedness Guidelines* (AAEP 2003:9).

significantly affects disaster outcomes. Of course, both humans affect animals and animals affect humans but the effects can be very disproportionate and merit further consideration in relation to all aspects of disaster management. A good example of the imbalance in this relationship is the rabies epidemic that broke out on the eastern Indonesian island of Flores between 1998 and 2003. Rabies can be fatal to both humans and animals and is thought to have been introduced into the island by dogs accompanying fishermen from Sulawesi in 1997. Shortly after, the first human cases of rabies were diagnosed and resulted in a total of 113 fatalities among a population of 1.6 million over the next five years. As there was no contingency plan for managing the epidemic and insufficient vaccine to immunise the canine population, the authorities decided on a mass cull of dogs commencing with the slaughter of over 50,000 animals in the district where the disease first appeared but ultimately leading to the death of approximately 48 per cent of the island's estimated 800,000 dogs (Windiyansih et al. 2004). The loss of so many dogs as a health precaution or the eradication of an entire breed of pig as an economic measure in the earlier cited example on Hispaniola gives some idea about the relative value placed on human over animal lives in disaster situations.

### **Social vulnerability of animals**

Far from the "accepted wisdom" on the subject that sees them as an undifferentiated mass upon which different types of disasters impact with similar socio-economic consequences (Sen and Chander 2003:926), different animals are affected in different ways and respond differently under different conditions. This exposure can just as well be described in terms of vulnerability as any pertaining to human populations. The concept of vulnerability assesses exposure to hazards in terms of what renders communities unsafe, a condition that depends primarily on a society's social order and the relative position of advantage or disadvantage that a particular group occupies within it (Hewitt 1997:141). Vulnerable populations are those at risk not simply because they are exposed to hazard but as a result of a particular form of marginality that is usually determined as far as people are concerned by a combination of variables such as class, gender, age, ethnicity and disability (Wisner 1993:131-133 and Watts 1993:118-120). The emphasis is on historical process, that combination of factors that come together at a particular time and place to expose some individuals, groups, communities or societies to the effects of hazard. This notion has previously been applied only to humans but it is just as applicable to animals though the nature of their exposure may vary, particularly in respect to the nature of their relationship with human society. So increasingly instrumental has human-induced considerations become in determining the level of risk that an animal's vulnerability in the first instance is largely a measure of whether it is considered domesticated, 'caged' or wild.

Domestication increases an animal's vulnerability to all types of hazard. Of course this statement requires qualification as the relationship is far from simple. The process of domestication is usually viewed more from an anthropocentric perspective as conferring, on the one hand, great benefits through increased speed, strength, utility and productivity balanced, on the other hand, by increased morbidity through the mutation across species of a new set of contagious diseases such as smallpox, measles and influenza incubated among livestock, pets and poultry. Viewed from the animal standpoint, however, domestication entails among many other both positive and negative factors concentration in large numbers often in hazardous locations. Patterns

of human settlement tend to unduly reflect soil conditions that favour agro-pastoral activities but such areas are also disproportionately found on floodplains or close to active volcanoes. Moreover, the nature of animal rearing involves congregating animals together in large numbers and/or in close proximity to other animals under conditions that facilitate the spread of disease and their mutation across species.<sup>6</sup> That is to say, domesticated animals are rendered more vulnerable to hazards through their association with humans than are their feral or wild counterparts.

This vulnerability extends to all forms of agro-pastoral activities from commercial ranching to nomadic herding and transhumance. It is often composed of a complex array of interrelating factors that show how the construction of vulnerability is often a multi-layered process. In the case of sheep rearing in southern Chile, the fertile volcanic soils around Mt Hudson make for good pasturage and the cold climatic conditions favour animal rearing rather than agriculture. The 1991 eruption occurred during a particularly severe winter with especially cold temperatures and unusually deep snowfalls. Moreover, a depressed world wool market meant that stock numbers were higher than normal and more sheep were left to forage on land that had already been systematically overgrazed during preceding droughts. Many of these animals were already malnourished and under stress from a mixture of human and climatic conditions before the new hazard occurred. The blanket of ash that subsequently covered already limited food sources proved too much for many weakened sheep that succumbed and died in their thousands from starvation or toxæmia (Rubin et al. 1994:400).<sup>7</sup>

At the other end of domestication, so to speak, animals kept by nomadic or semi-nomadic pastoralist or those who practise transhumance are also vulnerable but in different ways and from different causes. Herd size and diversity have as much to do with cultural variables as they have to do with agro-climatic conditions or the carrying capacity of the land. The vulnerability of domesticated animals in parts of India or in the rangelands of East Africa are a reflection of the high endemic levels of environmental, economic and political risks that their owners are exposed to in terms of climatic instability, destructive livestock diseases, poor infrastructure, unreliable markets and even widespread insecurity and conflict. The recent growth in the number of smaller ruminants such as sheep and goats in India is both a consequence as well as a cause of soil erosion. In the absence of proper incentives or support mechanisms, pastoralists decide to hedge their risks by increasing the number of livestock rather than attempting to improve their productivity, a classic sort of ‘tragedy of the commons’ that has serious import on animal nutrition and therefore their vulnerability to drought and disease among other hazards (Gupta 1992).<sup>8</sup> Pastoralists’ preference for herd diversification as a means of both minimising risk and accumulating capital testifies to the variety of animal species’ responses to hazard (Little et al. 2001:405). In East Africa, herders rear two or more animals to mitigate

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<sup>6</sup> On the transmission of diseases between humans and animals, see: Lise Wilkinson *Animals and Disease* (1992); and Joanna Swabe *Animals, Disease and Human Society* (1999).

<sup>7</sup> Toxaemia is a condition produced by the presence of bacterial toxins in the blood, usually with tissue or organ damage, fever, and severe intestinal upset.

<sup>8</sup> The ‘tragedy of the commons’ involves the overuse of common-pool resource to which a large number of people have access. If all users restrain themselves, then the resource can be sustained. If you limit your use of the resource but your neighbour does not, then the resource will collapse. The ‘tragedy’ occurs because it is personally more advantageous to share in the declining sustainability of the common resource than not to benefit from it at all (Hardin 1968).

the impact of droughts and increase the chances of their own and their herd's survival. Along with cattle, a prestige item and symbol of prosperity, camels, sheep and goat are also raised, the latter two often seen as 'small change' to be capitalised on for ready cash in times of personal or environmental travail (Hogg 1980:305, Sen and Chander 2003:924).

As has long been recognised among farmers and herder, different animals are vulnerable to different hazards in quite different ways. Some domesticates, in fact, might be more at risk than others. A historical study of flooding in the Philippines suggests that smaller animals were more vulnerable under such circumstances than larger ones, that more sheep, pigs and poultry perished than did carabaos, cattle and horses. Where greater detail is available, the data only reinforces the notion that smaller, younger and perhaps feeding mothers were particularly at risk (Bankoff 2005). Not only are animals differently vulnerable but they cope with disasters differently: they have different levels of resilience. The Murchison earthquake of 1929 was one of the largest seismic shocks to hit New Zealand during the twentieth century measuring 7.8 on the Richter scale. It struck a largely agricultural area at the northern tip of the South Island between the city of Nelson and the Tasman Sea laying waste to the small settlement of Murchison but causing relatively little loss of human life (17 dead) due to the low population density. So violent was the uplift near the quake's epicentre that the region's topography was substantially altered, prompting large numbers of livestock to seek safety in the hills. While the cows soon returned to the valley pastures below and were easily rounded up again, pigs proved quite another matter. Once freed from their pens, they remained in the high country, turned feral and took to 'raiding' farm areas, rooting up pastures and taking their toll of young lambs (Grayland 1957:123).

The 'caged' or second set of animals that collectively constitute a discrete group whose vulnerability profile shares certain common characteristics are defined by their closer proximity to human society either as domestic pets, laboratory specimens or zoo animals. They are 'caged' in that their freedom of movement is severely limited, their intake of food carefully monitored, and their daily routines highly regulated.<sup>9</sup> In many respects, their lives are so closely enmeshed with that of humans that they suffer the same exposure to risk as their human owners, testers or keepers. Of all animals, their vulnerability is exacerbated the most by their closer association and involvement in human lives.

Pets constitute the largest sector of this categorisation though the whole notion of animal companions is a contested one more specific to western countries. The distinction between pets and livestock is not always clear in the developing world where even dogs are raised to be eaten, as sentinels and for trade as much as for companionship (Windiyarningsih et al. 2004:1390). The question of pets is predominantly one that concerns the western world; even in Japan few animals are kept in this capacity. Recent evidence suggests that the rise in pet populations in western countries is now even outstripping human growth rates. The number of companion cats and dogs in the USA rose from 98 million in 1980 to 130 million in 2004 and the population of dogs, cats, birds, small animals, reptiles and fish is now larger than that of people (Hall et al. 2004:368). The specific vulnerability of pets is

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<sup>9</sup> I am aware of some of the obvious anomalies in this categorisation that should include at one extreme battery-reared farm animals and perhaps exclude, at the other, the domestic cat.

largely a measure of their closer association to humans and particularly of their dependency on them for care, food and shelter. These are instincts and skills that may have largely atrophied in 'captivity' and so expose them to greater risks of predation, starvation or to the effects of inclement weather if suddenly withdrawn. On the other hand, there are strong emotional bonds between animals and humans. Pet owners may fail to evacuate an area when required to if they are prohibited from taking their animals with them and consider it justified risking danger to themselves and to others to effect their rescue (Lockwood 1997, Heath et al. 2001:659).<sup>10</sup> However, a distinction between different species' vulnerability is still manifest even here with studies showing that more dogs are likely to be the objects of rescue than cats (Heath, Voeks and Glickman 2000).

Laboratory animals pose another unique set of factors that increase their vulnerability in disaster situations, a situation that is already perilous from the usages to which they are put in scientific experiments and in product testing. Laboratory animals include a variety of species ranging from mice and small rodents to large primates and ruminants though over 90 per cent fall within the first two categories. Many are also 'immunocompromised', that is they require special environmental conditions to survive. Most are unaccustomed to local climatic conditions and neither know how to forage or seek shelter. Some may have been used for infectious disease or toxicological studies that may include zoonotics against which they have been immunised but which pose a health risk to other animals and to humans. Just how many animals are included in this category is hard to estimate but there are nearly 2,000 facilities engaged in biological research involving animals in the USA alone with a combined budget of over US\$10 billion (Heath 2000). The extent to which such animals are rendered vulnerable is illustrated by the fate of the 78 nonhuman primates, 35 dogs, 300 rabbits and many rodents who drowned when tropical Storm Allison inundated their basement vivaria at Houston's Health Science Center in June 2001 or the fire that swept through the Swine Research Center at the University of Wisconsin incinerating 700 pigs used in studies of organ transplants, nutrition and bone development in December 1995 (NY Times 26 December 1995, Goodwin 2003). In both instances, the selection, confinement and location of animals for human purposes increased their exposure to hazard.

Zoo animals are subject to much the same hazards as are laboratory ones though the range of species affected is more extensive. Many animals may be rare or endangered ones such as the fire that destroyed the World of Primates exhibit at Philadelphia Zoo on Christmas Day 1995. In all, six lowland gorillas, a family of orangutans, four white-handed gibbons and 10 lemurs perished as the facility was not required to be fitted with smoke detection equipment as 'the building only housed animals' (Sudyam 2002:19). Hurricane Andrew that hit then Florida coast in August 1992 virtually demolished Miami's Metrozoo, releasing thousands of exotic animals including more than 2,000 primates into the city streets (Keller 1992, Dickstein 2004). An additional peril often awaits zoo animals in times of war. They may be abandoned to die of hunger and thirst, be bombed or shelled whether inadvertently or not, and may even become a supplemental food supply in times of duress. Perhaps the most notorious incident of the latter kind took place during the Prussian siege of Paris in 1871 when the animals in the zoo were added to the city's diet, including the institution's two

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<sup>10</sup> The strong attachment of livestock owners to certain of their animals should not be underestimated and can often resemble that of pet owners (Hall et al. 2004:370).

elephants, Castor and Pollux. Only the lions, tigers and monkeys were spared; the big cats as they were too dangerous to approach and the primates because of ‘some vague Darwinian notion that they were relatives of the people of Paris and eating them would be tantamount to cannibalism’ (Kranzberg 1950:63).<sup>11</sup> Nor should this additional threat be relegated to the realms of historical curiosity: Kuwait City’s zoo animals experienced a similar fate during the Iraqi invasion of 1991. About 70 per cent of the animals were eaten by starving soldiers, especially the antelope and deer leaving only 28 out of an original 440 exhibits alive (NY Times 3 March 1991).<sup>12</sup>

Furthest removed from human society but in many ways no less influenced by it, the vulnerability of wild animals is as much a matter of shrinking habitats as it is a question of hazards. For some very rare animals, in fact, a hazard now represents an absolute disaster, precipitating species extinction. There is a public perception fed by the media that wild animals as part of nature have innate survival skills that allow them to cope with disasters. Even when they are clearly imperilled by hazards, they are seen as subject to the immutable laws of natural selection that allow only for the survival of the fittest (Dickstein 2004). (The hype about the Indian Ocean Tsunami is one such case in point.) In fact, hazards can be just as devastating for wild animals as they are for humans, disorientating animals, displacing them from their homes and forcing them to find new sources of food and shelter.

The dramatic decline in the extent of the world’s tropical forests is paralleled by a drastic loss in bio-diversity. Already, it is estimated that two-thirds of wildlife habitats and 70 per cent of major vegetation types have been lost in South and Southeast Asia, a region that includes two of the world’s 12 ‘mega-diverse’ countries (Indonesia and Malaysia) and the second largest rain forest system (GEO 2000:2, Biodiversity). In Southeast Asia, comparative research on the extensive forest fires connected with three major ENSO events in 1972, 1982-83 and 1997-98 suggest that *biodiversity hotspots*, rain forests that because of their relative ecological stability support an especially rich number of species and endemics are now at risk. Previously burnt forests are more sensitised to future fires and so progressively extend the range of their impact and by spreading to previously unburned forest are now encroaching upon those areas that support the highest levels of biological diversity and uniqueness (Taylor et al. 1999:1172). The Sundarbans of West Bengal, on the other hand, are not so much threatened by fire as by water. Floods associated with tropical cyclones and storm surges inundate this unique estuarine forest ecosystem that also happens to be one of the few surviving habitats of the Indian tiger (*Panthera tigris tigris*), an endangered species with an estimated population of less than 6,000 worldwide (GOI 2001).<sup>13</sup> Wildlife is also under threat from traditional hunting practices that have become unsustainable in the region’s remaining forests and that often intensify as a consequence of hazards such as fire (Peres, Barlow and Hugaasen 2003). In many tropical areas, animal populations show a consistent decline in density as species are locally extirpated or reduced to insignificant

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<sup>11</sup> A plaque commemorating how the zoo animals ‘serve as food for the Parisians’ still hangs at the entrance to the Jardin des Plantes, a phraseology that Rebecca Spang argues invokes ‘a sense of self-sacrifice’ and ‘an image of the zoo animals actively engaged in the war effort’ (Spang 1992:768).

<sup>12</sup> These events became the subject of a film directed by Ralph Ziman called *The Zookeeper* (2001) though the story is transposed to a fictionalised Balkan state.

<sup>13</sup> The Sundarbans tiger, though an Indian or Bengal tiger exhibits unique behavioural characteristics, living in a tidal swamp, having no fear of water and regularly feeding of human flesh. They are protected by the 2585 sq. km. Sundarbans Tiger Reserve established in 1973 (GOI 2001).

numbers, so creating the phenomenon described as the ‘empty forest’ (Redford 1992). Not, of course, that wildlife is only at risk in tropical areas. In North America, Stephan Dickstein describes the sight of squirrels going into a form of feeding frenzy in which they are so desperate for food they refuse to retreat from people, of racoons blown out of chimneys by hurricane winds, of other animals stranded by flood or attempting to outrun fire, or wandering in suburban neighbourhoods looking for a new homes (Dickstein 2004).

Surprisingly, often more is known about the behaviour of certain wild animals in times of duress than about domestic animals. These ethological studies clearly show that animals are both affected by hazards in different ways and also manifest a diverse repertoire of coping strategies to deal with them. Long-term demographic studies reveal the effects that hazards can have on primate numbers. A severe two-year drought caused a 40 per cent population decline among ring-tailed lemurs (*Lemur catta*) in southwestern Madagascar but the mortality was far higher among lactating females, infants and juveniles than among males (Gould, Sussman and Sauther 1999:73-76). Other studies show that older animals are also particularly susceptible (Dittus 1988:1641). Moreover, populations already under environmental stress appear to be more vulnerable to subsequent or recurrent hazards (Gould, Sussman and Sauther 1999:77). Another study of long-tailed macaques (*Macaca fascicularis*) affected by drought and fire in the rainforests of eastern Borneo showed that animals clearly adapt their behaviour and diet to new conditions. In this instance, the macaques were recorded eating more insects and seeds to take advantage of available food sources, foraging less extensively and spending more time resting to conserve energy, and splitting into dispersed subgroups to alleviate population density (Berenstein 1986:258-261). In fact, the fragmentation of social cohesion under such circumstances seems to be a marked feature of many primate species as the costs of food competition markedly increases and has much in common with the greater human tendency to migrate following a disaster (Dittus 1988:1640).

As the discussion in this entire section has been at pains to point out; animals are vulnerable to different hazards in different ways, depending on a whole series of factors than include species, habitat, circumstances, sex, age, and ‘profession’ among others.<sup>14</sup> If the variegated way in which all animals are exposed to risk is not more widely appreciated, this is more the result of hitherto limited interest rather than any real research outcome. The notion that the socio-economic impact of disasters is the same regardless of hazard type probably has its roots in the idea still prevalent in emergency management that animals are simply property. Not only do domesticated and wild animals exhibit very different social vulnerabilities but they also manifest resilience in all manner of different ways, some of which have long been known to herders and farmers in developing countries or have been more recently ‘discovered’ by scientists in developed ones. And there is always the animal-human relationship to consider that is so particularly evident among the second or ‘caged’ group of animals. On the one hand, this latter group comprise the most cherished and loved of all animals, companions for whose sake many humans consider it perfectly justified to risk their own or others’ lives and that frequently becomes an issue of hostility between a public who considers them as ‘family’ and emergency personnel who largely see them as ‘property’ (Heath, Voeks and Glickman 2000:375). On the other

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<sup>14</sup> I am using the word ‘profession’ here to include not only an animal’s role among its peers (ie lactating mother) but also the purposes it may be put to by humans.

hand, the vulnerability of laboratory and zoo animals most closely resembles that of people institutionalised for one reason or another in hospitals, asylums and prisons whose freedom of movement is severely curtailed and whose risks are thus compounded. As a group, however, 'caged' animals graphically illustrate the complexity that the animal-human relationship always presents in determining animal vulnerability.

### **Animals and the globalisation of disasters**

Hazards and the habitats in which animals live, however, are changing and changing faster than they have done in millennia. The nature of disasters is also changing; they are becoming more globalised. The globalisation of disasters takes various forms. In one sense, it is about hazards on a truly planetary scale such as the effects of climate change. It is also about hazards that may manifest themselves far from their source of origin as is often the case with pollutants that are released into air and water. And it can also be the product of worldwide socio-economic forces that are transforming the fabric of societies through alterations in the means of production.

Climate change as a result of human activities is raising average temperatures and altering weather patterns. As such it will have an increasing effect on animal populations, contributing to the spread of some and to the decrease and even extinction of many more. Some species, of course, may benefit from different climatic conditions to expand their geographical distribution to previously unsuitable habitats. The grey-headed flying fox (*Pteropus poliocephalus*) has 'colonised' large open spaces of metropolitan Melbourne due to a mixture of warmer temperatures and higher precipitation from artificial watering of parks and gardens (Parris and Hazell 2005). Many other animal populations, however, are put at risk by the increasing number of epiphenomenal or secondary hazards associated with climate change such as the increasing intensity of tropical cyclones spawned by rising sea-surface temperatures or the greater number of forest fires. Over the last 20 years, the combined effect of El-Niño induced droughts and land-use changes have dramatically increased the number of fires in tropical forests with detrimental effects on canopy dwellers and primates (Barlow and Peres 2004: 375). In some cases, the combination of climate change and fire can lead to the loss of entire ecosystems such as is presently occurring in the high-altitude forests of Mt. Kilimanjaro in Kenya (Hemp 2005). Climate change is already blamed for the loss of at least one species of frog in Costa Rica and studies estimate that the rate of extinction from such causes may reach to between 18 and 35 per cent by 2050 (Pounds, J., M. Fogden and J. Campbell 1999, Thomas et al. 2004). Though there is considerable dispute as to the long-term effect of temperature and precipitation variations, it is generally considered that such changes will only further exacerbate the already dramatic decline in species diversity (Cockrem 2005:494).

While climate modification constitutes a hazard in itself, it is also a factor in the spread of disease. In years of increased rainfall, there are often more reports of infectious diseases such as Rift Valley Fever in Africa or Foot and Mouth Disease in South America or of vector-borne diseases such as Venezuelan Equine Encephalomyelitis (Heath, Kenyon and Zepeda Sein 1999:263).<sup>15</sup> Changes in human activity, too, associated with animal husbandry or the close relationship with

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<sup>15</sup> Venezuelan Equine Encephalomyelitis is a mosquito-borne viral disease of all equine species that causes death or progressive central nervous system disorders.

companion animals has led to the further dissemination of ectoparasites and parasitic zoonoses (Colebrook and Wall 2004, Macpherson 2005). Rene Dubos argued that the global relationship between humanity and infectious agents was so complex as to require consideration of everything 'that makes up an organism's internal environment and all the living and inanimate things with which it comes into contact', what he called the *total environment concept* (Dubos 1959). Responsibility for disease causation is a result of both behavioural and environmental changes caused by human agency that leads to the emergence of new viruses and that favours their rapid dissemination (Morse 1992:389-409). The outbreak of a highly pathogenic avian influenza virus (H5N1) among poultry in Southeast Asia in 2004 is subsequently spreading to Europe and Africa carried along migratory routes by wild birds. Attempts to confine the disease have led to the mass culling of poultry in areas adjacent to its occurrence: nine million in mainland China and as many as 30 million in Thailand. In the latter country, the disease spread to tigers in a provincial zoo who had been fed with infected chickens and led to 45 deaths out of a population of over a hundred animals (OIE 2004).

These hazards can be considered global both in their extent and their scope though their effects vary from location to location and according to circumstances. But the processes of globalisation are insidious, having their causation in one place but manifesting themselves somewhere else. Pollutants particularly fit this group of hazards, released into mediums like water or air that carry them far from their point source. Fresh water bodies are polluted with salts of heavy metals, oil products, chlorinated hydrocarbons and other toxic agents. Acid rain falls over Scandinavia, the United Kingdom, the Baltic States and Russia. Increasing numbers of fish in rivers and lakes are exposed to doses of chemical that, at the very least, affect their size and ability to reproduce or, in the last resort, are fatal. Two types of these technogenic disasters can be identified based on their impact upon ecosystems: disasters that disturb the biota only to a threshold where recovery is still possible; and those that lead to irreversible changes and an ultimately fatal impact upon animals populations (Shilova and Shatunovskii 2005:27). Often, however, such disasters can have long-term effects on animal populations that are not readily apparent. Sea otter populations (*Enhydra lutris*) were thought to have recovered rapidly from the *Exxon Valdez* oil spill in Alaska when a tanker ran aground spilling an estimated 42 million litres of crude oil into Prince William Sound in 1989. Despite an apparent recovery of numbers after the initial fatalities, evidence suggests that continuous sub-lethal exposure to oil still present in the ecosystem affects reproduction rates and that the area acts more as a 'sink' that attracts otters from surrounding areas rather than one that supports a sustainable population (Monson et al. 2000). On the other hand, the Chernobyl disaster has had very unforeseen consequences on animal populations. An accident caused when a nuclear power plant in the Ukraine released at least seven tons of radioactive material into the surrounding environment and carried it as far a-field as Ireland led to the establishment of a 30 kilometre exclusion zone around the crippled plant and the evacuation of virtually the entire human population. Although animals in the area are highly radioactive, their numbers have proliferated with many rare or endangered species returning to what has effectively become a wildlife or 'nuclear' sanctuary (Mycio 2005:67-126). The aftermath of Chernobyl illustrates the complexity that always surrounds hazard and the often inadvertent effects of disaster as much as for animals as for humans. There are 'animal winners' as well as 'animal losers'.

The worldwide socio-economic forces that are transforming the very fabric of societies through alterations in the means of production comprise yet a third way in which the forces of globalisation are engaged in changing the nature of disasters and how they affect animals. Frequently, many of these events would not even be considered 'hazards' as such but through altering the background circumstances, they exacerbate or even create vulnerability and so increase risk. The intensification of commercial farming and the breeding of large numbers of animals in highly regulated environments where nutrition, temperature and ventilation are all automated have their parallel in the increasing concentration of human populations in fast expanding urban milieus. In 1999, Hurricane Floyd a powerful category four storm wreaked havoc on animal populations confined in purpose-built structures housing stock in their thousands. As many as 28,000 hogs, two million chickens, 750,000 turkeys and 700 cattle were killed, while floodwaters inundated 46 waste lagoons in North Carolina's eastern coastal plain, threatening drinking water and aquatic ecosystems. As small farms have been increasingly replaced by large industrialised animal factories over the last fifty years, the exposure of intensively confined animals is rendered much greater to hazards such as collapsing structures, the breakdown of automated systems, dehydration and even starvation (HSUS 2005). Such concentrations of animals are also the 'breeding ground' of diseases, no more so than in aquaculture where poor or ineffective bio-security measures, interaction between cultured and wild populations, slow awareness of emerging pathogens and climate change create optimal conditions for the spread of viruses, bacteria, fungi and parasites (Bondad-Reantaso et al 2005). Moreover, animal husbandry is also a significant factor in climate change, contributing between 20 and 35 per cent of total global greenhouse gases, especially methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) from excreta and the straw or litter used in their bedding (Monteny, Bannink and Chadwick 2006:163).

What are referred to here rather broadly as the forces of globalisation signify on one level an intensification of the association between human societies and the environment, creating more complex relationships and exposure to risk. Anthony Oliver-Smith talks about a sense of 'mutuality' that exists between nature and culture and how disasters are uniquely situated in both the material and social worlds as well as in some hybrid space created by their intersection. Any understanding of disasters, he argues, must be grounded in a theoretical approach that is 'capable of encompassing the web of relations that link society (the organization and relations among individual groups), environment (the network of linkages with the physical world in which people and groups are both constituting and constituted), and culture (the values, norms, beliefs, attitudes, knowledge that pertain to the organization and those relations)' (Oliver-Smith 1998:186). As the relationship between the human and physical world changes, so, inevitably, does the nature of vulnerability alter and the forms that disasters take vary. And just as human exposure is changing, so, too, is that of animals. Many of the risks that human societies are subject to are offset at least to some extent by advances in science, technology and procedure. However, it is not always apparent that the same factors are at work with animals that are still principally regarded as property.

### **Fair Game?**

Are animals simply ‘fair game’ when it comes to hazards, largely expendable property to be replaced as appropriate? They certainly suffer and die in huge numbers regardless of whether their fate is made a matter of media attention or even statistical notation. Animals are exposed to a wide range of hazards ranging from the natural, to the epizootic to the anthropogenic and, as such, are just as much the ‘victims’ of these events as are people. In some respects, their exposure to risk is even many times greater: Humans do not consider it inappropriate to control a disaster or prevent one from happening by culling animals in their thousands or hundreds of thousands – perhaps, even eradicating an entire ‘breed’.

Animals are not only exposed to hazards, an obvious if sometimes neglected point but different animals are affected in different ways under different conditions. Trying to understand how animals are vulnerable necessitates ceasing to think of them as an undifferentiated mass and beginning to consider them from a perspective that takes account of species, habitat, circumstances, sex, age and ‘profession’ amongst other variables. Any attempt to categorise animals, however, necessarily involves defining them according to their relationship with humans. The significance of that relationship is immediately apparent in the categories used here to define domesticated, ‘caged’ or wild. But animals do not only exhibit quite distinct vulnerabilities to hazard but as sentient creatures they also display varying degrees of resilience when confronted by them. If they are property, then they are at least ‘conscious’ if not ‘thinking’ property. These are qualities that need to be recognised; think of the pigs in the Murchison! Only when they are confined, do they forfeit these attributes as do many ‘at risk’ or ‘special needs’ groups within human societies. Given the intimacy of the animal-human relationship, it is only to be expected that the nature of their vulnerabilities are also becoming more complex. Anthropogenic-inspired changes associated with climate change, the spread of trans-boundary diseases, widespread habitat threat from pollution and contamination, and the intensification of agro-pastoral industries further expose animals to threats of an altogether different magnitude.

There are other issues raised in this paper that remain unanswered in so preliminary an overview. Foremost is the need to examine the differences between animals and disasters in the developed and developing world. Is there a North-South divide among animal populations and how does that affect their levels of vulnerability? Circumstantial evidence indicates that there are differences with animals in the developing world more at risk from slow onset disasters such as drought and epizootics but that those in the developed world more exposed to technogenic ones associated with pollutants and industrial farming. Exactly how this exposure parallels that between human societies requires further elaboration. There are also definitional ambiguities to consider. Concepts like ‘pet’ evidently have specific cultural roots but other classifications may be subject to similar contestation. One only has to think of the Nuer’s relationship to cattle as evoked in the introductory quote to this paper to ponder on where the limits between livestock, pet and indeed ‘family’ really lie in some cultures (Evans-Pritchard 1940:16-50).

Animal programmes began to gain acceptance as an integral part of emergency procedures in some states of the USA following the carnage associated with Hurricane Andrew in 1992 but still remain a neglected aspect of disaster

management plans almost everywhere. As animals are very much a part of disasters, so they need to become a part of emergency management. In the developing world, this requires greater recognition that effective disaster management programmes ensure that people's livelihoods as well as their lives are saved and that this means extending emergency services to include livestock. In the developed world, it involves a better understanding of the degree of emotional dependence on animal companions and the level of losses involved in industrial farming to convince emergency planners that animals are not only 'family' business as well as 'big' business but are 'their' business too.

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