Throughout history disasters have caused destruction and injury and exacted a heavy toll of death and suffering. In just the past 20 years they have claimed the lives of over 20 million humans worldwide and caused property damage easily exceeding $500 billion. To date, the United States has not experienced a truly massive disaster with tens of thousands of human deaths, but hurricanes, floods, wildfires, and other disasters have killed millions of poultry, swine, and fish and many thousands of research animals in holding facilities. The extent of a disaster’s impact varies according to the amount of warning, institutional and community ability to prepare, animal density, type of housing, availability of trained response personnel, and resources. Regardless of the cause, whether natural or technological, the repercussions of most disasters are often similar (Heath 2000), including impacts from power outages, failure of heating and cooling systems, chemical spills, insufficient personnel, security breaches, and animal escapes. In all cases, the institutional animal care and use committee (IACUC) should never lose sight of maintaining the well-being of the animals.

A disaster plan must involve not only clearly delineated staff responsibilities but also the availability and use of resources and individuals trained, credentialed, and ready to assist. But the individuals involved must first consider their personal welfare and safety, and then attend to the health, safety, and well-being of their family. Only then should they begin to concern themselves with employment responsibilities. Too often heroic action is expected from disaster victims. Undoubtedly each disaster responder will feel an absolute commitment to “save their animals” but if there are deaths in the family, the house has been blown away, or there is no food to feed the children, it is difficult to expect the employee to focus on their occupation until they have addressed personal priorities.

Animal care facilities have done an admirable job of preparing disaster plans, but, as the authors in this issue learned, these plans may not be truly functional during the actual event. In first-hand accounts of their experiences, these contributors describe the existence of a plan and the need for changes to meet specific problems as well as longer-term solutions associated with disaster planning, response, and management. Animal restraint and/or transport, shelter, communication, personnel issues with caretakers and security, and veterinary care are challenges in all disasters, no matter the cause. From these articles the reader can learn about, and hopefully apply lessons from, real-life experiences in individual or institutional animal care planning.

In this essay we discuss veterinary disaster planning with information to broaden the reader’s view of disaster response. Critical to any effective disaster response is the type of support expected and available from ancillary agencies such as police and fire departments, poison control, hazardous material responders, animal control, principal investigators who use animal care facilities for ongoing research, and search and rescue. In addition to these sources of support are important but overlooked and underused resources during disasters—credentialed veterinarians, veterinary technicians, and volunteers from community, state, and federal agencies.

**What Is a Disaster?**

There is no standard definition of “disaster.” Traditionally, the term is used to describe large-scale incidents that overwhelm the resources of an affected community. Because disaster response is multidisciplinary and depends on the integration of multiple levels of responders, the use of more precise definitions is useful. The 1988 Robert T. Stafford Disaster Relief and Emergency Assistance Act (www.fema.gov/about/stafact.shtm) established two incident levels, emergencies and major disasters:

- The Act defines a federally declared emergency as “any occasion or instance for which, in the determination of the President of the United States..., federal assistance is needed to supplement state, tribal, and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.”
A major disaster is “any natural catastrophe (including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood, or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.”

Thus, it seems the distinction between the two is a function of impact on a specific area. More frequently in the United States, the term “emergency” should be used to describe incidents that can be handled with existing community resources. An emergency can quickly overwhelm local resources, although this may be less likely in larger metropolitan areas if there is an organized, rehearsed disaster plan in place to guide the professionals responding to the incident.

The Stafford Act did not adequately recognize 21st century threats and therefore needed to be amended to establish appropriate responses for emerging catastrophic events such as chemical, biological, radiological, and nuclear attacks or accidents. National response structures have evolved and the response plan was improved to meet these threats (see the discussion below under Federal Programs).

However, many factors point toward an increasing probability of mass casualty incidents. Among these factors are the growth of population in flood plains, seismic zones, and ocean or lakeside housing developments; the transport of hazardous materials; the risks of chemical or nuclear facility mishaps; catastrophic fires and explosions; terrorism; and weapons of mass destruction, including animal disease agents used as weapons (Figure 1).

Natural versus Intentional Events

Natural events are usually forecast and provide some degree of warning, so animal caretakers have an opportunity to put their disaster plan into action. Contrast that with intentional (human-generated) events for which there is usually no warning and no time for preparation! Most planners anticipate the unintentional event but give minimal thought to disasters incited through terrorism. But these are the events that will truly test disaster response plans because few institutional personnel and responders have experience in this arena.

A crucial distinction between the impact of “disasters” created by violent animal rights extremists or other terrorist groups and those of natural events (e.g., floods, fires, earthquakes, hurricanes, tornadoes, or blizzards) is the repercussions of the former. When animal rights extremists undertake destructive or violent actions they are usually driven by a rational strategy—specifically, they expect that the action will garner public support for their mission and that it will turn public opinion against their target. A classic example of such an action was the 1984 illegal break-in, coordinated by the Animal Liberation Front (ALF) and People for the Ethical Treatment of Animals (PETA), that resulted in the acquisition of videotapes made by researchers working in a head trauma research laboratory at the University of Pennsylvania. So egregious were the actions depicted in the videos that public attention focused on the research and lack of control over research activities and institutions rather than the illegal actions by which the evidence was acquired.

Mitigation Measures for Intentional Events

Encouraging Transparency

The best way for a research facility to prevent illegal actions aimed at winning public support for those who oppose animal research is by allowing public access. But such transparency is not as common as it should be. Even though IACUC meeting minutes are, in principle, available to the public under freedom of information laws, too many institutions redact them so heavily as to conceal the substantive deliberations that may have occurred. Such redacting creates doubts in the public mind rather than assuaging concerns. After all, IACUCs are intended in part to reflect and express public concern about research. One academic dean said it very well: “if we feel that that we must hide what we do in research, we should probably not be doing it.”

In our view, scientists must not hide the work they do with public research money, particularly in public institutions. What people imagine is happening to the animals is often far worse than what is actually happening. At Colorado State University (CSU), animal advocates have served on the IACUC from the moment it was created and have been invaluable in reassuring their constituencies about what goes on in the university’s labs. On numerous occasions, university personnel have given tours of animal facilities to animal advocates.
welfare people. The response has been uniformly positive—in one case, a group donated $1,000 to buy toys for the research dogs.

In sum, animal care and use committees must work diligently to assure the public of the institution’s commitment to both proper treatment of research animals and openness to public concerns. Such a strategy can prevent support for strategically planned extremist actions.

If, however, extremists are unconcerned about public support, they become the conceptual equivalent of an unpredictable natural disaster, and the advice in the article by Bailey and colleagues (2010) is as good as can be tendered. Animal care and use committees should avoid the two extremes of paranoia and secrecy on the one hand, which can serve to invite the unwanted behavior, and dismissal of or inattention to threats on the other.

**Appointing an Ombudsman**

Another innovation that has worked for CSU is the appointment of an ombudsman for animal concerns and other biomedical research issues. The ombudsman is independent of any bureaucracy, is pledged to protect people who raise complaints, and gets more expressed concerns from students, technicians, and other vulnerable people than does the entire regulatory system. This arrangement not only benefits the animals but also allows for the resolution of problems through informal conversation with researchers rather than cranking up the ever-increasing bureaucratic machinery of regulation. Researchers generally much prefer this informal process to paper trails and endless meetings. The ombudsman works closely with the IACUC, reports to it on all activities, and can help create a collegial mechanism for problem solving.

**Promoting a Real Sense of Community among Researchers**

Smith (2010) provides a valuable reminder for animal care and use committees—the importance of building a genuine community of researchers at an institution. Notwithstanding ubiquitous references to a “scientific community,” very often researchers are lone wolves, working on their own problems within their immediate circle of associates. As Smith clearly points out, the careers of people whose research depends on the health of their animals may be placed in jeopardy by only one irresponsible investigator. Smith’s institution benefited from the presence of strong and decisive administrators willing to spend the requisite amount of money. Unfortunately, this is not always the case, particularly during financially bad times.

It is necessary to build a sense of mutual responsibility among researchers, which can serve the institution well not only during infectious disease outbreaks but in any disaster. The key question is how to effect this sense of responsibility. Very little literature exists on that question, but the IACUC can be instrumental in creating such a culture by operating not as police but as colleagues helping colleagues. A policing approach is the kiss of death for an academic society with a sense of mutual interdependence and of shared responsibility for each other’s well-being.

In addition, committees and research staff should bear in mind that animal care technicians often bond strongly with the animals in their care and should be valued employees in a research facility. If such people become embittered or angry in the wake of a disaster, they may well fall under the influence of violent extremists. It is worth recalling that the majority of break-ins are inside jobs.

**Effective Preparation for a Disaster**

The effects of any disaster, whether man-made or natural, can be minimized and/or avoided through the establishment and implementation of appropriate preventive and mitigation measures, and indeed the *Guide for the Care and Use of Laboratory Animals* (NRC 1996) recommends a disaster preparedness plan. But no plan can be effective without the support of personnel training and management, so frequent training of all personnel involved is essential. In addition, as the articles in this issue show, the plan usually requires changes to meet the specific problems of an actual disaster.

In June 2007, the Biological Safety Level 4 (BSL-4) Laboratory in the Centers for Disease Control and Prevention (CDC) in Atlanta was struck by lightning. Such labs are considered highly secure environments for the most dangerous and lethal pathogens. But with one flash Georgia Power (supplying primary power) and the CDC backup generators were knocked out, shutting down the biocontainment laboratory’s negative air pressure system, a design feature meant to prevent the escape of airborne microorganisms into the environment. Fortunately, the CDC BSL-4 facility was not operational at the time. If it had been, what, if any, plans were in effect to minimize a widespread event? Swearengen and colleagues (2010) describe their own experiences with biocontainment facilities at the University of Texas Medical Branch in the wake of a devastating storm.

Does your disaster plan provide for impacts beyond your doors—loss of public utilities (e.g., power, water), limited communication capacity, and impassable roads? Although your plan states that you will work with institutional and even community emergency operations, have you actually worked with these people other than to show them how to get into and out of your facility? As seen in Figure 2, there is far more to a disaster plan than evacuation routes! In the section below on Disaster Response Resources we discuss local, state, and federal resources to consider in preparing for and responding to a disaster.

**Care of Laboratory and Other Animals**

The first priority of disaster relief is to protect and save human life. But when urban populations are struck by a disaster,
many of the victims are animal owners (according to a 2007 survey by the American Veterinary Medical Association [www.avma.org], 59.5% of US households have pets). With widespread emphasis on the human-animal bond and the annual expenditure of billions of dollars at over 2,000 animal facilities involved with research, disaster agencies are now called upon to deal with more complicated animal-related issues. In 2006, Congress passed the Pets Evacuation and Transportation Standards (PETS) Act to increase preparedness and response to animals caught in disasters; it amends the Stafford Act to ensure that state and local emergency preparedness operational plans address the needs of individuals with household pets and service animals after a major disaster or emergency.

For research animals caught in disasters, clearly the emphasis is on saving both animal lives and ongoing research. However, there may be only a short window of time (12-48 hours) for rescuing research animals (Heath 2000), a task that frequently conflicts with personal needs and obligations for the laboratory and animal care staff. Unfortunately, there are no specific federal directives to deal with research animals affected by a disaster—the principal investigator is merely asked to update funding agencies about the number of animal losses and clarify new research timelines!

Personal versus Professional Responsibilities

In a major disaster, personnel tasked with animal care have their own lives disrupted and it is difficult to expect them to leave aside their personal catastrophe in order to attend to their occupational tasks. Their priorities are their personal safety, then the safety of their family, and finally the safety of animals. Even if their dedication to their job is great, turning to their task is often hampered by (1) increased levels of security during disaster response, (2) the fact that local first responders are responsible for the first 72 hours of a major disaster, and (3) inadequate preparation as “practice drills” are rare because they are disruptive and expensive.

Furthermore, most fire fighters and police—the official first responders—have minimal or no experience in animal handling or restraint; to expect them to capture and restrain a large research animal is expecting far more than their experience and training have afforded. Therefore, as Goodwin and Donaho (2010) advise, it is critical to identify “essential personnel” before a disaster and give them first responder access to buildings or facilities that house animals. This list of personnel must be kept up to date and frequently communicated to local emergency operations centers.

Disaster Response Resources in the United States

The existence of county and community preparedness plans greatly increases the self-reliance and effectiveness of assistance, contributing to a decrease of disaster-related mortality and morbidity. Community or county sources are termed community animal response teams (CARTs); at the state level are state animal response teams (SARTs), veterinary medical response corps (VMRCs), or veterinary medical assistance teams (VMATs); and there are federally deployed national veterinary response teams (NVRTs) (Figure 3).

The first order of business for local agencies is to conduct vulnerability studies of each community or county, mapping specific locations of potential disasters and pinpointing potential associated risks; thus, each community or county knows the location of all animals that may be in harm’s way. An inventory of existing resources to facilitate rapid mobilization during the emergency follows; it should include an up-to-date list of all trucks, trailers, and boats available to evacuate large animals, kennels, shelters, research animal holding facilities, and fairgrounds that house animals.

Community Programs

CART is one of the more common designations for local animal emergency planning, preparedness, and response networks. In some communities, the CART program is a network of agencies and nongovernmental organizations with volunteer participation routed through existing community organizations. Other communities, particularly ones with fewer volunteer organizations, may establish a program in which volunteers are affiliated directly with local government. While the exact format and nomenclature vary greatly, local disaster response programs share the following basic goals (Dennison 2009a):

- Create a unified network of community animal response resources in a system connected to local emergency
management, to develop and execute the community animal emergency plan.

- Help communicate lead and supporting roles for various mission tasks to the network of stakeholders. This is particularly important since there is often high turnover in personnel in government and nongovernmental organizations, private-sector businesses, and community volunteers.
- Actively promote and create opportunities for volunteer involvement and provide a mechanism (e.g., insurance) to address volunteer liability and accident issues.
- Facilitate training and exercises.
- Support community preparedness outreach.
- Maintain standards and credentialing for local disaster response teams.

The community emergency manager is responsible for overall development of the local emergency operations plan, and works with local agencies and organizations in the community animal and agricultural sector, who do most of the planning for their specific area of expertise. The group that drafts the community animal emergency plan should include the community or county emergency manager and a handful of local animal or agricultural experts who get the first draft ready for discussion by a broader group of agencies, organizations, and individuals. Based on input from the stakeholders, the group develops further draft versions until the plan is ready for final approval by elected officials.

**State Programs**

Once an event overwhelms local resources, the local emergency operations center notifies the state emergency operations center and requests assistance (deployment of state resources requires such a request). Each state develops mechanisms for addressing both animal and agricultural emergency management issues according to its statutes regulating these areas. In addition, each state has differing strengths and challenges, risks, and resources, and a unique political environment. Thus states address these issues through a variety of programs and nomenclatures, typically including two mechanisms specifically for animal issues in disasters:

- State agencies (e.g., a department of agriculture, state veterinarian, or state emergency management agency) address these issues through their statutory authorities and partnerships with nongovernmental entities.
- State programs may supplement state agencies by helping to coordinate state-level stakeholders, building partnerships between the state and the private sector, supporting local animal or agricultural emergency response
capacity, developing private-sector funding resources, and facilitating the use and credentialing of volunteers, including animal professionals.

Groups in the second category are generally referred to by the acronym SART, which can mean a state animal response team, state agricultural response team, or state animal resource team, depending on the state involved. In addition, some states have adapted the term—the State of Maine Animal Response Team (SMART) and Mississippi Animal Response Team (MART)—or use an altogether different nomenclature for programs with similar functions—the California Animal Response Emergency System (CARES) and Utah Emergency Animal Response Coalition (UEARC). We use the term SART for all state programs in this category.

States have different interpretations of the role of their VMRC programs. VMRCs may fulfill some of the roles of a typical SART program (e.g., in Wyoming and Oklahoma) or exist in addition to it (e.g., in Colorado, North Carolina, Florida). In some states the VMRC is a unit of the Medical Reserve Corps (human) program (e.g., Colorado, Minnesota, Oklahoma), and in others it is a program of the chief animal health official (e.g., North Dakota, South Dakota, Montana, Idaho, North Carolina, Arizona). Some VMRCs focus on animal disease response and others have a broader mission, including all-hazards emergency response. In all cases, VMRCs provide a mechanism to mobilize trained and credentialed veterinary professionals from the private sector to support the state’s emergency needs. Currently there are over 20 state VMRC programs (Dennison 2009b).

Animal health emergencies, such as disease outbreaks, are managed primarily under the statutory authority of the state’s chief animal health official and the US Department of Agriculture. The role of SART or VMRC programs varies widely for these types of incidents, but their tasks might include the following (Dennison 2009b):

- Help to engage local and state stakeholders in raising awareness of animal health threats and to promote local and state mitigation and preparedness efforts.
- Promote awareness of animal health emergencies in basic training for individual volunteers.
- Include biosecurity information in outreach materials on animal and agricultural preparedness.
- Identify and train individuals and teams that can assist in mission tasks related to an animal health emergency response. Some states have invested substantial efforts in training private-sector veterinary medical professionals to respond under the chief animal health official during an animal disease emergency.
- Help to identify and develop auxiliary mission capabilities that might include mental health support, care for animals isolated on farms or animal facilities due to quarantine restrictions, public information and outreach, community surveillance, logistical support (e.g., provision of food and water, transportation, medications, and specialized equipment), and many more.

### Federal Programs

The federal government maintains a wide array of capabilities and resources that can assist state governments in responding to incidents. In addition to the provisions of the Stafford Act, the National Response Framework (NRF) defines how the nation responds to emergencies and disasters (www.fema.gov/emergency/nrf/). Based on best practices and stakeholder input, the NRF presents guiding principles that enable all response partners to prepare for and provide a unified national response to disasters and emergencies, from the smallest incident to the largest catastrophe.

Emergency planning is a national priority that is the subject of the National Preparedness Guidelines (www.fema.gov/pdf/government/npg.pdf), which comprise four critical elements:

1. the National Preparedness Vision, which provides a concise statement of the core preparedness goal for the nation;
2. National Planning Scenarios, planning tools that depict a full range from terrorist attacks to natural disasters and that form a basis for coordinated planning, training, and exercising;
3. the Universal Task List, which provides a menu of unique tasks linked to prevention, protection, response, and recovery strategies and identifies critical tasks that require the development of response capabilities; and
4. the Target Capabilities List, which defines specific response capabilities for all levels of government.

In addition to these elements, the Guidelines incorporate key guidance documents such as the National Incident Management System (www.fema.gov/emergency/nims/), the National Infrastructure Protection Plan (www.dhs.gov/nipp), and other national continuity policies and directives.

These national plans are continuously evolving to anticipate events and actions, maximize opportunities, and guide response operations. That is why plans are best described as “living” documents. Planning is the cornerstone of all preparedness. The NRF provides a foundation for unified planning for all response partners.

### Conclusions

There seems to be generally good participation in disaster planning and preparedness. Yet certain common problems persist—animal restraint, transport, and shelter; communication failures; personnel issues with caretakers and security; and veterinary care. As many of the authors in this issue stress, an element that is frequently overlooked is the training of individuals to respond to the plan. Training is paramount for effective response and must not be limited to “yearly” exercises. Changes in personnel, policies, procedures, and threats emphasize the need for more proactive scheduled training.
Furthermore, it is difficult to expect human victims of a disaster to be the only, or even primary, help following a disaster. Disaster planning requires an awareness of the availability of trained, credentialed responders in the community; these organized professionals and volunteers are a tremendous asset, but they can help only if they are included in disaster planning, training, and response.

Finally, in the United States, if community or county response teams are overwhelmed, state and federal teams are available for deployment. If you are a victim in a disaster, know that you are not alone and that there are trained, credentialed individuals available to help.

References and Suggested Reading


