Routledge Handbook of Animal Welfare

Edited by Andrew Knight, Clive Phillips
and Paula Sparks

25

ANIMAL DISASTER MANAGEMENT

Steve Glassey

Introduction

The Australian Black Summer fires of 2019–2020 that decimated over three billion animals (World Wildlife Fund, 2020) served as a harsh reminder of hazards we humans choose to create. Disasters are not natural, nor are they an event. They are a process manufactured and implemented by people and their choices (Kelman, 2020, p. 15). Definitions of what constitutes a "disaster" also tend to be anthropomorphic and fail to recognise animals in their terminology, often relegating such sentient beings as environmental impacts or property loss. Humans are increasingly becoming more at risk from natural hazards such as floods, storms, drought, and fires, and this increase is strongly correlated with urbanisation, population growth, and climate change (Haddow et al., 2017). Animals, however, are becoming more vulnerable to these hazards, also through farming intensification, loss of natural habitat, and failing animal-health infrastructure – again all caused by human action. It is only humans – albeit with varying degrees of influence, power, and resources – who can mitigate these risks. This power imbalance places a moral obligation on humans to act to protect animals from the effects of disaster that they have created.

Though sometimes used interchangeably by lay persons, emergencies and disasters are distinctly different. An emergency is an event that threatens life or property, whereas a disaster is an emergency that is beyond existing capacities and requires outside assistance. To avoid confusion with veterinary emergency medicine, animal disaster management is more easily understood when engaging a wide range of audiences from veterinarians to disaster managers. The goal of animal disaster management is to create animal-inclusive resilient communities.

Why animals matter in disasters

The earliest example of the protection of animals from disaster can be found in the biblical story of Noah's Flood, where Noah and his family were spared by God from a cataclysmic flood after being directed to build an Ark to house themselves and two of every kind of animal (New International Version 2011, Genesis 7). Though science and religion may not agree on the existence of such an Ark, the cultural significance of non-human species being pivotal to the existence of human life within religious texts should not be disregarded.

It is estimated that more than 40 million animals are affected by disasters annually, with this number increasing in the Anthropocene (Sawyer and Huertas, 2018, p. 2). However, the genesis of animal disaster management in modern times is largely due to the lessons and reforms following Hurricane Katrina. In August 2005, Hurricane Katrina struck the Gulf Coast of the United States of America. In its wake, it left US$110 billion in damage and 1,836 people dead, making it the third-deadliest disaster in US history. This disaster also highlighted the importance of companion animal emergency management, with over 50,000 pets being left behind during the evacuation of New Orleans, and 80–90% of these pets perishing. What was anticipated to be over within a few days turned into a catastrophe and triggered the largest animal rescue operation in US history – an operation that rescued approximately 15,000 pets, supported by some 5,000 volunteers. Prior to 2005, it was Federal Emergency Management Agency (FEMA) policy that pets should be left behind during evacuations. This has now been completely changed with the introduction of the Pets Evacuation & Transportation Standards (PETS) Act. The single most compelling fact for public safety officials to learn from Hurricane Katrina was that approximately 44% of the people who did not evacuate stayed, at least in part, because they did not want to leave their pets behind (Fritz Institute 2006). Indeed, Heath and Linnabary reinforce this finding saying that:

> There is no other factor contributing as much to human evacuation failure in disasters that is under the control of emergency management when a threat is imminent as pet ownership. Emergency managers can take advantage of the bond people have with their animals to instill appropriate behavior amongst pet owners in disasters.
>
> *(2015)*

The human–animal bond has been the primary focus of animal disaster management, often using the well-documented phenomena of humans placing themselves at risk for animals, as a means to tackle animal welfare concerns through a paradigm of "saving animal lives, saves human lives". And this is particularly true of companion and service animals that have benefited the most in terms of regulatory changes to protect them from disaster impacts, despite them being the least vulnerable, given that human guardianship affords them protection. It is the animals that do not have, or have little to no, human–animal bonds, such as wild animals and those exploited for consumption, that are afforded the least levels of protection, making them significantly more vulnerable to the impacts of disaster. Society as a whole generally ranks animals through a sociozoologic system, which classifies animals in a structure of meaning that allows them to define, reinforce, and justify their interactions with other beings (Irvine, 2009, p. 7). This construct of a sociozoological scale gives further weight to the understanding that disasters are not natural; they are manifested by humans, determining which animal species are less important than others, thus making some animals more vulnerable than others. Humans are largely responsible for making animals vulnerable to disaster, but unlike humans, animals often do not have a choice in the construction or exposure of their aggravated vulnerabilities. This vulnerability can be exacerbated by weak animal–health infrastructure which is regarded as a root cause in companion animal disasters (Heath and Linnabary, 2015), along with myriad other complex *wicked problems* within a public policy and planning context (Glassey, 2020a). Even the legal status of animals can contribute to increasing their vulnerability to the effects of disaster. Treated as property, animals are made "legally inferior to people" and therefore "usually afforded low priority in emergency response initiatives" (Best, 2021). The reality of animal disaster laws is that they seldom have little to do with sentience or the welfare of animals; the drivers for such laws are more focused on protecting people through improving human evacuation compliance

and preventing humans from returning into hazardous disaster zones to save animals, especially companion animals.

Given the impact on human and environmental well-being arising from animals being affected by disasters and emergencies, the outdated reference to "animal welfare emergency management" by some governments in their emergency planning fails to recognise these relationships and is counter-productive to making animals as a priority in disaster risk reduction, within a One Health or One Welfare environment.

Phases of disaster management

Within the profession of emergency management (also known as disaster management), a life-cycle approach is taken to mitigate hazards, prepare for the impacts of residual risks (the remaining risk after mitigation controls have been applied), respond to disasters to protect life and property, and support affected communities to recover. These are typically known as the four phases of comprehensive disaster management (Haddow, 2011, p. 9), though some countries such as New Zealand refer to these phases as Reduction, Readiness, Response, and Recovery respectively (Glassey and Thompson, 2020).

Prevention phase

Within the context of animal disaster management, the prevention phase includes elimination of the risk or reducing it to an acceptable level, such as banning intensive farming or at least reducing the associated risks, such as not building animal housing facilities on flood plains. Other mitigatory measures include seismic bracing of animal caging systems in regions prone to earthquakes (such as New Zealand), and the installation of fire suppression systems and availability of water for firefighting, to name just a few. However, there is often a residual risk despite these treatments being applied, and therefore preparing for the eventuality of the hazard is required.

Prevention activities can extend to the passage of laws to better afford protection to animals to avoid them being exposed to disaster hazards in the first place. In Texas, under Section 821.077 of the Health and Safety Code, it is illegal to restrain a dog outside and unattended during extreme weather or when such associated weather warnings have been issued (State of Texas 2007). Though companion animals are less vulnerable than captive production animals, dogs and cats often receive higher levels of legal protection. Again, this illustrates that animals are likely ranked by their attachment with humans, rather than their raw vulnerability alone. Intensively farmed animals such as pigs and chickens are extremely vulnerable to the impacts of disaster. Often these facilities are built on remote and hazard-prone land, which makes the land less expensive and which is therefore perceived to be more profitable to operate a business on. Local ordinances could be used to prevent the building or operation of intensive farms in flood plains, largely eliminating the flood risk to these animals. In 1999, Hurricane Floyd devastated parts of North Carolina. Approximately 2.8 million poultry, 30,500 hogs, 2,000 cattle, and 250 horses drowned during this disaster (Green 2019, p. 2).

In the 2020 Canterbury earthquake, over 20,000 chickens died or were destroyed as their caging systems collapsed (Glassey and Wilson 2011). The installation of seismic bracing for caging would likely have prevented many of their deaths.

Laboratory animals are seldom considered in disaster management and there is limited research in this area. These animals are always confined to cages, often fully dependent on automated feed, watering, and environmental control for their survival, and when these systems fail, their welfare is compromised severely. In 2006, a generator failed at the University of Ohio, and

when electricity was restored it triggered the heating system and the temperature reached 105°F (40.5°C). Nearly 700 animals died (Irvine, 2009, p. 85). Though some producers may perceive mitigation measures such as automatic fire suppression, backup ventilation systems and seismic bracing to be expensive, disaster risk reduction makes economic sense. According to the United Nations, every dollar invested in risk reduction and prevention can save up to 15 dollars in post-disaster recovery (United Nations Office for Disaster Risk Reduction 2020a).

Zoos and aquaria also have been impacted by disaster and are often overlooked, with emergency planning requirements generally focused on loss of containment of dangerous animals and protecting the public, rather than the large-scale negative animal welfare impacts on their captive animals that disasters that can have. In 2002, the Prague Zoo was flooded leading to over 150 animals being killed (Irvine 2009, p. 124), and in the Afghanistan post-war period of 2001, the animals at the Kabul Zoo were left without sufficient care and attention, leaving many to perish from starvation and the following harsh winter conditions (Sawyer and Huertas, 2018, p. 51).

As US and coalition troops withdrew from Afghanistan in August 2021, Kabul, including its municipal zoo, fell under the control of the Taliban. The Asia for Animals coalition (AFA) reported that no animals had been harmed and that the Taliban was ensuring the zoo continued to operate as normal (AFA 2021). It is unclear if the continued protection of these zoo animals was a conscious decision of the Taliban, whether it be as a lesson from the 2001 post-war period, or even part of their *hearts and minds* campaign to purport a new, changed, and more humane style of governance. The plight of animals during the US withdrawal indeed captured the world's attention and caused outcry when it was alleged American forces had left behind their military service dogs, which was later found to be incorrect. The animals photographed in airline crates at the Hamid Karzai International Airport were in fact dogs from the Kabul Small Animal Rescue who were hoping to have these animals and their staff evacuated (DefenseOne 2021). Public reaction also successfully pressured the United Kingdom government to allow Pen Farthing, a former British Marine who operated the Nowzad animal sheltering charity in Kabul, to evacuate dozens of dogs and cats to the UK on a privately chartered plane (Washington Post, 2021). Farthing was criticised by government leaders including British Defence Secretary Ben Wallace for supposedly putting the lives of animals ahead of people (Washington Post, 2021).

When the *Aquarium of the Americas* lost backup generator power during Hurricane Katrina, over 10,000 fish suffocated (Irvine 2009, p. 13). Having resilient infrastructure is key to the survival of captive animals dependent on automated environmental, feeding and watering systems. Similarly, in the 2011 Christchurch earthquake, the Southern Experience Aquarium suffered irreparable damage, and despite rescue efforts an undisclosed number of fish were euthanised due to poor water quality and the generator failing (Potts and Gadenne 2014, p. 217).

Animals that are at the whim of humans for their survival are most vulnerable to disaster and those that are live-exported by sea are no different. In 2019, the livestock carrier *Queen Hind* capsized with over 14,000 sheep on board bound for slaughter. The conditions on board prior to the capsize were cramped. Despite the efforts of animal rescue specialists from Four Paws and the Animal Rescue and Care Association (ARCA) of Romania, more than 13,820 sheep drowned or died because of the capsizing. It was later found that the vessel had secret floors that would have contributed to overloading, and that affected the vessel's stability (Zee, 2021). The prohibition of live export would have prevented this human-caused disaster.

Preparedness phase

As part of the PPRR framework, disaster planning within the preparedness phase provides an opportunity to improve response effectiveness to protect life and property, as well as reducing

the impacts on communities under a pre-agreed approach, which aimed at providing role clarity across organisations. Classic scholars such as Auf der Heide (1989) promote a fundamental principle that emergency plans should be based on *likely*, not *correct* behaviours. From a traditional emergency service perspective, it would be seen as *correct* that, when people are told to evacuate and leave their companion animals behind, they would do so compliantly. However, it is more *likely* that the guardians of these animals when faced with evacuation may refuse to evacuate unless they can take their animals, as experienced in Hurricane Katrina (Irvine, 2009) and disasters such as the Fukushima nuclear incident following the 2011 Japanese earthquake and tsunami (Kajiwara, 2020).

Developing animal-inclusive emergency plans helps to clarify the roles and responsibilities of parties during a disaster. So as not to create dependency and complicate evacuation logistics, it is critical that the guardians of animals take responsibility for their welfare. This responsibility is often enshrined in law, and as disasters are not natural, the obligations on such guardians are not necessarily eroded. In some countries or states, there are additional legal responsibilities for ensuring the safety of animals exposed to foreseen extremes of weather (Glassey, 2018; 2019; 2020b).

Though there are many different models, the Emergency Management Accreditation Program (EMAP) standard is one that is flexible to apply to animal disaster planning at all levels (national, state, local). Using the EMAP standard (2019) as a benchmark, emergency management plans should include the following considerations:

- Program Management, Administration and Finance, and Laws and Authorities;
- Hazard Identification, Risk Assessment, and Consequence Analysis;
- Hazard Mitigation;
- Prevention;
- Operational Planning and Procedures;
- Incident Management;
- Resource Management, Mutual Aid, and Logistics;
- Communications and Warning;
- Facilities;
- Training;
- Exercises, Evaluations, and Corrective Action;
- Emergency Public Education and Information.

In addition to the core standards above, animal-specific considerations should include:

- Lessons from previous emergencies;
- Euthanasia and depopulation;
- Carcass disposal;
- Humane trapping in evacuated areas;
- Feeding in place protocols;
- Veterinary considerations (i.e. zoonotic disease management);
- Disposal of unclaimed displaced animals (such as adoption);
- Animal search, rescue, evacuation, sheltering, body recovery, and decontamination.

Though this chapter does not focus on animal disease management, planning considerations from the Good Emergency Management Practice (GEMP) manual published by the Food and Agriculture Organization of the United Nations (FAO) has useful advice, including the advo-

cating that animal–related disaster plans be part of national disaster management arrangements and be able to access related government funding (2011, p. 18). Where countries such as the United States have passed the PETS Act that secures federal funding for companion and service animal emergency management activities, despite reports presented to Parliament, the New Zealand government has continued to exclude animal disaster management from its national disaster response and recovery funding arrangements (Glassey, 2019).

The value in the planning phases is often not the end document, but more so the process that should engage stakeholders to develop a common appreciation of the hazards, and of how a coordinated response should be conducted. Where plans are developed in isolation they typically end up as a *box ticking* exercise, also known as suffering from the "paper plan syndrome" (Auf der Heide, 1989).

Animal disaster management planning approaches are still generally in their infancy, given that in most part until the passage of the US PETS Act in 2006, there were few regulatory drivers for such planning around the world. Much of the planning efforts have focused around adopting human-centric approaches, which makes sense for reasons of compatibility, efficiencies, and giving legitimacy to efforts. However, such adopted planning models were developed and refined for a single species – humans, without due regard to the other species. There are approximately 7,700,000 species of animals on earth (Mora et al., 2011) and this variety of non-human species creates extra challenges for animal disaster planners, who often must develop plans that can accommodate end users (being animals), from a few grams to hundreds of kilograms, that are uncommunicative and likely to hide, escape, or attack. It would appear that helping humans in disasters is easier in comparison.

In 2014, the National Planning Principles for Animals in Disasters (NPPAD) was released by the National Advisory Committee for Animals in Emergencies and endorsed by the Australia-New Zealand Emergency Management Committee (Trigg et al., 2021). The NPPAD provided 8 principles for the planning process and 16 further principles to be included in actual plans. In 2020, it was found that in Australia there was moderate awareness of the principles across stakeholders, and low to moderate implementation of the principles (Trigg et al., 2021). These principles – though developed primarily in Australia – are generally applicable to most other countries and may be of benefit to the planning process.

The preparedness phase could include creating and testing emergency plans for animal housing facilities, public education campaigns around animal disaster preparedness, training animals to be familiar with evacuation processes and transport, carrying out microchipping campaigns, subscription to early warning systems for floods, fires, and the like, and training for animal disaster responders in incident command, wildland fire, and flood safety. This ensures that when the disaster occurs, the response to protect life and property can be at its most effective, which may include pet-friendly evacuation centres, emergency animal fostering, veterinary disaster care, and rescues of animals.

Education, training, and exercising are also critical to the preparedness phase. The range of animal disaster management courses and education programmes is slowly increasing. Information sharing and networking continue to help advance this emerging professional discipline and forums such as the National Alliance for State and Agricultural Emergency Programs (NASAAEP) (Green, 2019, p. 3) and the Global Animal Disaster Management Conference (GADMC) have made significant contributions to promoting animal–inclusive resilient communities.

Complimentary to the range of existing planning approaches, Vieira and Anthony (2021) developed six ethically responsible animal caretaking aims for consideration when developing disaster management plans and policies in the Anthropocene. They include (1) saving lives

and mitigating harm; (2) protecting animal welfare and respecting animals' experiences; (3) observing, recognising, and promoting distributive justice; (4) advancing public involvement; (5) empowering care givers, guardians, owners, and community members; (6) bolstering public health and veterinary community professionalism, including engagement in multidisciplinary teams and applied scientific developments. Armed with the Australian NPPAD, the EMAP standard and the six ethically responsible caretaking aims, animal disaster planners now have tools to create effective plans.

Response phase

Although the response phase is often the most publicised, it is often the most short-lived. The window of time to rescue animals before they die of injuries, disease, thirst, or hunger is often small and requires immediate intervention. In agriculture, it is argued that insuring animals may lead to negative animal welfare outcomes, as often the trigger for payment is the death of such animals (Sawyer and Huertas, 2018). It then becomes financially attractive for the guardians of livestock to allow them to perish. However, restocking of herds following disasters has frequently been found to be ineffective, leading to longer-term economic harm to farmers, and there is a driver to encourage early intervention to protect surviving stock as a better alternative (Sawyer and Huertas 2018).

An example of this ineffective restocking occurred in Myanmar in 2008, following Cyclone Nargis, where areas suffered large losses of working buffalo that were critical to harvesting rice. Without these animals the flood-contaminated lands could not be rendered productive, and so new working buffalo were introduced. However, this restocking programme failed to properly address animal-health considerations and led to the introduction of new diseases and further mortality of such stock (Sawyer and Huertas, 2018). "Poor support for these animals, often worked harder in the aftermath of a disaster, or poorly planned restocking programmes can make a bad situation worse very rapidly" (Sawyer and Huertas, 2018, p. 7). Since the early 2000s humanitarian aid and veterinary professionals started to critically reflect whether their interventions to protect livestock following disasters were effective. This led the Food Aid Organization of the United Nations (FAO) and other organisations to develop and publish the Livestock Emergency Guideline and Standards (LEGS 2017). The LEGS manual provides general information and technical standards to improve the quality and livelihoods impact of livestock-related projects in humanitarian situations (LEGS 2014). However, LEGS focuses on assisting communities in less developed countries and does not provide standards for disaster interventions involving other non-livestock animals such as companion animals.

Where animal rescues are carried out there is often a disconnect between animal interest groups undertaking this function and the human-centric rescue authorities. Often these "animal rescuers" are spontaneous groups without authority, training or equipment and this *delegitimisation of animal rescue* particularly hinders those specialist animal disaster rescue teams who attempt to seek a legitimate and integrated animal-human disaster response (Glassey 2021).

The delegitimisation of animal rescue is defined as the:

> Sub-optimal response by animal interest groups who respond to assist animals in emergencies or disasters in an unsafe or illegal manner, which consequently makes it more difficult for bona-fide emergency animal rescue groups to be accepted and used by authorities and the community in future interventions.

> *(Glassey 2021)*

Aside from potentially putting human lives at risk, delegitimisation has negative effects for animal welfare through eroding trust between the animal response community and emergency service organisations. Ultimately, this loss of trust and confidence may lead to animal protection in disasters being considered a hindrance rather than an opportunity to improve human and animal safety. Studies have shown that humans do place themselves at risk for the needs of animals, such as breaching cordons to attend to their animals or failing to evacuate if they are unable to take their animals (Heath, 1999; Heath et al., 2001; Heath and Linnabary, 2015; Irvine, 2009; Glassey, 2010; Potts and Gadenne, 2014; Taylor et al., 2015).

During the bushfires in Australia in the summer of 2019 and 2020, the loss of three billion animals gained global attention, as well as responses from domestic and international animal interest groups. Such groups formally or informally identify as "animal rescue"; however, in the disaster response context, this is confusing and misleading to emergency service organisations. These groups use the term "animal rescue" whereas it might be more appropriate if "animal care", "welfare", or "rehoming" were used. The use of "animal rescue" undermines the credibility of emergency services organisations that rescue animals, and some may regard the term "rescue" as an embellishment of capability.

Unfortunately, the lack of animal-inclusive emergency management planning results in animal interest groups responding to disasters without appropriate authority, training, or equipment, as observed in by Glassey and Anderson (2019) in the Nelson, New Zealand fires of 2019. Even animal interest groups that have a focus on animal disaster response have been found wanting, such as during the summer bushfires where promotional videos showed personnel working with flames and smoke around them, and also without basic protective equipment (Glassey 2021). The wearing of flame-retardant apparel, safety boots, helmets, goggles, and gloves is a rudimentary requirement for working on firegrounds, as – even days and weeks after the fire has gone through – vegetation and underground fires are common, and create a risk for personnel to step or fall into. The risk of branches and trees falling during and after fires remains substantial and requires helmets to be worn. The use of videos or pictures showing animal interest groups not adhering to basic safety requirements delegitimises animal rescue and reduces the level of confidence and trust of emergency services organisations (Glassey, 2021).

The disconnect is compounded with animal groups setting their own standards for training, often not recognised by public safety agencies. In urban search and rescue operations, internationally accepted search markings placed on collapsed or damaged structures (such as following an earthquake) fail to incorporate animal rescue, leading to confusion when animal rescue groups place their own markings (Glassey and Thompson 2020).

Another aspect of delegitimsation of animal rescue occurs when animal interest groups respond to an emergency and claim pre-existing animal welfare issues as being caused by, or related to, the event. This could include taking footage of stray animals in a damaged city and suggesting the animal was in need of rescue, when it was, at that time and prior to the disaster, a stray animal; or showing dogs without kennels or being chained up following floods, when the dogs were in these conditions prior to the flood. Such flooding may have exposed these vulnerabilities, but may not have been the cause of such animal welfare concerns. It is argued that prevention is better than post-event response, and animal interest groups wanting to reduce animal vulnerability to disasters could focus efforts on mitigation and strengthening weak animal-health infrastructure to make a sustainable impact on improving animal welfare (Glassey, 2021).

Where animals are rescued from a disaster-affected area, if a guardian is not located, affected animals are often put into temporary accommodation. Disasters by definition exceed local capacity, so often day-to-day facilities such as animal boarding facilities, humane shelters, and pounds may be unavailable due to damage or exceeding capacity, not to mention that often

these organisations may also be attending to their own animals and disaster responsibilities. Where possible, existing facilities and service providers should be used as they generally offer higher levels of animal welfare to that of temporary shelters, and their use also stimulates economic recovery. Much has changed in the past decade, with the United States leading many new approaches to emergency companion animal sheltering. Traditional Animal-Only Shelters (AOS) are those where the care of the animals falls to the sheltering team. Animal-Only Shelters can be appropriate in some situations, but they are generally not sustainable when a large number of carers is required, making this approach difficult to scale up for any wide-area disaster. It has also been found that these shelters are 25 times more expensive to operate than Co-Habitation Shelters (CHS) and five times more expensive than Co-Located Shelters (CLS) (Strain 2018). As animals are separated from their guardians in Animal-Only Shelters, this can increase stress in the animal, which can heighten the risk of disease. Where companion animals are co-located, evacuees are accommodated in a building nearby to where the animals are housed, allowing guardians to maintain care and responsibility for their pets. This provides routine and sense of purpose and increases the guardian–animal interaction time. The other option – which is just gaining traction in the US – is co-habitation, where humans and their companion animals are housed as a single-family unit. This often leads to reduced stress in both the animal and the human, as pets often provide a familiar psychosocial coping mechanism and animals are typically more settled and quieter. The lack of providing suitable, pet-friendly sheltering leads not only to poor animal welfare outcomes, but also can compromise human safety – especially for those with strong attachments to their animals. This was the case following the 2011 Japanese earthquake, tsunami, and nuclear disaster, where lonely elderly people were left with no option but to sleep in their cars near evacuation centres that did not permit animals, only to be socially isolated, suffer hypothermia in the winter, and, on one occasion, Deep Vein Thrombosis (DVT) from cramped sleeping and sitting conditions (Kajiwara, 2020, p. 66). Accepting that "Feeding in Place" can also be an alternative to emergency animal sheltering in some circumstances, the bottom line is that Co-Habitated Sheltering is the gold standard (Green, 2019, p. 147).

The lack of pet carriers has been linked as a causal factor in evacuation failure (Heath, 1999, p. 209), particularly for those with multiple small animals. It is now common practice for specialist animal disaster response charities like Animal Evac New Zealand to go into areas likely requiring evacuation or under evacuation notice and distribute pet carriers to improve evacuation compliance. This leads to better human and animal safety outcomes (Glassey and Anderson, 2019).

When confronted with the need to evacuate, some households may even intentionally partially evacuate to leave someone behind to attend to their animals, whilst the remainder leave for safety (Taylor et al., 2015). Where animals have been left behind in an evacuated disaster zone, many often return to rescue or attend to their animals, which may put themselves or public safety responders at risk, as in the 2010 Haiti earthquake (Sawyer and Huertas, 2018, p. 10), Canterbury earthquakes (Potts and Gadenne, 2014), and Edgecumbe flood (Glassey et al., 2020).

It is common for humans to put themselves at risk to protect their animals or act protectively, such as in the case of the Weyauwega train derailment in 1996. Following the derailment of a train carrying large quantities of hazardous materials, the entire Wisconsin township consisting of 1,022 households was hastily evacuated. Within a couple of days, pet owners attempted to breach the cordon to rescue their animals. Frustrated owners on "behalf of the animals" then phoned through a bomb threat to emergency operations centre. This led to significant negative media attention which prompted the state Governor to order the National Guard to enter with armoured vehicles to assist with the rescue of hundreds of pets left behind (Irvine 2009, p. 38).

The loss of companion animals in particular can have devastating mental health impacts. Hunt et al. (2008) found that survivors of Hurricane Katrina were just as likely to suffer post-traumatic impacts from losing their companion animal as they were from losing their home. Disasters can also draw out the worst in humanity and create opportunities to exploit those vulnerable in the community by individuals, such as *disaster paedophiles* who use the state of chaos to traffic unaccompanied minors (Montgomery, 2011). Animals too can be vulnerable from similar abuse as observed in Hurricane Harvey with reports of *disaster rustling* and *disaster hoarding*, the latter involving animal hoarders who used the disaster as an opportunity to restock their hoard (Glassey, 2018).

Recovery phase

Even as the response phase commences, so should the initial planning for the recovery phase. Recovery can be also described as the regeneration of the community, and this phase also needs to include considerations for animals and their welfare. This often can include the supply of animal-friendly rental accommodation, reunification of displaced animals, and restoration of veterinary and animal welfare services. Recovery should *build back better*, and the United Nation's definition, which is human-centric, is defined as:

> The use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment.
>
> *(United Nations Office for Disaster Risk Reduction, 2020b)*

The lack of post-disaster, pet-friendly accommodation has constantly been identified as an issue, from Haiti where, following the 2010 earthquake, internally displaced persons in tented camps were unable to have their companion animals (Sawyer and Huertas, 2018, p. 10), to those who returned to radioactive exclusion zones near Fukushima to secretly attend to their animals, or were sleeping in their vehicles in freezing winter conditions with their animals, as animals were not allowed in temporary mass shelters (Kajiwara 2020). Similarly, in Christchurch following the 2011 Canterbury earthquake, pet-friendly accommodation became very scarce, forcing owners to relinquish their animals, causing much distress for both humans and animals (Potts and Gadenne 2014).

The stressful impacts on people and animals during and following a disaster can be suffered for months. Those people who respond to help disaster-affected animals, from volunteer rescuers to professional veterinarians, are not immune from the impacts of being exposed to the distressing experiences often found in a disaster. In a global study of veterinary disaster responders, it was found that 51% exhibited behavioural health issues during their response and up to 6 months afterwards (Vroegindewey and Kertis 2021). It is important for anyone considering becoming involved in animal disaster response to have access to psychological first aid training and resources.

The recovery phase should also include a process to reflect upon the response, and even on the recovery. Commonly following a response, an After Action Report (AAR) is written following a debrief of organisations involved in the response. The AAR is an important first step in the lessons management process, which aims to improve not only subsequent responses, but enhancements to the wider phases of comprehensive emergency management. Largely, AARs

are not mandatory, nor is the format, content, and dissemination. Though AARs are critical to improving subsequent responses, which should lead to better public safety and animal welfare outcomes, they are seldom shared, often due to fear of deficiencies bringing political embarrassment or reputational harm.

The lessons identified in AARs are unfortunately seldom learned. A study by Glassey et al. (2020) found that only 7% of applicable lessons were learned in the context of animal disaster response arising from the 2017 Edgecumbe Flood, to the 2019 Nelson Fires. The comparative analysis of AARs for both these events found that common problems related to training, capability, law, policy, planning, information management, and incident management, were repeated, and lessons seemingly not learned. The assumption that lessons are learned from previous disasters requires closer examination.

Recommendations

To improve animal welfare in disasters, much work is needed. Firstly, reducing animals' vulnerability to hazards must be made a priority. As part of a comprehensive emergency management approach, frameworks to create animal-inclusive community resilience must include evidence-based laws and policies. Such frameworks need to ensure guardians take primary responsibility for animal welfare in disasters, but must also provide for the monitoring and performance of government and partner organisations who facilitate and coordinate animal disaster management. There is currently no system to compare the effectiveness of animal disaster management frameworks across countries. It is recommended that the Animal Protection Index (World Animal Protection 2020) be revised to include an animal disaster management indicator, or that a global animal disaster management index is developed similarly to the National Capabilities for Animal Response in Emergencies (NCARE) as developed by the American Society for the Prevention of Cruelty to Animals (Spain et al., 2017). Model laws for animal disaster management should also be developed and considered as part of the revised or new indices. Other frameworks such as the Five Domains (Mellor 2017) could benefit from further research with respect to their application to animal disaster management.

There also needs to be more of a concerted effort to mainstream animal disaster management, away from being an "animal issue". The One Health – One Welfare approaches offer opportunities to connect animal and human welfare, and environmental sustainability, all in the context of disaster management and in line with international disaster risk reduction frameworks such as the Sendai Framework (Dalla Villa et al., 2020). Travers et al. (2021) also give recommendations to enhance the linkage between One Health and animal disaster management, including

> five overlapping spheres of action: (i) integrate pets into disaster management practice and policy; (ii) create pet-friendly environments and related policies; (iii) engage community action in disaster management planning; (iv) develop personal skills by engaging owners in capacity building and (v) reorient health and emergency services toward a more-than-human approach.

Maybe the answer is developing a "One Rescue" paradigm that recognises the benefits and opportunities for public safety when animals are integrated into disaster planning by human-centric authorities, such as having fire and rescue services coordinate animal disaster response to ensure an integrated approach, avoiding duplication of effort, and levering capacity from trained and equipped animal disaster responders, effectively acting as force multipliers. This approach positions the protection of animals not as an after-thought in disasters, but a core function that

will lead to better human and animal safety outcomes. This shift also would require those from the "animal" side to step up and gain more credibility within the disaster management profession, through completion of emergency management training, qualifications, and credentials such as the Certified Emergency Manager (CEM®) to supplement animal welfare or veterinary backgrounds. Likewise, those in the human-focused "disaster management side" need to better understand the importance and benefits of including animals in disaster arrangements, through professional development such as World Animal Protection's PrepVet course and FEMA Independent Study courses on companion animal and livestock emergency planning.

Conclusions

Millions of animals are disaster-impacted every year and this will continue to grow as humans make choices that increase the vulnerability of such animals to an expanding range of hazards, exacerbated through climate change, intensification of animal farming, urbanisation, weak animal-health infrastructure, and poor animal disaster management arrangements. As long as society fails to improve the status quo of animal disaster management, not only is animal welfare compromised, but the safety, well-being, and livelihoods of humans are too. To mitigate these impacts, a coordinated effort to better integrate animal and human disaster management systems, along with improved mechanisms for accountability at all levels, is required. Well over eight million species globally are depending on humans to have the moral compass to step up and address these vulnerabilities, and such action cannot come soon enough.

References

Asia for Animals, 2021. Kabul zoo updates. https://www.asiaforanimals.com/kabul-zoo [accessed on 4 September 2021].

Auf der Heide E, 1989. *Disaster Response: Principles of Preparation and Coordination*. St Louis: C.V. Mosby Company. Available from: https://erikaufderheide.academia.edu/research#papers [accessed 12 September 2021].

Best A, 2021. The legal status of animals: A source of their disaster vulnerability. *Australian Journal of Emergency Management*, 36(3), pp. 63–68. DOI: 10.47389/36.3.63.

Dalla Villa P, Watson C, Prasarnphanich O, Huertas G and Dacre I, 2020. Integrating animal welfare into disaster management using an 'all-hazards' approach. *Revue Scientifique et Technique* (International Office of Epizootics), 39(2), pp. 599–613.

DefenseOne, 2021. No US military dogs were left behind in Afghanistan, DOD says. https://www.defenseone.com/threats/2021/08/no-us-military-dogs-were-left-behind-afghanistan-dod-says/184984/ [accessed on 4 September 2021].

Emergency Management Accreditation Program, 2019. The EMAP standard. Available from: https://emap.org/index.php/what-is-emap/the-emergency-management-standard [accessed on 8 August 2021].

Food and Agriculture Organization of the United Nations (FAO), 2011. *Good Emergency Management Practice: The Essentials*. 2nd edn. (Honhold N, Douglas I, Geering W, Shimshoni A & Lubroth J, eds). FAO Animal Production and Health Manual No. 11. Rome, Italy: FAO, 131 pp. Available from: http://www.fao.org/3/a-ba0137e.pdf [accessed on 14 August 2021].

Fritz Institute, 2006. Hurricane Katrina: perceptions of the affected. Available from: http://www.fritzinstitute.org/PDFs/findings/HurricaneKatrina_Perceptions.pdf [accessed 12 September 2021].

Glassey S, 2010. Recommendations to enhance companion animal emergency management in New Zealand. Wellington: Mercalli. Available from: https://animaldisastermanagement.blog/resources/ [accessed 12 September 2021].

Glassey S, 2018. Did Harvey learn from Katrina? Initial observations of the response to companion animals during Hurricane Harvey. *Animals*, 8(47), pp. 1–9. DOI: 10.3390/ani8040047.

Glassey S, 2019. *No Animal Left Behind: A Report on Animal Inclusive Emergency Management Law Reform*. Wellington: Animal Evac New Zealand.

Glassey S, 2020a. Animal welfare and disasters. *Oxford Encyclopedia of Crisis Analysis*, Oxford: Oxford University press. pp. 1–26. DOI: 10.1093/acrefore/9780190228637.013.1528

Glassey S, 2020b. Legal complexities of entry, rescue, seizure and disposal of disaster-affected companion animals in New Zealand. *Animals*, 10(9), pp. 1–12. DOI: 10.3390/ani10091583.

Glassey S, 2021. Do no harm: Challenging conversation about how we prepare and respond to animal disasters. *Australian Journal of Emergency Management*, 36(3), pp. 44–48. Available from: https://knowledge .aidr.org.au/resources/ajem-july-2021-do-no-harm-a-challenging-conversation-about-how-we-pre-pare-and-respond-to-animal-disasters/ [accessed 31 July 2021].

Glassey S and Anderson M, 2019. *Operation Nelson Fires: After Action Report*. Wellington, NZ. Available from: http://www.animalevac.nz/wp-content/uploads/2019/08/Animal-Evac-NZ-AAR-Nelson-Fires -2019-isbn-ready.pdf. [accessed 31 July 2021].

Glassey S and Thompson E, 2020. Disaster search markings need to include animals. *Australian Journal of Emergency Management*, 35(1), pp. 69–74.

Glassey S and Wilson T, 2011. Animal welfare impact following the 4 September 2010 Canterbury (Darfield) earthquake. *Australasian Journal of Disaster and Trauma Studies*, 2011(2), pp. 1–16. Available from: https:// www.massey.ac.nz/~trauma/issues/previous.shtml [accessed 12 September 2021].

Glassey S, Rodrigues Ferrere M, and King M, 2020. Lessons lost: A comparative analysis of animal disaster response in New Zealand. *International Journal of Emergency Management*, 16(3), pp. 231–248. DOI: 10.1504/IJEM.2020.113943.

Green D, 2019. *Animals in Disasters*. 1st edn. Oxford: Butterworth-Heinemann.

Haddow GD, Bullock JA and Coppola DP, 2017. *Introduction to Emergency Management*. 6th edn. Oxford: Butterworth-Heinemann.

Heath SE, 1999. *Animal Management in Disasters*. St. Louis, Missouri: Mosby.

Heath SE, Kass PH, Beck AM and Glickman LT, 2001. Human and Pet-related risk factors for household evacuation failure during a natural disaster, *American Journal of Epidemiology*, 153(7), pp. 659–665.

Heath SE and Linnabary RD, 2015. Challenges of managing animals in disasters in the U.S. *Animals*, 5(2), pp. 173–192. DOI: 10.3390/ani5020173.

Hunt M, Al-Awadi H and Johnson M, 2008. Psychological sequelae of pet loss following Hurricane Katrina. *Anthrozoos*, 21(2), pp. 109–121.

Irvine L, 2009. *Filling the Ark: Animal Welfare in Disasters*. Philadelphia, PA: Temple University Press.

Kajiwara H, 2020. *Surviving with Companion Animals in Japan: Life after a Tsunami and Nuclear Disaster*. Cham, Switzerland: Springer Nature.

Kelman I, 2020. *Disaster by Choice: How Our Actions Turn Natural Hazards into Catastrophes*. Oxon, UK: Oxford University Press.

LEGS, 2014. *Livestock Emergency Guidelines and Standards*. 2nd edn. Rugby, UK: Practical Action Publishing.

LEGS, 2017. About LEGS. Available from: https://www.livestock-emergency.net/about-legs/ [accessed 4 September 2021].

Mellor DJ, 2017. Operational details of the five domains model and its key applications to the assessment and management of animal welfare. *Animals*, 7(8). p. 60. DOI: 10.3390/ani7080060.

Montgomery H, 2011. Rumours of child trafficking after natural disasters. *Journal of Children and Media*, 5(4), pp. 395–410.

Mora C, Tittensor DP, Adl S, Simpson AGB and Worm B, 2011. How many species are there on earth and in the ocean? *PLoS Biology*, 9(8), pp. 1–8.

New International Version, 2011. *Biblegateway.com*. Available from: https://www.biblegateway.com/passage/ ?search=Genesis 7&version=NIV. [accessed 5 August 2021].

Potts A and Gadenne D, 2014. *Animals in Emergencies: Learning from the Christchurch Earthquakes*. Christchurch: Canterbury University Press.

Sawyer J and Huertas G, 2018. *Animal Management and Welfare in Natural Disasters*. 1st edn. New York: Routledge.

Spain CV, Green RC, Davis L, Miller GS and Britt S, 2017. The national capabilities for animal response in emergencies (NCARE) study: An assessment of US States and Counties. *Journal of Homeland Security and Emergency Management*, 14(3). p. 20170014. DOI: 10.1515/jhsem-2017-0014.

State of Texas, 2007. Texas health & safety code. Available from: https://statutes.capitol.texas.gov/docs/hs/ htm/hs.821.htm [accessed 1 September 2021].

Strain M, 2018. Co-habitated human/pet shelter toolkit, 2018. Available from: https://animaldisasterm anagement.files.wordpress.com/2021/09/strain-2018-co-habitated-humanpet-shelter-tookit.pdf [accessed 4 September 2021].

Taylor M, Burns P, Eustace G and Lynch E, 2015. The preparedness and evacuation behaviour of pet own-ers in emergencies and natural disasters. *Australian Journal of Emergency Management*, 30(2), pp. 18–23.

Travers C, Rock M and Degeling C, 2021. Responsibility-sharing for pets in disasters: lessons for one health promotion arising from disaster management challenges. *Health Promotion International*, 2021, pp. 1–12. DOI: 10.1093/heapro/daab078.

Trigg J, Taylor M, Mills J and Pearson B, 2021. Examining national planning principles for animals in Australian disaster response. *Australian Journal of Emergency Management*, 36(3), pp. 49–56. DOI: 10.47389.36.3.49

United Nations Office for Disaster Risk Reduction, 2020a. Funding. Available from: https://www.undrr .org/about-undrr/funding [accessed on 3 February 2021].

United Nations Office for Disaster Risk Reduction, 2020b. Terminology: Build back better. Available from: https://www.undrr.org/terminology/build-back-better [accessed on 3 April 2021].

Vieira ADP and Anthony R, 2021. Reimagining human responsibility towards animals for disaster manage-ment in the Anthropocene. In Bovenkerk B and Keulartz J, eds. *Animals in Our Midst The Challenges of Co-existing with Animals in the Anthropocene*. Cham, Switzerland: Springer Nature, pp. 223–254. Available from: https://link.springer.com/book/10.1007%2F978-3-030-63523-7 [accessed 12 September 2021].

Vroegindewey G and Kertis K, 2021. Veterinary behavioural health issues associated with disaster response. *Australian Journal of Emergency Management*, 36(3), pp. 78–84. DOI: 10.47389.36.3.78.

Washington Post, 2021. A Royal Marine rescued animals from Afghanistan in a mission dubbed 'Operation Ark.' https://www.washingtonpost.com/nation/2021/08/30/pen-farthing-afghanistan-animal-res-cue/ [accessed on 4 September 2021].

World Animal Protection, 2020. Methodology: Animal protection index. Available from: https://api.wor ldanimalprotection.org/methodology [accessed on 4 April 2021].

World Wildlife Fund, 2020. Australia's 2019–2020 Bushfires: The wildlife toll (interim report). Available from: https://www.wwf.org.au/news/news/2020/3-billion-animals-impacted-by-australia-bushfire -crisis#gs.wz3va5 [accessed 15 August 2021].

Zee J, 2021. Animal transport disasters: Queen hind sheep rescue in Romania. In Global Animal Disaster Management Conference. Available from: https://gadmc.org/speakers/profile/?smid=410 [accessed on 15 August 2021].