



Costa Rican
Experience

Risk Management and Animal Care in Disasters

*Increasing the Resilience
of the Livestock Sector*

Alejandra Díaz, Sacha Trelles and Juan Carlos Murillo



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Inter-American Institute for Cooperation on Agriculture (IICA), 2016



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Foreword

Costa Rica's Ministry of Agriculture and Livestock, through the National Animal Health Service (SENASA, Spanish acronym), has achieved important improvements in animal health, animal welfare and public health, tackling diverse challenges to the livestock sector in sustainability and climate change, emergency or disaster response, food security, productivity and competitiveness. Achieving objectives of this nature calls for concerted efforts by national public and private institutions, as well as the support of international agencies.

Given its location in Central America, Costa Rica is highly vulnerable to disasters. These tend to be felt more forcefully in rural areas, and cause considerable damage and loss to farming and livestock production systems. The January 2009 earthquake that decimated the town of Cinchona, in the province of Alajuela, caused fatalities and left communities devastated in its wake. Losses in the agricultural sector totaled USD 10,996,647, USD 2 million of which were in the livestock sector, with almost half a million production animals affected. On the other hand, impacts of drought triggered by phenomena such as El Niño include decreased availability of fodder, greater mortality of cattle, lower rates of productivity and higher prices for inputs.

In response, SENASA, in coordination with the National Commission for Risk Prevention and Emergency Response (CNE, Spanish acronym), the private sector and academia, and with the support of World Animal Protection, previously known as the World Society for the Protection of Animals (WSPA), has been implementing actions to strengthen institutions, build capacity in disaster risk management, and promote prevention with the aim of reducing health risks through prompt care of animals in affected zones. Regulations established in 2013 on emergency devices set out in the General Law on SENASA therefore included a sinking fund for health emergency response, and provisions on contracting procedures in emergency situations. These regulations define the mechanisms necessary for re-establishing animal health and veterinary public health in epidemic or non-epidemic health emergencies.

Over the years, the foundations have been laid for a national response system to epidemic or non-epidemic health emergencies of natural and man-made origin. The mechanisms established have been shown to be effective while also pointing to opportunities for improvement. The proof lies in SENASA's capacity to respond

to a health emergency and its swift and appropriate action in affected areas. This was demonstrated in the recent health emergency triggered by El Niño, which brought droughts in some regions and intense rains in others.

Its experience in disaster risk management has enabled SENASA to perform health risk management more efficiently, making it a unique case in the Central American region and fairly rare in Latin America. Given the innovative quality of its *modus operandi*, which includes financing mechanisms and contributions to building and strengthening the resilience of Costa Rica's livestock sector, World Animal Protection and the Inter-American Institute for Cooperation on Agriculture (IICA) consider this a valuable experience worth sharing and bringing to international attention.

We wish to express our gratitude to CNE, the School of Veterinary Medicine at the National University of Costa Rica, Asociación de Agricultores y Ganaderos de Sarapiquí (AGRIGASA), World Animal Protection, the private sector and all the organizations that have taken part in this experience, for their efforts and dedication in the tasks undertaken.

Our thanks also to IICA for its work in systematizing this experience. All of the stakeholders have learned a great deal from the methodology of analysis, synthesis and interpretation that this institution employed. We hope the lessons and improvement opportunities generated by this work will allow us to continue making steady progress towards better risk management and a more resilient livestock sector.



Bernardo Jaén
Director

National Animal Health Service

Prologue

Given current environmental challenges and the role agriculture plays in people's wellbeing, the fight against poverty and inequality, and the attainment of food security, IICA has assumed the task of systematizing Costa Rica's experience in *risk management and animal care during disasters* as part of its efforts aimed at the development of sustainable and resilient agriculture.

In these new conditions, farmers must now deal with a heightened incidence of catastrophic climate events such as drought, flooding, frost, altered rainfall patterns, hurricanes, landslides, pests and emerging and re-emerging diseases. All of these jeopardize productivity and food security, making it necessary to manage risk from a broader perspective that truly serves as an instrument to reduce vulnerability and increase the sector's resilience.

Climate change poses new hazards while exacerbating those that already exist. Unfortunately, smaller countries, and even large ones, are not fully prepared to cope with excess rain, rising temperatures, new knowledge related to pests and diseases, and other consequences of climate change. The 14 million small producers in Latin America and the Caribbean are particularly vulnerable to these phenomena, since they have fewer technological and economic resources to deal with them (IICA, 2014). Moreover, it has been verified that the repeated impact of smaller-sized emergencies irrevocably erodes the economies and future of small producers in the countries of the region.

Addressing these challenges calls for modern integrating frameworks and instruments, special financing mechanisms, transformations of stakeholders' capacities, generation and use of new technical knowledge, and the development of new leadership under a new paradigm of risk management. Several of these elements are already in place in Costa Rica, where the veterinary service endeavors to manage health risks in the best way possible by providing prompt care to animals affected by an emergency or disaster.

The aim of this document is to share the knowledge generated and lessons learned by the different stakeholders, as guidance for other countries also seeking to reduce disaster risk and increase the resilience of the livestock sector.

We are deeply grateful to the authors of this publication. Their capacities and experiences have contributed to a critical and thoughtful approach in assessing the case of Costa Rica. A pathway to learning is thus opened: the data has been systematized and analyzed, and lessons garnered for further development, but also as input for similar processes.



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The systematization of Costa Rican experience in *risk management and animal care in disasters* has been possible thanks to the contributions of its protagonists. Through the analysis of their experiences and creative practices in different spaces of reflection (workshop, forum, interviews, etc.), the authors were able to recover the knowledge acquired in order to make conceptual and technological advances in understanding of the theme, and to help enrich similar initiatives in other countries and regions.

We wish to express our appreciation to all of the participants in this systematization process, and especially:

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1. Introduction

The world population, and especially those who depend on agriculture, is increasingly exposed to adverse phenomenon such as drought, flooding, hurricanes, landslides, earthquakes and epidemic outbreaks of geological, meteorological, hydrological, biological or man-made origin that can turn into authentic disasters.

Such emergencies can spring up suddenly or surface slowly. They may be an isolated event or unleash additional events, or a combination of both. They can produce death and injury, harm health and property, destroy livelihoods, deteriorate services, produce social and economic upheaval and cause serious environmental damage.

Every year millions of people who depend on livestock production, particularly in rural areas, are confronted with these emergencies. They not only endanger

food production at local or national scale; the problem can reach regional and global proportion. What is at stake, therefore, is the planet's food and nutritional security.

The livestock sector sustains almost one billion of the world's most impoverished inhabitants, and is likely to continue doing so in the coming decades. As livelihood of the poorest population, it is vital. Livestock make up an integral part of agricultural systems, raising productivity and providing a continuous stream of food and income for homes (FAO, 2009).

In the rural zones of most countries, the ties between people and their animals are extremely important. Animals are a source of food, labor or transport. Seventy percent of the planet's poor, the group most vulnerable to disaster, owns livestock (Campbell and Knowles, 2011). Livestock assets are therefore valuable, and their loss usually places producers at greater risk, especially those engaged in family farming

Disasters, particularly floods, generally wreak havoc, jeopardizing the economy, animal health, human health and food security. However, much of the damage and loss caused by these events could have been avoided or at least ameliorated through suitable risk management, applying mechanisms that would have reduced the vulnerability of the most fragile sectors.

Costa Rica is exposed to countless hazards due to its location and geological structure. Because it receives so much precipitation, most emergencies are associated with heavy rainfall, flooding and landslides. Occurring alongside are scenarios of extreme dryness, as in the North Pacific region where rain scarcity tends to be more frequent, extend over larger areas and reach greater magnitudes. There are also earthquakes and a latent threat of volcanic eruptions, such as those of the Turrialba Volcano currently taking place.

Over the course of the 20th century, Costa Rica experienced 22 quakes and 11 volcanic events, the most recent being the eruption of the Irazu Volcano between 1963 and 1965, and Arenal Volcano in 1968 (CNE, 2010). During the 2005-2011 period, total losses recorded from the impact of hydrometeorological and geotectonic phenomenon amounted to 1,130,390,000 dollars in constant 2011 dollars. The year with greatest economic consequences from natural phenomenon was 2009, when losses reached 447.35 millions of dollars (1.77% of GDP). The major cause for these numbers was the earthquake in Cinchona, province of Alajuela, which left losses of 419.37 million dollars, 92.43% in the rural area (387.63 million dollars) (MIDEPLAN-MAG, 2013).

Given the country's conditions of vulnerability and their repercussions on the livestock sector, SENASA has deployed actions for animal management in emergencies from the perspective of disaster risk management. These entailed improving prevention and response capacities, training field staff in impact analysis and animal needs after a disaster, setting up an emergency fund, preparing emergency plans for the livestock sector and developing operational protocols, among other aspects. To achieve its ends SENASA has established cooperation ties with CNE and other national institutions, following global trends closely.



Turrialba Volcano. Eruption in October, 2014. Photo: SENASA



Effects on Cattle.

A departure from traditional health risk management, this type of action allows for more effective protection of animal health, public health and animal welfare, all an essential part of the institution's mission. It also helps reduce disaster risk and strengthen the resilience of the livestock sector.

Through the systematization of Costa Rica's experience, supported by numerous spaces of reflection and analysis, a series of innovative practices has been identified. In the last analysis, they are the collective creation of the stakeholders themselves. Our goal here is to share these with a wider audience so that they can serve as example for similar initiatives in other countries and regions.

This publication outlines the conceptual framework for the Costa Rican experience, dedicates a section to recalling the importance of the livestock sector in world economies, describes Costa Rica's experience in risk management and animal care during disasters, and concludes with lessons learned and improvement opportunities.



2. Conceptual Framework

2.1. The Concept of Risk

Surely humankind has perceived risk ever since the use of reason was obtained, explaining it on the basis of religious conception at the dawn of history, or in the different social and political forms adopted by society over the course of time.

In a broad sense, the word “risk” alludes to the likelihood of one or several hazards occurring, with the possibility of harmful effects. At stake can be the health of individuals, animals and plants; property; way of life (livelihood); the environment; finances and even the development of a people.

In the realm of health, risk designates the probability of an incident taking place that is harmful to the health of people or animals, and the likely magnitude of its biological and economic consequences (OIE, 2014). Risk management in this case includes the identification, selection and application of measures for lowering the level of risk.

Regarding disasters, risk refers to the possible losses a disaster would cause in terms of lives, health conditions, livelihoods and goods and services, and what could occur in a particular community or society in a specific period of time in the future (UNISDR, 2009). In this case, the emphasis is on probable impacts, not the likelihood of an event taking place. There is also recognition that disaster risk is constructed socially through a process inserted in the dynamics of development.

Reducing both risks and possible damage and loss are common practices in risk management. The focus has been evolving, however, and now increasingly centers on causes and prevention. The change is largely due to a new awareness of man's key role as inducer of risk and interested party who should have sufficient capacity to react quickly and effectively to an extreme event.

For UNISDR (2009), risk management covers risk assessment and analysis for the purpose of executing strategies and specific actions to control, reduce and transfer risk. This is a generalized practice through which organizations approach investment risks and operational risks, interruption of business, breakdowns in production, environmental damage, social impacts and damages caused by fires and natural threats. Along with agriculture, where production is directly or indirectly affected by meteorological and extreme climate episodes, sectors that depend on supply of water and energy likewise cannot afford to ignore the issue of risk management.

Risk Management

The systematic approach and practice of managing uncertainty to minimize potential harm and loss. (UNISDR, 2009).

In general, the paradigms upholding different interpretations of risk management now stress prevention and focus on causes more than consequences. Risk is considered a process constructed in a dynamic and multi-causal way, wherein causes and consequences interact spatially and temporally. An isolated or sectoral analysis of dangers or threats has lost relevance.

Now that world health is being confronted with new diseases and the reappearance of those once believed eradicated, intersectoral and multidisciplinary work is

the preference in risk management. Individual health is determined both by the people and animals around us, and the environment in which we develop. Recognition of this convergence demands a change from the traditional approach to public health, animal health and disease control. Achieving comprehensive health requires sustained actions for improved quality of life, human as well as that of domesticated species and the ecosystems of which we form part (Díaz, Medina and Trelles, 2010).

In this line of thinking, ensuring animal health and welfare and veterinary public health in disaster situations should lead veterinary services to broaden their vision of risk management. They must also take preventive measures and strengthen their response capacity to attend animals—whether production or companions—in a possible emergency.

Society now faces global hazards and catastrophic events that overpower relief capacity from conventional or sectoral spheres. Health and disaster risks are part of these, along with financial, technological and all of the other types of risk to which they are closely related. In a context of sustainable development, the response to them thus calls for a comprehensive but also holistic approach.

2.2. The Concept of Disaster

As with risk, the concept of disaster has also evolved over time and no longer refers so much to an event itself, such as an earthquake or flood, but also encompasses the social and economic consequences unleashed. Hence, for a disaster to be declared as such, losses and damages must be of such magnitude that the normal functioning of society is interrupted.

UNISDR (2009) defines “disaster” as a serious interruption of the normal functioning of a community or society due to an event that has caused so many deaths and material, economic and environmental losses that the affected community or society does not have the necessary capacity to deal with the situation with its own resources. A “crisis” or “emergency” is defined as a threatening situation demanding that urgent measures be taken. With effective response to an emergency, an event can be prevented from reaching the proportions of a disaster. It should be pointed out that the terms “disaster management” and “emergency management” are usually used interchangeably.

Lavell (2014) states that while risk is a latent condition, disaster is relevant and real, and represents the materialization of the degree of risk to which a society is exposed. Disaster risk is the convergence in a given space and time of conditions of vulnerability and exposure to a concrete physical event or a synchronous

or staggered array of events. While poverty is not equivalent to exposure and vulnerability, it does feed into these in a certain way. Disaster risk is connected with unsustainable forms of development, such as environmental degradation (UNISDR, 2009).

Disaster is thus configured as the result of a combination of factors: exposure to a hazard—which can be natural, geological, biological, hydrometeorological or technological—, conditions of vulnerability, and the impossibility of addressing the consequences of the phenomenon that has occurred.

For the purposes of this publication and to achieve a more comprehensive vision of risk management, the aim is to analyze both emergencies and disasters from a health standpoint. In this sense, both disasters and emergencies can be classified as epidemic or non-epidemic. The latter can be natural, anthropic or technological in origin, while the former refers to outbreaks of emerging or reemerging disease in humans or animals, whether accidental or intentional (bioterrorism).

With respect to epidemic emergencies or disasters, it is important to point out that these have risen to international scales in recent decades, many in light of the close relation that exists between public health, animal health and the environment. Box 1 shows main changes in the world contributing to an upsurge of diseases.

The Planet Is Changing.

We are in a new era of infectious disease: diseases that were assumed eradicated re-surface, and unknown diseases arise all of a sudden. There are planetary changes that are contributing to this phenomenon. The primary ones are indicated below.

- Growth of world population and urbanization

Both facilitate the spread and appearance of diseases, since people and animals are living in ever closer proximity to one another.

As human populations increasingly share space with one another and with domestic and wild animals, there is ever-greater risk of diseases crossing over from one species to another.

- Climate change

With the environment's modification, the agent-host-environment relation is also changing and new pathways are being created for the appearance and spread of diseases.

- Livestock production

This refers here to both rustic and intensive production:

- Rustic, artisanal or backyard production, which applies little or no technology, lacks infrastructure, and given the absence of good practices of animal raising, furthers the appearance and spread of diseases.
- Intensive livestock production, which modifies production systems to supply an ever-growing human population that demands more and more animal protein, can also place public and animal health at risk if the necessary biosafety measures are not applied.

- The rise in trade of agricultural products

The commercialization of agricultural products is increasing daily thanks to trade liberalization and globalization, but also to advances in transportation and new trade mechanisms and instruments.

Any error in production, processing, transport or any other link in the food chain can affect food innocuousness and therefore consumers, even though they may be far away from the product's place of origin

- Greater mobilization of people and pests

The increased movement of people also increases risks to human and animal health, as a local problem can easily become a global problem.

Not only humans travel. Non-human travelers, such as pests, can also be transported inadvertently. These pests could be vectors of disease or species that do not exist in the country where they arrive, and which alter the ecosystems where they install themselves.

- Cultural customs and practices

If not handled or controlled adequately, some cultural customs or practices can create conditions furthering the appearance and spread of diseases. This is the case of cockfighting, hunting and raising wild birds, and live animal markets, among others.

Source: Díaz et al. (2010).

Epidemic emergencies or disasters can be associated with a non-epidemic emergency or disaster. A non-epidemic disaster can create ideal conditions for the outbreak and spread of diseases new to the environment. They may also increase the incidence of existing diseases, given the fragility of the survivors and conditions furthering the spread of pathogens, the rise in vectors, and other aspects resulting from the event. This can make the damages to society even greater.

Table 1 shows some diseases in animals that can present in the frame of non-epidemic emergencies or disasters.

Table 1. Some Diseases Associated with Non-epidemic Emergencies or Disasters

Infectious Diseases	Description	Non-epidemic Disaster
Diseases transmitted by vectors	Arbovirus (encefalitis equinas), from an increase in vector populations.	Floods, hurricanes, droughts, prolonged summers.
Avian diseases	Newcastle, bird flu. Due to changes in the migration patterns of wild birds, greater contact between wild and domestic birds.	Floods.
Clostridial diseases	Black leg, botulism, tetanus, others. Due to contamination of stagnant water and fodder with spores.	Floods.
Anthrax	Highly contagious for animal and people. Prevented through suitable disposal of cadavers.	Droughts and prolonged summers.
Salmonella	From consumption of contaminated water or foods that come into contact with contaminated water.	Floods.
Leptospirosis	From stagnant water, consumption of foods contaminated with the urine of infected animals (rodents).	Floods.
Parasitosis	From immunodepression, which can encourage the manifestation of subclinical parasitosis, e.g., cryptosporidiosis and giardiasis.	Floods.
Infections of the urinary tract	Cases reported in pets.	Floods, hurricanes.
Mastitis	When dairy cows are not milked, can become infectious.	Earthquakes, landslides.
Diarrheas	From stress, consumption of waste water, etc.	Floods, droughts.

Non-infectious Diseases	Description	Non-epidemic Disaster
Traumatic injuries	Blows and fractures.	Floods, landslides, earthquakes, volcanic eruptions, hurricanes.
Pneumonia	From aspirating water, ash, irritant gases, etc.	Floods, eruptions.
Hypothermia and hyperthermia	Difficulty maintaining body temperature in extreme situations.	Floods, hurricanes, prolonged summers, high temperatures.
Toxicosis	Consumption of toxic plants or other toxic or harmful substances in periods when fodder is scarce. Can also produce ruminal impaction.	Droughts, prolonged summers.

The information above shows the importance of comprehensively managing health risks, regardless of whether the threat is epidemic or non-epidemic. It also reveals that institutions with public and veterinary competence must improve their capacities to prevent and deal with disasters, and in this way better contribute to the integration of disaster reduction in development plans.

2.3. Disaster Risk Management

Disaster risk management is an extension of the concept of risk management that specifically addresses the risk of disasters and aims to minimize losses and damages stemming from the occurrence of these events. Reducing vulnerability and increasing resilience are two key aspects when dealing with disaster risk management.

According to UNISDR (2009), disaster risk management seeks to avoid, lessen or transfer the adverse effects of the threats through different activities of prevention, mitigation and preparation. Management activities that cover and aim to correct or reduce pre-existing disaster risk refer to “corrective management of disaster risk,” while activities that cover and seek to prevent the increase or appearance of new disaster risks allude to “prospective management of disaster risks.”

Disaster Risk Management

“The systematic process of using administrative directives, organizations, skills and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards, natural threats and the possibility of disaster.” (UNISDR, 2009)

Application of the United Nations International Strategy for Disaster Reduction (UNISDR) in the *Hyogo Framework for Action 2005-2015: Increasing the Resilience of Nations and Communities to Disasters* sought to establish a culture of prevention as integral part of disaster risk management, although it is recognized that much of the resources nations have available for these actions has instead been geared to addressing consequences.

Resilience

“The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.” (UNISDR, 2009)

As indicated by UNISDR (2015), without effective disaster risk management, sustainable development is not possible. Many disasters cause economic losses, leave societies broken by the death of family members and oblige residents to migrate far away from socio-environmental hazards or to look for new livelihoods. The impacts are accumulable, and frequent recurrence of adverse events erodes resilience, or the ability to resist or overcome a new disaster. The

capacity of families, cities and countries to attain greater wellbeing is therefore diminished (UNISDR and CEPREDENAC, 2014).

Clearly emergency response cannot be limited to *saving human lives*; it must also *protect and reinforce the livelihoods* of the affected populations. Not only does this foster their immediate recuperation, but their long-term ability to resist and recover and reduce their vulnerability can also be enhanced, along with lowering the possibility of new disasters arising. (LEGS, 2014)

The Third U.N. World Conference on Disaster Risk Reduction in Sendai, Japan, concluded on March 18. Representatives of 187 Member States agreed to a new framework for action and financing, the *Sendai Framework for Disaster Risk Reduction (2015-2030)*, successor to the Hyogo Framework and which seeks substantial reduction of risks and losses caused by disasters, as well as loss of lives, livelihoods and health of people, businesses, communities and countries. One of the Sendai Framework priorities (the third), “Investing in disaster risk reduction for resilience,” recommends that local and national governments “strengthen the protection of livelihoods and productive assets, including livestock, working animals, tools and seeds.”

For its part, World Animal Protection (2014) has stated that if animal welfare holds a key place in disaster risk management it is possible to significantly reduce the community’s suffering, accelerate its recovery, and lower subsequent dependence on humanitarian relief.

Disaster risk reduction therefore concerns multiple sectors: without joint work, the results of individual efforts will be meager. In addition, resilience capacity must be strengthened beforehand in order to reduce risk.

2.4. Impact of Disasters

The economic, social and environmental losses associated with disasters undeniably affect country development.

Although improvement of disaster management has contributed enormously to lowering mortality, economic losses are reaching between 250 and 350 million U.S. dollars a year. Measured in terms of “years of human life” lost, disasters represent a setback for development comparable to that caused by diseases such as tuberculosis. Every year around 42 million human life-years are lost in disasters reported internationally. These losses are concentrated disproportionately in low- and middle-income nations (UNISDR, 2015).

At global level, average annual losses anticipated from earthquakes, tsunamis, tropical cyclones and river flooding are currently estimated at 314 million U.S. dollars in construction alone. This figure would be even higher were other hazards included, such as drought, and other sectors such as agriculture (UNISDR, 2015).

UNISDR and the Coordination Center for the Prevention of Natural Disasters in Central America (CEPREDENAC, Spanish acronym) (2014) state that according to the EM-DAT CRED¹ database, from 1970 to 2011, 69.7% of the disasters taking place in Central America were unleashed by extreme hydrometeorological events, including floods (55%), storms and hurricanes (33%), drought (10%) and extreme temperatures (2%). Another 21% was triggered by geophysical hazards such as earthquakes (54.5%), volcanic eruptions (24.6%), and seismic tremors (20.9%), and 9.3% by biological hazards (epidemics and infestations).

According to the Economic Commission for Latin America and the Caribbean (ECLAC), total estimated damage after assessing 32 disasters occurring in Central America (which represent a third of all events recorded in EM-DAT) rose to US\$ 68,932,000 and losses worth US\$ 14,979,000.

Particularly alarming is the rising trend in mortality and economic losses associated with recurring, localized, small-scale disasters. These risks, called “extensive,” are closely linked with causal factors such as inequity, environmental degradation, deficient planning and management of urban development, and weak governance. They constitute a central concern for low-income households and small businesses that depend on public infrastructure and on the local governments that administer it (UNISDR, 2015).

In effect, damages to goods and economic and human losses from low-intensity, high-recurrence phenomena are more significant than from those of high-intensity and low-recurrence (intensive risk). But the losses caused by intensive disasters are usually assessed, recorded and attract international attention, unlike the cost of extensive risk. Its consequences tend to be underestimated, as is the causality of the processes that build risk (UNISDR and CEPREDENAC, 2014). Those who assume losses from extensive risk are the people themselves, normally the poor, so disasters only make poverty worse.

1. This database is operated by the Center for Research on the Epidemiology of Disasters (CRED) at Université Catholique de Lovain.

By failing to estimate damages caused by extensive disasters (low intensity and high frequency), the true impact of disasters is distorted. The recurrence of adverse, low- or moderate-intensity events, often localized, has a debilitating effect and makes it more difficult to recover from high-intensity phenomena. Therein lies the importance of building or strengthening resilience beforehand.

In the rural and agricultural sphere, more than 85% of losses and damages result from hydrometeorological events. As indicated earlier, Central America is witness. Tropical depression 12-E (the twelfth tropical depression that developed during the 2011 hurricane season in the Pacific) left Central American agriculture, livestock and fishing losses amounting to US\$ 406 million, or 67.6% of total loss in productive sectors (agriculture, industry, commerce and tourism) (UNISDR and CEPREDENAC, 2014).

Climate change and climate variability, the presence of non-routine phenomena of unpredictable magnitude, new slow-maturing processes (especially sea level rise and deglaciation) and changes in climate averages or norms portend even higher costs if risk management and adaptation fail to move forward (Lavell, 2014).

The situation becomes more complex given that non-epidemic disasters create conditions for greater incidence of disease in both humans and animals. This can lead to epidemic emergencies whose consequences are not generally included in total estimates of the effects of disasters (their repercussions on the livestock sector are analyzed in section 3.4).

Hence, sustainable development can only be attained by investing in disaster risk reduction. An annual global investment of US\$ 6 million in suitable strategies for disaster risk reduction would generate total benefits worth US\$ 360 million in terms of risk reduction² (UNISDR, 2015).

2. Estimates depend on the cost-benefit ratio and discount rate applied.



3. Importance of the Livestock Sector

3.1. Economic Importance

Worldwide, the global livestock sector has made extensive gains in recent decades. Demand for animal-sourced products in the fastest growing countries, as well as technological innovations in this area, have boosted livestock production.

Livestock represents 40% of the global value of agricultural production and is the mainstay of livelihoods and food security for almost one billion people. Driven by the rise in incomes and supported by technological and structural changes, this is one of the fastest growing sectors of the agricultural economy. Livestock products also make up an expanding proportion of agricultural exports. While most are consumed in the country where they were produced and not traded internationally, these products nevertheless represent an important export category. (FAO, 2009)

World livestock populations have increased in recent decades. Between 1980 and 2010, the number of chickens rose 272%, from 7.21 to 19.6 billion, with a 305% increase in those slaughtered, from 18.43 to 56.2 million. Ruminant populations also grew during the same period. World population of small ruminates went from 1.56 to 1.99 billion head (28% increase), while the number of those slaughtered rose 74%, from 540 to 939 million. Trends were similar for bovine populations, although with lower increases than for poultry (FAO, 2013a).

Raising livestock also contributed importantly to the economic wellbeing of poor families in the rural zones of many developing countries of Latin America and the Caribbean (LAC), making trends in production and consumption of livestock products a crucial indicator of growth and development of rural communities and improvements in the economic wellbeing of families in developing countries. Meat and dairy production has grown rapidly in this region, but poultry production leads, almost doubling from 2001 to 2011 and higher than in the rest of the world. While its expansion may not have been quite as spectacular, beef, pork and dairy production nevertheless rose by a third during the same period, a rate likewise higher than the world average (ECLAC, FAO, IICA, 2013).



In Central America, bovine livestock constitute one of the most economically important agricultural sectors, representing 1.3% of regional GDP and around 20% of agricultural GDP. This clearly makes it the most important agricultural sector, followed by banana, sugar cane, poultry and coffee (FAO, 2014). In this region, the sector (bovine, pork and poultry) includes some 475,000 ranching properties, along with another 1,500,000 farms where there are also backyard fowl. (RUTA, 2012)

The economic bonanza from raising livestock plays a fundamental role in the economic wellbeing of poor families in rural zones of LAC countries and offers great potential for family farming. It is a source of food, revenue, draught animals and manure that can be used as fertilizer or fuel. Families can improve their economic and social status in good years, and buffer the setbacks brought by bad ones. (ECLAC et al., 2013)

The livestock sector is large and expanding rapidly in different developing countries, thanks to the rise in incomes, population and urbanization. The possibilities of the upward demand for livestock products are considerable, and signify challenges in using resources efficiently, managing health risks for both animals and humans, reducing poverty and ensuring food security (FAO, 2009).

3.2. Importance for Food Security

This sector is vital to food security, not just for small rural producers who directly depend on livestock to obtain food, income and services, but also for urban consumers enjoying the benefit of foods derived from quality animals at accessible prices. Livestock play an important role in the four main dimensions of food security: availability, access, stability and utilization (FAO, 2009).

In large part, and increasingly so, animal-sourced products meet the daily nutritional needs of the population.

Worldwide, livestock contribute 15% of total food energy and 25% of dietary protein. Animal-sourced products provide essential micronutrients that cannot be obtained easily from plant foods (FAO, 2009).

In the Latin American and Caribbean countries, these products contribute considerably more of per person daily caloric intake (622 kcal/capita/day) compared to all developing countries (178 kcal/capita/day) and in the world (501 kcal/capita/day). Rapid growth has been recorded in per capita poultry and dairy consumption in many LAC countries. Milk is the animal product that contributes

most to the daily caloric intake of consumers in this region (185 kcal/capita/day), a figure three times higher than that of developing countries (FAO 2013b). Per capita consumption of beef has begun to rise in LAC, although at a slower rate than for pork, poultry and dairy products. It is fairly predictable that rapid growth of livestock production in LAC nations will improve living conditions for many of the region's rural families in the future (ECLAC et al., 2013).

Expansion of the livestock sector provides numerous economic benefits by generating employment and economic growth, along with the nutritional benefits and contribution to food security. However, it should not be forgotten that this growth poses challenges for small farmers, including health risks.

3.3. Importance as Livelihood

Livestock provide a livelihood for a large percent of rural women, men and children living in poverty. Beyond the direct role in generating food and income, livestock are a valuable asset as a storehouse of wealth, guarantee to obtain loans, and safety net during times of crisis. Livestock are also essential for agricultural production systems, consuming waste from crop and food production, helping control insects and weeds, producing manure to fertilize and renovate fields, and providing draught power to plough and transport (FAO, 2009).

Campbell and Knowles (2011) indicate that in high-income nations livestock have a direct economic importance deriving from the benefits of production and sale of foods (meat, eggs, milk, etc.). Animals have multiple uses in low-income nations, with direct and indirect values as shown in Table 2.

Table 2. Direct and Indirect Values of Livestock in Low-Income Countries

	Direct Values	Indirect Values
Animal-sourced food	<ul style="list-style-type: none"> - Foods for consumption - cash 	<ul style="list-style-type: none"> - Contribution to year-round food security - Nutrition - Source of micronutrients that contributing to cognitive and physical development
Transport and Ploughing	<ul style="list-style-type: none"> - Cash earned or labor costs avoided 	<ul style="list-style-type: none"> - Improved agricultural output - Contribution to local connectivity, links to more distant markets
Manure	<ul style="list-style-type: none"> - Fertilizer - Fuel 	<ul style="list-style-type: none"> - Improved soil fertility - Improved agricultural output
Financial Aspects	<ul style="list-style-type: none"> - Cash income 	<ul style="list-style-type: none"> - Vehicle for savings - Form of insurance
Social Roles	<ul style="list-style-type: none"> - Fulfillment of social and cultural obligations 	<ul style="list-style-type: none"> - Reinforces networks of social support

Source: Campbell and Knowles (2011)

Practically 80% of the world’s undernourished lives in rural zones, and most subsist on agriculture, livestock included. In some countries the most impoverished rural households raise livestock more frequently than the wealthiest, even though the average number of head per household is fairly small. Many small farmers who make their living from livestock do not participate in commercial markets. In general, they depend on family labor to carry out the basic activities of livestock production, such as herding (FAO, 2009, 2013c).

Livestock are therefore vital to family agriculture. They are an integral part of the production system, provide food and income, and can be used as a resource to work the farm or even as means of transportation.

Rural women look after livestock as often as men do, albeit the number of animals tends to be less and they often own poultry and small ruminants, not large-sized animals (FAO, 2009). Roles in care and attention to production animals fall to different members of the nuclear family. In Latin America's rural zones, adult males look after the cattle, older children and adolescents care for sheep, goats and pigs, and women are in charge of raising poultry.

It should be borne in mind that family farming is one of the productive activities with the greatest productive, commercial and socioeconomic limitations. The quantity and quality of productive resources are deficient, and incentive mechanisms to obtain land and water are scarce. In Latin America and the Caribbean, holdings in the family agriculture sector are estimated at approximately 17 million units, bringing together a population of around 60 million people. Of all productive units, the proportion represented by family farming is calculated to be over 75% in almost all of the Latin American countries, and up to 90% in some. This predominance in the region's total productive units does not hold for the extent of farmland in the hands of this sector (ECLAC et al. 2013). Nonetheless, family agriculture plays an important role in basic food supply in the region's countries (ECLAC et al. 2013).

According to FAO (2009), the number of poor whose subsistence depends on livestock is not known with certainty, but is most often cited at an estimated 987 million (Livestock in Development, 1999) or approximately 70% of the 1.4 million people living in extreme poverty worldwide.

Given the importance of the sector, loss of livestock in an emergency or disaster (epidemic or non-epidemic) could cause dire economic harm, as well as food insecurity. Such circumstances could also condemn the poor population to chronic, long-term poverty.

3.4. Impact of Disasters on the Livestock Sector

Despite this sector's contribution to the economy and food and nutritional security, and role as livelihood, the economic repercussion of non-epidemic disasters on the livestock sector has tended to be underestimated. This is because attention usually focuses on disasters and emergencies of an epidemic type.

However, a non-epidemic emergency or disaster can affect a large quantity of animals and even cause death. It all depends on the nature of the event and the characteristics of the communities damaged. An eruption of volcanic ash, for example, contaminates pasture and reduces the amount of fodder available. It

may also cause toxicosis if the animals consume contaminated fodder or material other than fodder. Many animals can starve to death. Volcanic acid rain has similar effects. In addition, animals can develop pneumonia when exposed to volcanic material (from inhaling ash, for example), which can be fatal.

Floods have all types of effects. Moisture or the concentration of contaminated gases fosters diseases such as leptospirosis, or many animals may drown.

During times of drought, cases of anthracnose and other infectious diseases can break out, or diarrhea may become more prevalent.

Moreover, as sources of water become less available, domestic and wild animals may be obliged to drink from the same source, which does not occur under normal climatological conditions. With such contact, the former may acquire infectious agents from the latter, fostering the appearance of emerging diseases that can be passed from wild to domestic biological cycles. If zoonotic agents are involved, public health could be at risk.

In 2011 Campbell and Knowles made a bibliographical review of economic repercussions when animals are lost in a natural disaster, and showed that livestock have countless functions in low-income economies. In these countries,



Effects of prolonged drought. Photo: World Animal Protection.

they have both a direct value and a multiplicity of indirect values (for farming and for food, savings and cultural value). However, the authors point out that when disaster strikes, assessment of losses generally focuses on direct values, rarely incorporating the indirect values that can be more difficult to observe yet are often more significant than direct financial losses.

The study concludes by noting that commonly, neither the real value of livestock nor the indirect economic consequences of disasters are fully understood. The authors hope that pointing out the need to identify all of the values related to livestock in low-income economies and including them as direct and indirect impacts of disasters, will support future investigations in this area.

Table 3 presents a summary of direct and indirect impacts arising from the loss of livestock in a disaster, according to Campbell and Knowles (2011).

Table 3. Direct and Indirect Impacts from Loss of Livestock in Disasters

	Direct Impacts	Indirect Impacts
Work	Loss of animal-sourced food	<ul style="list-style-type: none"> - Loss of food security - Nutritional loss, with short-term consequences for worker productivity and long-term consequences for education, community development and worker productivity
	Loss of draft power, increased demand for human labor	<ul style="list-style-type: none"> - Reduced labour availability
	Lost opportunities for income generation	<ul style="list-style-type: none"> - Loss of productive use of labour, particularly for women, children and the elderly - Reduced income security
	Loss of culturally and socially important animals	<ul style="list-style-type: none"> - Reduced cultural/social opportunities, such as participation in weddings, funerals, etc. - Loss of social support networks

Capital	Reduced availability of draft power leading to increased demand for machinery and fuel	<ul style="list-style-type: none"> - Dependence on borrowed assets or borrowing to finance their use. - Increased dependence on external inputs, such as fossil fuels
	Loss of savings and investments	<ul style="list-style-type: none"> - Loss of investments income from animals - Inability to cover sudden expenses, such as medical bills, and school fees. - Herd sizes may become unviable leading to relocation, loss of social status and poverty
	Loss of livestock as an input for industries related to animal-sourced food	<ul style="list-style-type: none"> - Reduced income or substitution from dairies, markets, abattois, butchers, retailers and restaurants
Land	Loss of draft power	<ul style="list-style-type: none"> - Reduced agricultural productivity, with the consequent reduction of food security - Reduced crop residues leading to reduced livestock productivity and increased demands on other feed sources, such as communal grazing areas - Increased demands on these areas can lead to degradation of natural resources
	Loss of manure	<ul style="list-style-type: none"> - Reduced agricultural productivity - Increased demand for chemical fertilizers, which may be expensive or unavailable - Increased demand for alternative fuels, such as firewood, which can lead to degradation of forest and woodlands.

Source: Campbell and Knowles (2011)

Disasters also cause decapitalization, which compromises future production and jeopardizes farmers’ standing as loan recipients when they are unable to meet financial obligations.

In light of this panorama, investing in disaster risk reduction is the best way to deal with any adverse phenomenon. But what are the benefits derived from incorporating risk reduction? To answer that question, the returns on those measures need to be quantified.

Given the paucity of information about benefits from risk reduction measures in the livestock sector, Economists at Large and World Animal Protection decided to make a cost-benefit analysis of interventions in three communities (Box 2).

These investigations revealed the true value of including animals in risk management processes, from prevention to the response phase. Bearing in mind that the value of livestock is far more than monetary in rural areas, as discussed earlier, it becomes even more important that these processes include animals.

Box 2. Case Study: Livestock in Disasters
The economics of losing livestock in a natural disaster. Lessons from World Animal Protection
<p>The Work of World Animal Protection</p> <p>World Animal Protection’s Disaster Management Program has been responding to the needs of animals in disaster since 1964. The organization has conducted 141 interventions in 43 countries since 2000, interventions that have directly contributed to the welfare of 1,249,134 animals, and indirectly to many more.</p> <p>Given the scarcity of information on the benefits of incorporating disaster risk reduction measures in the livestock sector, Economists at Large and World Animal Protection decided to make a cost-benefit analysis of the work the latter had carried out in three communities affected by adverse phenomenon: Mwingi in Kenya, Assam in India and Chihuahua, in Mexico.</p>

Cost-benefit Analysis of the Intervention in Mwingi, Kenya

In 2011, World Animal Protection carried out an intervention in Mwingi, Kenya, in response to the prolonged drought affecting that district. According to the analysis made by Economists at Large, over a one year time period, the Mwingi intervention generated \$2.74 of benefits in the form of avoided losses for every \$1 spent. If the time period is extended to 3 years, the cost-benefit ratio increases to \$6.69 in benefits for every \$1 spent. This analysis takes into consideration a 50% survival rate. Other factors considered for the analysis are the duration over which income is attributed to the intervention and the discount rate. This last is based on the financing rates available to the rural community.

Source: Economists at Large (2013).

Cost-benefit Analysis of the Intervention in Assam, India

The second analysis corresponds to World Animal Protection's relief operation to help the communities of Assam, India, affected by flooding in 2012. The report by Economists at Large estimated that livestock production worth US\$ 4.7 million was recovered thanks to the intervention. Given that the cost of the intervention was just \$49,000, it is clear that very high yields were obtained at a very low cost.

It is important to underscore that net benefit and cost-benefit ratio calculations depend on the percentage of livestock value actually attributable to the response, which is uncertain. If a survival rate of 100% is attributed to the intervention, an estimated US\$ 96 of benefits were obtained from every US\$ 1 in costs. At a survival rate of 50%, the same percentage used in the Mwingi analysis, the result of the cost-benefit analysis is US\$ 48 of benefits for each USD 1 spent.

Source: Economists at Large (2014)

Cost-benefit Analysis of the Intervention in Chihuahua, Mexico

In 2012, World Animal Protection began helping livestock producers in the municipality of Aldama, in Chihuahua, to improve their ability to resist disaster and recover afterwards (resilience) by protecting their livelihood, among other aspects. The intervention was in response to extensive drought resulting from climate change. The report by Economists at Large (2015) analyzed work during 2012 in this zone, where livestock constitutes the main livelihood. In the municipalities where World Animal Protection made its evaluation, it was determined that over 12,500 head of cattle had died and more than 3000 were in danger. The cost-benefit analysis in this case was difficult as other external factors were identified, such as the way land was managed and the price of beef in the United States. Nevertheless, it was possible to calculate a benefit of USD 7 to USD 14 for every USD 1 invested, based on an estimate of avoided losses. The range reflects the fact that market price had fallen by half due to the drought.

Source: Economists at Large (2015)

Costa Rica’s experience in disaster risk reduction took place within the conceptual and global framework discussed earlier. SENASA’s work, also within that framework, is not limited to animal rescue and care in a disaster. Employing a much broader vision, it also aims to strengthen the resilience of the livestock sector through prevention and risk reduction efforts.

Care given to animals in a non-epidemic emergency or disaster acquires a preventive nature at the epidemic level. In effect, ensuring that animals have adequate care and shelter, potable water, feed and basic conditions during a disaster, is actually managing a new or potential risk arising from the conditions that generated the non-epidemic event.

Given the vital role of veterinary services in disaster management, the World Organization for Animal Health (OIE), a global reference organization of animal health, has formed the ad hoc Group on Natural Disaster Risk Reduction and Management in relation to Animal Health and Welfare and Veterinary Public Health. In January 2015, the ad hoc group began preparing guidelines in this frame. These would reflect the need for veterinary services to implement disaster management and risk reduction measures with the objective of protecting animal health, animal welfare and veterinary public health in such situations.

Currently the OIE has standards and guidelines in place for animal care in epidemic emergencies or disasters, but they are still needed specifically for animal care in disasters. This also holds for the OIE Tool for the Evaluation of Performance of Veterinary Services (PVS Tool).





Figure 1. Geographical location of Costa Rica

4. The Experience of Costa Rica

4.1. Country Context

4.1.1 Geographical Location and Population

Costa Rica is situated in the southern part of Central America, extends 51,100 km² and its capital is the city of San Jose. The country's total population is 4,301,712 (INEC, 2011), of which 73.85% live in the urban areas of the main cities (San Jose, Heredia, Alajuela and Cartago).

4.1.2. Importance of the Agriculture and Livestock Sector

In 2013, the agriculture and livestock sector contributed 9.4% of GDP and provided employment for 12% of the working population (State of the Nation Report, 2014). According to the 6th National Agriculture and Livestock Census of 2014, there are 93,017 farm holdings, representing 47.1% of national territory, with an average size of 25.9 ha.

Of these farming properties, 28.5%, or 26,489, are mostly dedicated to producing cattle, and the rest to coffee (24.3%), fruit (12.3%), basic grains (8.4%), vegetables (4.9%), and the remainder (21.7%) to sugar cane, natural forest, palm oil, pasture and other activities.

Concerning land tenure, 91.2% of the holdings are under some type of self-ownership. In terms of use, 43.4% of this farmland corresponds to pasture, 30.6% to forest, 15.7% to permanent crops and the rest to tilled and other land.

Women’s share of participation as farm producers is 15.6% at the national level.

Table 4 below presents a summary of livestock activities in Costa Rica.

Table 4. Livestock Data for Costa Rica

Type of Livestock Activity ¹	Number of Farms	Total Number of Farm Animals	Number of Animals Elsewhere
Cattle	37,171	1,278,817	7,966
Goats and sheep	4,140	48,652	1936
Pigs	14,355	435,243	4,980
Buffalo	247	4,380	-
Horses, donkeys, asses and mules	21,057	71,021	-
Poultry ²	36,752	18,589,455 ³	178,308
Aquaculture	2,804	-	-
Beekeeping	1,893	30.851 (hives)	-
Others	-	-	2,227

Source: INEC (2015).

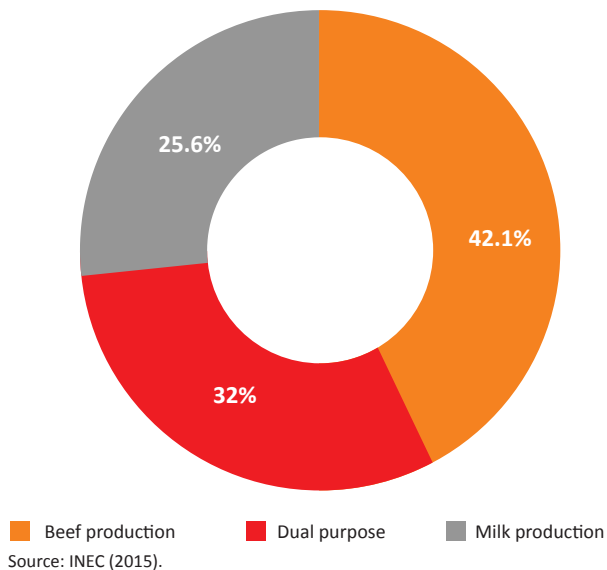
1 A farm can have one or more livestock activities, so may be included in several activities.

2 Includes hens, pullets, roosters, chicks, and laying hens; does not include other types of poultry.

3 Includes farm and backyard animals.

Cattle herds are comprised 42.1% of beef cattle, mainly in the province of Guanacaste where drought is most frequent, most extensive and of greatest magnitude. Dual-purpose and dairy cattle represent 32.0% and 25.6%, respectively.

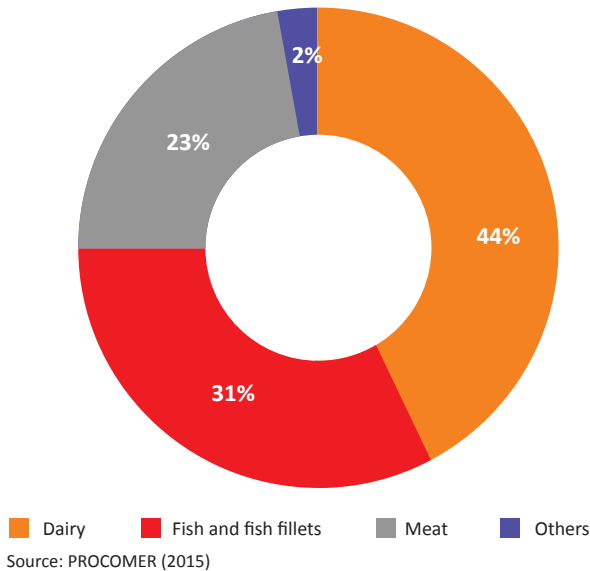
Figure 1. Costa Rica: Percent Distribution of Cattle According to Purpose, 2014



Meat and other livestock products form an integral part of the Costa Rican diet. Twenty-three kilograms of chicken are consumed per capita annually (SEPSA, 2014), more than beef and pork, respectively at 15.5 kg/year (CORFOGA, 2015) and 12.2 kg/year (SEPSA, 2014). In addition, 200 kg of dairy products are consumed per person every year (Cámara Nacional de Leche 2013).

Costa Rica is a net exporter of agri-food products. As shown in Figure 2, below, primary exports in the livestock and fish category are dairy products, fish and fish fillets, and meat products.

Figure 2. Composition of the Value of Exports in the Livestock and Fishery Sector, 2014



4.1.3. Health Situation of Costa Rica

Because it is free of exotic diseases such as foot and mouth disease, Costa Rica's health status ensures its competitiveness in livestock production, public health protection and commercialization of animal-sourced products. The country makes every effort to maintain and upgrade that status. Declared free of classical swine fever in 2009, it obtained the health status of "controlled risk" for bovine spongiform encephalopathy in 2013, and is currently requesting recognition for "negligible risk" status, which would permit increased trade of cattle products in the international market. As for brucellosis, Costa Rica is attempting to lower the prevalence of this disease and obtain the health status of "free zone".

Intersectoral efforts are also made to tackle diseases with zoonotic potential in the best way possible. This year (2015), the World Veterinary Association and OIE awarded Costa Rica a prize for implementing a comprehensive awareness campaign to prevent equine encephalitis, under the aegis of the

National Animal Health Service (SENASA) and Association of Veterinarians. The campaign focused on the province of Guanacaste (the region frequently affected by drought).



4.1.4. Climate Conditions and Climate Vulnerability

Costa Rica is exposed to hazards associated with both geographical location and geological structure. It is a tropical country crossed by mountains, with a large number of active volcanos and strong tectonic activity. Most emergencies are related to the elevated precipitation (flooding and landslides), which are worsened by regional effects. Earthquakes and volcanic eruptions are also a latent threat. Over the course of the 20th century, Costa Rica was affected by 22 quakes and 11 volcanic events, the most important being the eruptions of the Irazu Volcano between 1963 and 1965, and Arenal Volcano in 1968 (CNE, 2010).

One of the events having greatest economic impact in recent years was the 2009 “Cinchona earthquake,” when losses reached US\$ 419,370,000. Of this amount, 92.43% (US\$ 387,630,000) occurred in the rural area (MIDEPLAN - MAG, 2013).

With respect to natural hydrometeorological events, El Niño and La Niña play a decisive role in the nation's agricultural production. These events have to do with the ENSO phenomenon (El Niño/Southern Oscillation), which is related to climate disruptions in many parts of the world, as well as alterations in different terrestrial and marine ecosystems. In its oceanic component, contrasting phenomenon related to surface temperatures of the tropical Pacific Ocean give rise to two events, depending on the temperatures: El Niño, due to warm anomalies, and La Niña, caused by cold anomalies (IMN, 2014). This is manifested as higher temperatures, drought, rainfall and flooding, with varying effects on the different regions of the country.

From 2005 to 2011, total losses from the impacts of hydrometeorological and geotectonic events reached US\$ 1,130,390,000, as recorded in the 16 emergency plans issued during those years. Fifteen of these were in response to climate events and account for 62.9% of the losses. Of total damages, 64.32% was reported in zones considered urban and 20.21% in rural areas. Concerning the distribution of losses, the agriculture and livestock sector took third place (US\$ 128,250,000), after road infrastructure (US\$ 383,790,000) and the electrical system (US\$ 308,620,000). The year with greatest economic impact from natural phenomenon was 2009, at 1.77% of GDP and 30.42% of capital spending. The greatest economic impact from climate-related phenomenon was observed in 2007 and 2010 with losses equivalent to 0.87% of GDP in both cases, although they amounted to 26.07% of capital expenditure in 2007, and 17.17% in 2010 (MIDEPLAN-MAG, 2013).

Along with these large-magnitude events is a long list of daily "low intensity" incidents, entailing more gradual, permanent damages suffered by the population, especially urban. By the end of a period, these add up to higher magnitudes than some of the rapid onset, larger-scale events. In these cases, vulnerability acquires a chronic nature inherent to the social situation of part of the population. In a development context where current risks are not adequately taken into account, increasingly frequent floods, quakes, landslides, volcanic eruptions and problems related to technological factors make up a long chain of disasters in the country's history, with unequal and differentiating impact on the wellbeing of the Costa Rican population. (CNE, 2010).

The livestock sector is a strategic activity for the country from both an economic and social standpoint: it is the dominant activity in rural zones and an important source of employment. It is thus one of the productive areas most affected by emergencies.

Indeed, emergencies impact directly on animals, damage the livestock infrastructure and elevate the risk of disease. This in turn can be harmful to the country's health status, weaken food security and leave farmers without their livelihood.

Animal health is a public good, and as such no effort should be spared in taking care of it.

4.2. Official Veterinary Service

Since the 1970s, Costa Rica has had an official Veterinary Service which has been evolving and adapting to the needs of animal health and veterinary public health.

The National Animal Health Service (SENASA, Spanish acronym) created in the 2006 National General Animal Health Service Act N° 8495, is a body of minimal deconcentration with operational legal personality under the Ministry of Agriculture. This law laid the foundations for a modern veterinary service operating in accordance with international standards and complying with guidelines issued by the World Organisation for Animal Health (OIE), the benchmark global agency in this area. OIE's mandate is to improve animal health, veterinary public health and animal welfare throughout the planet.

SENASA's area of competence is animal health and welfare, and veterinary and environmental public health. It works in a chain approach through the stages of production, transformation, distribution and commercialization of animal-sourced products, in adherence to development plans and policies in the agri-food sector.

SENASA administers plans, and directs and takes measures all over the country in relation to services, programs and campaigns for the prevention, control and eradication of animal diseases. It oversees and ensures the health of domestic animals and aquatic, wild or other types of species, as well as the innocuousness of products, byproducts and derivatives for human and animal consumption.

The abovementioned law establishes legal bases for the declaration of emergencies, integration of an ad hoc emergency commission that acts as advisory and consultation body in each national or regional emergency, authorization of these autonomous entities to assign budget lines and other resources deemed necessary to assist SENASA when a national or regional emergency is declared, and allocation of a sinking fund exclusively for emergency response.

SENASA's emergency response activities were thus designed to be carried out recognizing the possible health, economic, environmental and social repercussions that many animal diseases, especially zoonotic, can have on the country.

In this frame, in 2009 SENASA created the **National Program on Animal Management in Disasters**, and from that moment on has worked to reinforce its capacities of preventing and addressing disasters that affect the animal population, public health and the national economy, taking into account principles of governance for disaster risk management.

4.3. Governance of Disaster Risk Management

a. National Commission on Risk Prevention and Emergency Response

The National Commission on Risk Prevention and Emergency Response (CNE, Spanish acronym) was created through the Emergencies Act N° 4374 of 1969, with the eruptions of the Irazu Volcano (1963-1965) and Arenal Volcano (1968) as background. In addition to creating CNE, this law gave the Executive Power authority to declare a state of emergency anywhere in national territory, and created the National Emergency Fund. During the following years, CNE gradually became recognized as the entity in charge of emergency preparedness in the country. In 1999, a reform to the Emergencies Act through Law N° 7914 entrusted the institution with responsibilities for prevention (CNE, 2014).

Later on, Law N° 8488 was published in 2006 as a reform of Law N° 7914, making **CNE the governing body in risk prevention and preparedness in response to emergency situations.**

CNE evolved toward risk management with this new law, whose regulatory framework acquired a primarily preventive orientation. Risk management was defined as public policy cutting across all development policies. All institutions were required to include this theme in their planning and to assign the respective budget for such activities.

In similar fashion, Law N° 8488 established the National Policy on Risk Management, assigning two instruments for its application: the National Risk Management Plan, which is the mechanism that defines strategy or the road map, and the National Risk Management System, the organization that carries actions forward.

The National Risk Management System includes the current organizational model, so its objective is to prevent, prepare for and respond to disaster and emergency situations, aiming for the integration and coordination of all relevant stakeholders in Costa Rican society, both centralized and decentralized public institutions, in regional and local spheres.

The following coordination entities form part of the structure of the National Risk Management System (SNGR, Spanish acronym) in which the Central Administration, Decentralized Public Administration, local governments, the private sector and organized civil society are represented.

- Sectoral – institutional
- Technical – operational
- Regional – municipal
- Thematic-territorial networks
- National Forum on Risk
- Supervisory committees for subsystems

Technical-operational coordination mechanisms include the Emergency Operations Center, a permanent coordination entity under CNE that brings together at national level all of the public institutions and nongovernmental organizations working in first response. Likewise, under the aegis of CNE, SNGR has advisory and international support bodies organized by specialty, area of interest or thematic areas, in order to take advantage of national knowledge and installed institutional and organizational capacity. The Technical Advisory Committees advise the Commission, Emergency Operations Center and other coordination entities of the National Risk Management System on specific topics of their competence.

b. National Risk Management Plan

The National Risk Management Plan 2010-2015 is the strategic planning instrument that defines commitments and orients resource allocations by State institutions.

The plan disaggregates information into strategic competences and commitments and identifies specific actions and goals aimed at generating changes and contributing to national development. Its content is organized along seven lines; the first five have a strictly preventive focus and the other two deal with emergency response and the reconstruction phase.

National Risk Management Plan 2010 - 2015



c. National Risk Management Policy 2016 - 2030

This year (2015), CNE has begun preparing the National Risk Management Policy for the 2016-2030 period, under which it will, with long range vision, orient and link disaster risk management actions by the State, the private sector and civil society under the stewardship of CNE.

With this policy, Costa Rica will be putting the commitments adopted internationally in the Sendai Framework for Risk Reduction 2015 – 2030 into practice in the national arena, to be implemented through five-year strategic plans.

The Sendai Framework defines four priorities for actions:

- Understanding disaster risk in all its dimensions
- Strengthening disaster risk governance to manage disaster risk—institutional arrangements; organizational, legal and policy frameworks—to manage risk efficiently and effectively
- Investing in disaster risk reduction for resilience
- Enhancing disaster preparedness for effective response, and to “Build back better” in recovery, rehabilitation and reconstruction

The National Risk Management Policy 2016-2030 will be adopting these priorities toward the expected outcome in 2030, stated as follows:

“The substantial reduction of disaster risk and losses of lives and health, and of the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.”

This aspiration recognizes the importance of animal protection to the recovery of populations affected by disasters, which should be expressed in the corresponding policy guidelines.

In this context, the National Policy brings together efforts by CNE and SENASA toward animal care during disasters, efforts that fully adhere to the value now conferred to livelihoods internationally.

Once the National Policy is established, CNE will then develop the National Plan 2016-2020 with strategic actions, goals and responsibilities over a five-year period.

This new conception of CNE’s public exercise is coherent with the international context and reflects the spirit of the Central American Comprehensive Risk Management Policy (Box 3).

Box 3
International Framework for Disaster Risk Management
<p>The international framework for national institutional strengthening in disaster risk management::</p> <ul style="list-style-type: none"> • Yokohama Strategy for a Safer World: Guidelines for the Prevention, Preparedness and Mitigation of Natural Disasters (1994). • Hyogo Framework of Action 2005-2015: Increasing the Resilience of Nations and Communities, which arose from the World Conference on Disaster Reduction, in Hyogo. • Sendai Framework for Disaster Risk Reduction, 2015-2030.
Central American Policy on Comprehensive Disaster Risk Management
<p>The Central American Policy on Comprehensive Disaster Risk Management was approved through Decision N° 15 at the 35th Ordinary Meeting of Heads of State and Government of Countries in the Central American Integration System, held in Panama on June 29 and 30, 2010. The policy aims to provide orientation for the region on disaster risk reduction and prevention, and thereby contribute to the comprehensive development of Central America.</p>
<p>General Objective</p> <p>Provide the Central American region with a framework for guiding comprehensive disaster risk management that facilitates the link between policy decisions and their corresponding application mechanisms and instruments, interlinking risk management with economic management, management of social cohesion and environmental management from a comprehensive approach (multisectoral and territorial) of respect for and guarantee of human rights, taking into account multiculturalism and gender equity.</p>

Specific Objectives

- Promote the implementation of comprehensive disaster risk management in countries of the region and in the operational and institutional structure of the Central American Integration System, as crosscutting and integral element of processes of human development.
- Encourage development processes driven in the Central American region to be designed in conditions of comprehensive security, incorporating the approaches of risk management and land management as unit of development.
- Work toward the harmonization of comprehensive risk management policies and strategies in the region with others adopted in the economic, social and environmental subsystems of the Central American Integration System.

The Secretary General of the Central American Integration System, through CEPREDENAC (Coordination for the Prevention of Natural Disasters in Central America) is responsible for overseeing the implementation of policy mechanisms and facilitating the dynamics of promotion and coordination toward other bodies of the System and between secretariats and subsystems.

Source: CEPREDENAC 2011

d. Technical Advisory Committee for Animal Protection in Disasters

Given the importance of animal management in emergency and disaster situations, CNE recently formed the Technical Advisory Committee for Animal Protection in Disasters (CATPAD, Spanish acronym), through Decision N° 061-03-2015 by CNE's board of directors. The committee advises CNE and other bodies of the National Risk Management System as an inter-institutional and inter-organizational entity with a professional perspective in this area, and directly coordinates its actions. Given its role in animal care during disasters in the country, SENASA participates in CATPAD.

The protection of Costa Rican livelihoods, continuity of livestock production during and after disasters, the dynamics of diseases in adverse situations, appropriate management of live animals (both domestic and wild) in disaster situations, and suitable disposal of cadavers are all matters of common interest to the different institutions making up the committee.

CATPAD is thus the prime advisory body to CNE and the National Risk Management System regarding animals, and seeks to promote prevention, preparedness and effective response in an emergency or disaster.

Technical Advisory Committee for Animal Protection in Disasters

Main Objective:

Contribute to comprehensive national disaster risk management with an emphasis on animal protection and health, strengthening prevention, preparedness and risk reduction, and promote interinstitutional strategies, programs, protocols and procedures for effective response and recovery from disasters or emergencies.

Specific Objectives:

- Generate information to support decision making on disaster risk reduction.
- Provide advising and accompaniment in areas of competence to the Emergency Operations Center and coordination entities of the National Risk Management System.
- Reinforce animal welfare to safeguard public health, human life and livelihoods.

Basic Functions:

The committee's functions are framed within the sphere of prevention, preparedness and response to disaster or emergency situations:

- Advising
- Recommendations
- Convergence and negotiation
- Induction
- Communication - Information
- Special support
- Consolidation of policies

Core areas to develop:

- Coordinated intervention under technical/scientific institutional procedures.
- Mutual interinstitutional assistance.
- Strategic alliances and continuous improvement.

Advising and support from national and international organizations represented in Costa Rica:

- World Animal Protection, as non-governmental organization, given its extensive international experience.
- Representatives of other organizations CNE considers advantageous due to recognized capacities and specialties in animal protection and health.

Source: CATPAD (2015).

4.4. Animal Risk Management in Disasters

SENASA leads animal risk management in disasters through the National Program of Animal Management in Disasters. The program was created in November 2009, with the Cinchona earthquake and legal foundations for creating SENASA as background. The program was fueled by initiatives of animal management in disasters previously implemented by CNE.

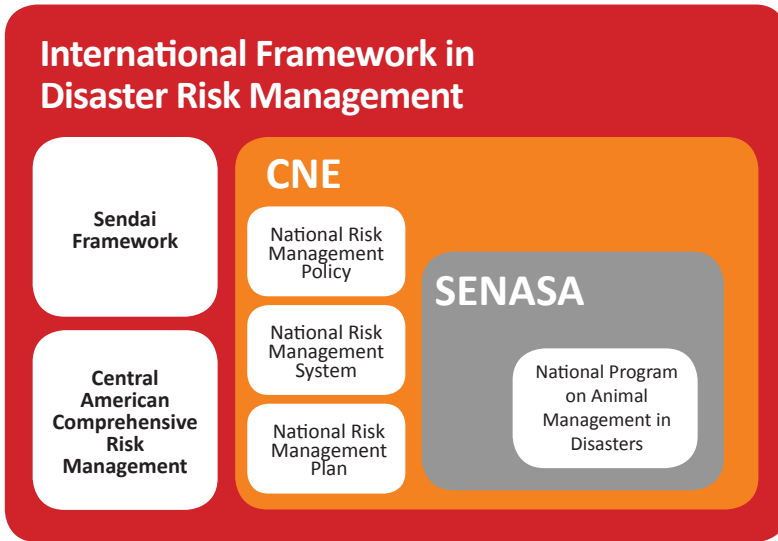
With the program's creation, Costa Rica became one of the first countries in the region to institutionalize this theme in an official veterinary service.

SENASA had acted in close coordination with CNE previously, and with the program's creation intersectoral coordination was consolidated. It directs SENASA activities and relations with the different stakeholders in the national risk prevention and emergency response system. There is a national coordinator who interacts with the institution's eight regional departments.

The purpose of the program is to ensure the continuity of Costa Ricans' way of life and livelihoods, as well as the survival of their production and companion animals in emergencies or disasters. Its objectives are to protect public health, animal welfare and production, and to maintain control over veterinary health and contribute to the resilience of the livestock sector.

Acting in accordance with OIE animal health principles, SENASA integrates disaster risk management in its regular work, recognizing CNE's leadership in moving forward a synergetic and articulated process. The program forms part of the Technical Advisory Committee (CATPAD). Figure 3 shows SENASA's national and international framework of action in disaster risk management.

Figure 3. Framework of Action by SENASA in Disaster Risk Management

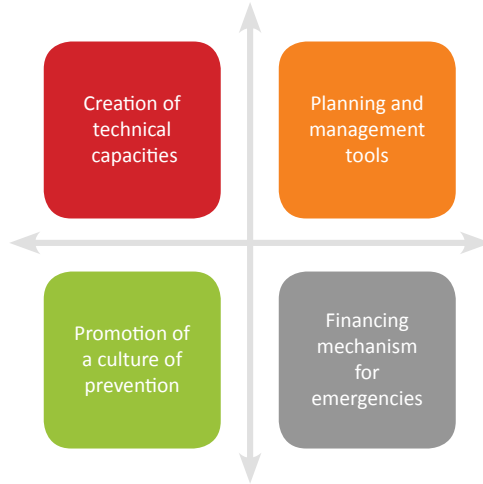


4.5. Mechanisms of Animal Care in Disasters

Through the National Program on Animal Management in Disasters, SENASA has been implementing a series of mechanisms for animal care during disasters. These efforts have been supported by national and international organizations, particularly World Animal Protection, renowned for its experience in risk management and climate change adaptation in relation to animals. The organization has also conducted educational initiatives with academia and in communities.

Mechanisms include the creation of new management and planning capacities and emergency response tools to complement those already existing. SENASA's efforts have also focused on the implementation of financing mechanisms and promoting a culture of prevention (Figure 4).

Figure 4. Mechanisms for Animal Care in Disasters



Costa Rica has made significant strides in animal care during disasters, albeit much remains to be done in terms of securing comprehensive risk management and the resilience of the livestock sector.

4.5.1 Creation of Technical Capacities

Technical capacities have been built on the foundation of general concepts and procedures allowing for a better understanding of animal management in emergencies and disasters. Accompanying this learning are specific tools that facilitate intersectoral coordination and systematized methodology to improve intervention efficiency.

Figure 5. Creation of Technical Capacities



a. Training on Animal Management during Disasters

Given the lack of systematized procedures and protocols for animal care in emergencies, SENASA began training its field staff with support from World Animal Protection. One hundred officials acquired knowledge about basic concepts, damage assessment, planning for interventions and the implementation of relief operations.

b. Training on the Incident Command System

Supported by the National University of Costa Rica (UNA, Spanish acronym) and World Animal Protection, SENASA trained 100 officials in a tool called “Incident Command System” (ICS) to direct, supervise and coordinate better emergency response.

ICS was conceived in the 1970s in the United States after a series of fires in southern California, when deficiencies were detected in the joint emergency relief work of different organizations. While originally designed for application in forest fires, the concept has evolved for response to all types of emergencies. The organization of ICS is based on command, planning, operations, logistics and finances (administration).

SENASA’s use of the Incident Command System assures better performance in emergency animal care in full coordination with the National Risk Management System.

c. Training on LEGS (Livestock Emergency Guidelines and Standards)

Supported by World Animal Protection, SENASA formed a team of instructors in standards and guidelines for livestock relief interventions (LEGS), an initiative to protect the livelihoods of livestock-dependent populations in humanitarian crises (Box 5). Trainings were held in Mexico (2012) and Panama (2013). From this initial instruction, 207 “LEGS technicians” were formed, including SENASA staff (100 people) and the Ministry of Agriculture.

Box 5

Standards and Guidelines for Livestock Interventions in Emergencies (LEGS)

• What is LEGS?

The LEGS initiative includes a set of international guidelines for the design, application and assessment of livestock interventions to assist people affected by humanitarian crises.

They are based on livelihood objectives that aim to provide rapid assistance to protect and rebuild the livestock assets of crisis-affected communities.

LEGS supports both the saving of lives and the saving of livelihoods through two key strategies:

- Assisting in the identification of the most appropriate livestock interventions in emergencies.
- Providing standards, indicators and guidance notes on these interventions based on good practices.

• Who should use LEGS?

Anyone involved in projects related to livestock in emergencies can apply the LEGS initiative:

- Persons, relief organizations, bilateral and multilateral agencies and governments that provide emergency assistance in areas where livestock represent an important livelihood
- Policy and decision makers in donor and government agencies (those whose funding and implementation decisions impact on emergency response)
- Educational institutions and community-based organizations

• The focus of LEGS

LEGS focuses on the overlap between emergencies, livelihoods and livestock, and its emphasis is on the need to protect animals during an emergency and assist in the subsequent reconstruction of agricultural assets. Because livestock are vital in different environments and parts of the world, LEGS covers both rural communities and urban and peri-urban (backyard) areas.

Source: LEGS (2014)



LEGS training

4.5.2 Generation of Planning and Management Tools

Because of the need to respond to non-epidemic emergencies, the National Program for Animal Management in Disasters has created ideal tools or tools complementing the ones it already had that were designed to support the institution's ordinary work and response to epidemic emergencies.

a. Vulnerability and Impact Maps

SENASA makes use of its Information System for Registration of Livestock Establishments (SIREA, Spanish acronym) to estimate the vulnerability of farms and animals, and the area impacted in an emergency. SIREA is a web platform that centralizes information about livestock establishments and makes it possible to visualize, capture, maintain and analyze geographical data, and interact with maps and images.

Vulnerability maps are then prepared using the SIREA database, historical data and specific information about the event in question. Once the number of farms and animal population in an affected area is known, informed decisions can be made. This also facilitates the preparation of emergency plans, planning of support logistics (feed, medical care, evacuation etc.) and estimation of possible damage and loss.

Once in the field, information on vulnerability maps is verified, impact maps are prepared and actual damages and losses are estimated.





Vulnerability and impact maps.

b. Emergency Plans

The new demands posed by animal care in emergencies have prompted SENASA to enhance its capacities, and thus LEGS guidelines are now starting to be applied in the assessment and identification of emergency response interventions. Residents can be supported more efficiently and producers can participate in identifying solutions to build resilience in the communities impacted.

4.5.3. Formation of VERU Teams to Support Animal Care in Emergencies

Together with the UNA School of Veterinary Medicine, World Animal Protection organized emergency response training in 2007. A year later the initiative was transformed into the Training Program for Veterinary Emergency Response Units (VERU), based on humanitarian relief contents available at that time when response was the priority issue.

The program was adopted by the UNA School of Veterinary Medicine as an outreach project called “Project VERU”.

The objective is to train advanced veterinary medicine students in logistics and animal care during disasters. Ultimately, the idea was to have trained volunteers who would collaborate in such tasks at the national level.

In 2014 UNA also reinforced its institutional disaster risk management program by incorporating Project VERU in its actions. Along with specific training in emergency response, work includes the formulation of preparedness plans recognizing the role of animals in livelihoods.

Thanks to this initiative, VERU teams are continually being formed. Professionals with competence in disaster risk management commit to joining the first response brigade when an emergency arises anywhere in the country, always in coordination with SENASA.

With the aim of reducing community vulnerability, VERU has evolved over the years and from 2011 to 2012 climate change adaptation was included to produce veterinarians with competence in risk management and climate change adaptation. From 2013 to 2014, the project was redesigned as an online course and risk management was reinforced, and in 2015 its validation was initiated in Mexico, which had already started training course instructors. The online training is currently endorsed by UNISDR. Box 6 outlines the course contents.

Box 6	
VERU Course: Risk Management and Climate Change Adaptation for Veterinarians	
Disaster Risk Management	<ol style="list-style-type: none"> 1. Terminology and concepts of disaster risk management: <ul style="list-style-type: none"> - Basic concepts - Disaster classification - Relation between disasters and development - Areas of disaster risk management - Action framework for disaster risk reduction - Stakeholders' involvement in disaster risk management
	<ol style="list-style-type: none"> 2. Analysis and planning of disaster risk reduction: <ul style="list-style-type: none"> - Identification - Specific vulnerabilities of animals - Risk mapping - Prioritization - Risk analysis matrix - Disaster risk reduction plan - Advantages for the community
	<ol style="list-style-type: none"> 3. Companion animals

Adaptation to climate change	<p>4. Adaptation to climate change:</p> <ul style="list-style-type: none"> - Fundamentals of climate change - Impact of climate change - Disasters and climate change - Actions to address drought - Impact of climate change on animals - Examples of climate change in different regions - Adaptation to climate change for the livestock sector
Animal care in emergencies	<p>5. Safety in emergencies</p> <ul style="list-style-type: none"> - Safety and biosafety - Zoonosis
	6. Incident Command System
	7. Triage
	<p>8. Evacuation of animals</p> <ul style="list-style-type: none"> - General actions before evacuation - Production animals - Domestic animals - Transport - Management of cadavers - Programs on Animal Management in Disasters
	<p>9. Standards and guidelines for livestock interventions in emergencies: Introduction to LEGS</p> <ul style="list-style-type: none"> - Preliminary assessment - PRIM matrix for response identification - Analysis of technical interventions - Monitoring and evaluation
	10. Role of the veterinarian
	11. Animal welfare

Source: World Animal Protection (2015).

VERU teams have been able to support SENASA in emergency response on several occasions, specifically with medical care, feeding and evacuation of animals (Table 5).

Table 5. Animals Assisted in Emergencies by VERU Teams

Emergency	Year	Number of animals helped (*)
Drought in Los Chiles, Alajuela	2008	1400 (cattle)
Floods in Guanacaste (Ortega, Bolsón)	2008	1200 (cattle, pets)
Flooding in Limón (Talamanca)	2008	2400 (pets)
Cinchona earthquake (Vara Blanca)	2009	6800 (cattle, pets)
Floods in Cartago	2009	1800 (cattle, pets)
Floods in Parrita	2010	8000 (cattle, pigs, goats, birds and pets)

(*) These figures refer only to animals assisted by VERU teams and do not represent total animals aided in these emergencies.



4.5.4. Promoting a Culture of Prevention

To secure the role of owners (companion and producer animals) as the first line of response in a disaster, World Animal Protection and SENASA launched two awareness campaigns at the urban and rural level.

Through this focus on prevention, in which all stakeholders in animal care are reminded of their shared responsibility, SENASA hopes to carry out its work more efficiently so as to minimize losses from a disaster.

a. “Trueno” Awareness Campaign

Implemented for three-month periods from 2012 to 2014, the “Trueno” awareness campaign geared to prevention was aimed at pet owners in predominantly urban areas.

The design of the campaign, which included both television and digital media, was based on an investigation to determine pet owners’ degree of preparedness if an emergency should arise. The target public consisted of 25 to 65 year olds, “heads of household” or “main purchasers,” at medium and high socioeconomic level, essentially urban residents and pet owners (30% of the country’s urban population).

By the end of the campaign, the number of people who had taken preventive measures in care for their pets had risen. From the 2% who had an emergency plan in place for their pet at the start of the campaign, this number increased to 21%, and the percentage of pets with identification went from 5% to 20%.



“Have an emergency plan that includes the whole family”



b. “Community Education”

In 2014, an awareness campaign called “community education” was deployed, aimed at livestock owners in Sarapiquí. The initiative consisted of workshops and demonstration activities, given a baseline study determining that these modalities would be the most appropriate.

By the end of the campaign, 80% of the producers who attended the workshops had taken some type of measure to reduce the main risks identified. Here are some of the impressions participants shared.

A 72-year old woman whose income depends on her 80 head of cattle and three dogs, said:

“The floods affect us a lot, because the water rises and flood the animals’ grazing areas. The workshops helped me a lot [...] They gave me some guidance about how to build sheds to protect the animals.”

A 54-year old producer belonging to the local chamber of ranchers said:

“The workshops help you handle any type of disaster, like floods and earthquakes. My property is in the heart of the town, so everything I learn is reflected in the

community. With the workshops people really got educated and they understood it really well.”

Box 7 outlines the tasks in this community education process as a reference for similar activities.

Box 7	
Educational process for effective emergency management, including animals	
a. Identification of work zones	To identify priority zones for training
b. Design of timeframe	To help visualize the tasks necessary to reach the objectives
c. Diagnostic stage	To ascertain inhabitants’ needs and interests, and determine the core theme of the project and any specific topics that could be covered
d. Definition of work objectives	To clarify the goals to which the work will be geared, and experiences during the process. Also allows the coordinating organization to lay a solid theoretical foundation for the participants.
e. Outline of the contents (definition and scope)	To indicate the theoretical framework for educational processes
f. Design of the workshop and evaluation process	Activities planning reminds facilitators to order activities for overall congruence in the workshop
g. Call for Participation (format and development)	Informs the target audience about the project that is about to begin, providing essential information regarding theme, dates, scheduling, place, and other data
h. Workshops	Workshops are the core means to raise awareness and inform the target audience about the contents to be addressed, and promote the self-managed work the group must do afterwards.

i. Work records

Provide an account of what occurred in order to make decisions about subsequent activities

j. Evaluation

Provides the necessary feedback for enrichment or change should the project be repeated. The evaluation also captures participants' assessment of the activities.

k. Closing Activity

By concluding the training and awareness process with a recreational activity, the construction of learning can be concluded in an atmosphere of camaraderie, trust and motivation about subsequent work in the communities.

Source: World Animal Protection (2015)

c. Training for Producers

SENASA has currently included aspects of animal management in disasters in the training activities that operational regions regularly provide for producers.

d. Other Initiatives to Increase Resilience

As part of the measures financed with the emergency fund activated in February 2015, SENASA plans to implement a pilot aquaponics system as a novel option to support livestock producers affected by droughts triggered by El Niño. This technique brings together hydroponics and fish cultivation, in which water from the tanks is run to trays where crops are grown in the midst of drought. The goal is to set up eight demonstration modules in the regions affected and teach producers how to implement this practice.

These initiatives are aimed at promoting food security, reducing dependence on humanitarian aid and building the communities' resilience.

4.5.5. Financing Mechanism for Emergencies

Through Decree N° 37828-MAG of 2013, SENASA established regulations for the emergency device set out in General Law N° 8495, defining the mechanisms

necessary to reestablish animal health and veterinary public health in an epidemic or non-epidemic health emergency, and maintain the country's health status.

For this, SENASA has defined health emergency as the exceptional situation or event caused by humans or nature that jeopardizes animal health or veterinary public health, and which generates a critical state and need requiring that SENASA take urgent or immediate actions within the scope of its competence.

Epidemic Emergency

Can be of accidental or intentional origin (bioterrorism) due to outbreaks of emerging or reemerging diseases in animals, such as the appearance of exotic diseases, that meet OIE notification criteria. Epidemic emergencies can be associated with non-epidemic emergencies or disasters.

Non-epidemic Emergency

Situation or process triggered by a natural or anthropic phenomenon that, when encountering conditions that foster a population's vulnerability, causes intense alterations of the community's normal functioning, such as losses associated with veterinary public health, the continuity of animal-sourced food production, animal welfare, livestock assets, commercialization of products and byproducts of animal origin, and the environment.

It is the responsibility of the Executive Power to declare a health emergency (national or regional). Once declared, SENASA activates the appropriate Health Emergency Plan and immediately takes charge of its direction.

For health emergencies of lesser magnitude, it is up to the Director General of SENASA to issue a resolution declaring the emergency and stating the technical and legal criteria that justifies the decision.

In these lesser emergencies with lower impact yet requiring SENASA's immediate attention due to the potential risk, response is carried out using the institution's ordinary budget and following streamlined procedures.

Decree 37828-MAG also established an ad hoc health emergency commission that serves as advisory and consultation body for the Director General's office and defines contracting processes when responding to these situations, underwritten with ordinary resources or the Emergency Sinking Fund.

Sinking Fund for Health Emergencies

The Sinking Fund for Health Emergencies includes resources from SENASA's regular budget as well as from loans, donations, allocations, fines and any other legal source of financing established for this purpose. Ordinarily up to 10% of revenues from the sale of SENASA's services is moved into this fund on a monthly basis.

SENASA administers the Fund under special accounting for better control over the resources allocated to each emergency to ensure they are accounted for and to prepare budgets and settlements that must be sent to the Comptroller General's Office. The flowchart in Figure 6 illustrates the Fund's use.

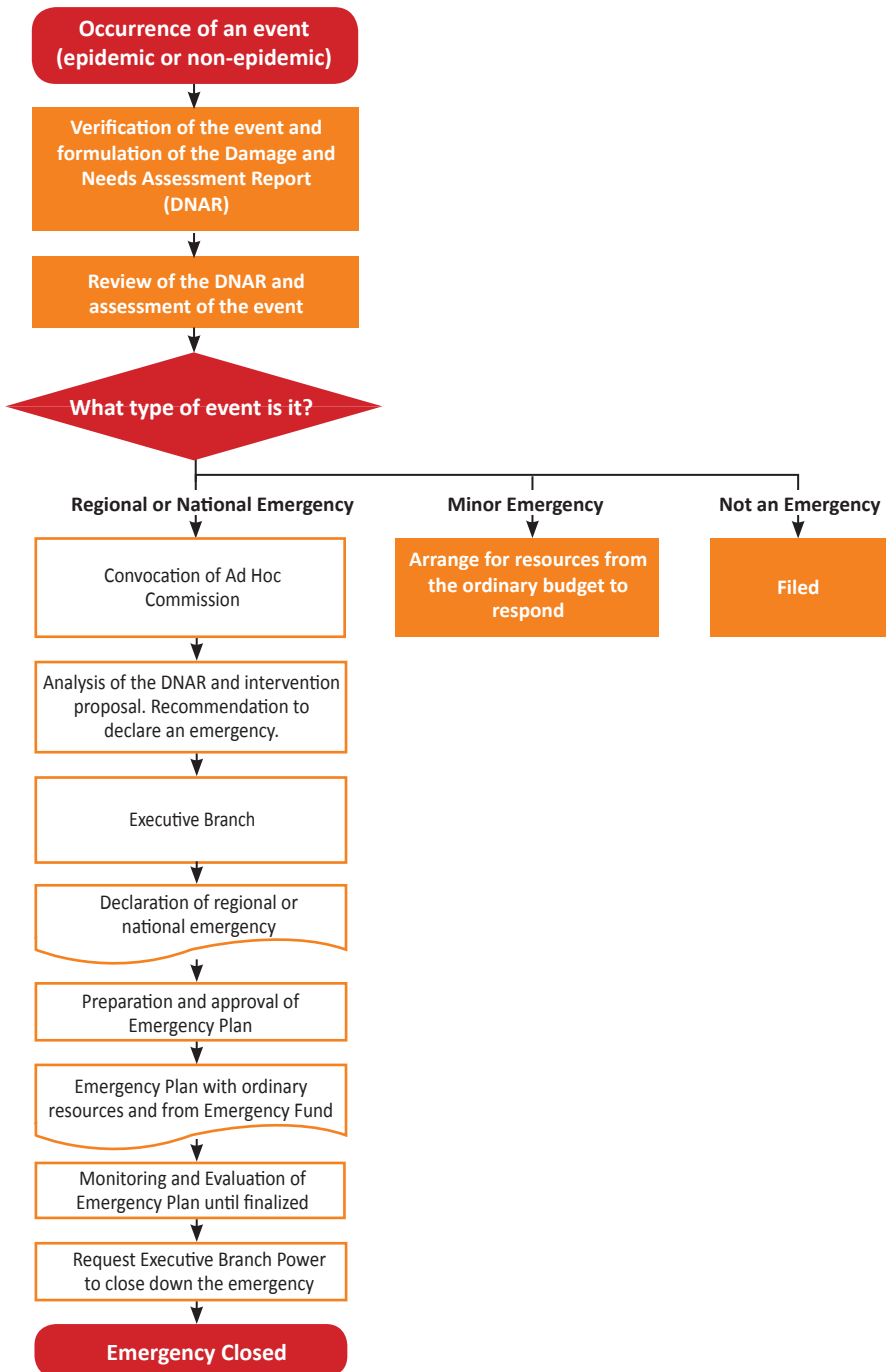
a. Simulation for Validation of the Fund's Use

In the same year that the regulations were approved (2013), SENASA conducted a simulation to test out the use of the emergency fund applying LEGS methodology.



Simulation Exercise.

Figure 6. Flowchart on Use of the Sinking Fund for Health Emergencies



Several institutions participated in the exercise: the Ministry of Agriculture, CNE, World Animal Protection, AGRIGASA, UNA, International Federation of the Red Cross, Traffic Police, and Ministry of Public Safety. International observers from Colombia and Honduras were also in attendance.

The simulation revealed areas for improvement, such as swifter procedures to activate the Fund and use its resources, and more streamlined mechanisms for intra- and inter-institutional linkage.

b. First Activation of the Fund

In February 2015, the Executive Power declared a regional health emergency, both epidemic and non-epidemic, in order to respond effectively to the needs of various stakeholders affected by either lack of rain or intense precipitation caused by El Niño. Thanks to this declaration it was possible to use the contracting mechanisms established for cases of emergency and charged to SENASA's Sinking Fund for Health Emergencies.

In these circumstances, SENASA activated the emergency fund for the first time and launched the emergency response procedures that had been set up. Overall, resources could be used more quickly than with the administrative processes followed in normal situations, while lessons were also generated on ways to perfect the financing mechanism.

It should be pointed out that on previous occasions emergency response was funded with resources programmed for other activities. Thanks to the Fund's existence, SENASA now has resources allocated specifically for this purpose.

Table 6. Declarations of Health Emergencies in the Livestock Sector

Año		Emergencia
2009	Declaration of regional health emergency (animal and phytosanitary health emergency), under the national emergency in the aftermath of the Cinchona earthquake.	From the regular budget
2009	Declaration of national animal health emergency, under the national emergency caused by presence of the AH1N1 virus.	From the regular budget
2015	Declaration of regional health emergency, both epidemic and non-epidemic.	SENASA Emergency Fund

Box 8

World Animal Protection

World Animal Protection, previously known as the World Society for the Protection of Animals (WSPA), is a global nonprofit organization that promotes animal welfare, with consultative status before the United Nations and European Social Council. It is active in more than 50 countries, and has played a pioneering role in the search for solutions to reduce animals' suffering, among other ways by working directly with communities.

In the area of disaster management, World Animal Protection has more than 50 years of collective experience worldwide protecting animals and the people who rely on them. Animal protection is an integral part of any effective emergency response since there are many people, especially those with few resources, who depend on animals to survive.

World Animal Protection establishes agreements with national and local governments, NGOs and communities to provide a specialized response in case of emergency and appropriate planning for risk reduction. Likewise, it helps prepare leaders who ensure that solutions are implemented benefitting both animals and people.

Through the Regional Office in Costa Rica, in Latin America World Animal Protection has promoted disaster risk reduction and training in emergency preparedness aimed at public institutions and the private sector in Colombia, Argentina, Mexico, Jamaica, Panama and Costa Rica.

The organization is also a member of the following:

- The Risk, Emergency and Disaster Task Force for Latin America and the Caribbean (REDLAC), an interagency group coordinated by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA).
- The OIE Animal Welfare Committee.
- The United Nations Humanitarian Response Depot, administered by the Food and Agriculture Organization.



4.6. Sharing the Costa Rican Experience

Costa Rica's experience in disaster animal response has awoken the interest of the international community, so much so that it has been invited to share its form of action in national and international forums. These include:

- a) The *Third World Conference of the United Nations on Disaster Risk Reduction*, in Sendai, Japan, March 2015, organized by UNISDR, where the Sendai Framework for Disaster Risk Reduction was adopted. The conference was attended by 6,500 people, including 2,800 government representatives from 187 countries. Another 143,000 individuals visited during the five days of the conference.

Several public forums took place while the event was occurring, one organized by World Animal Protection entitled, “*Testing successful solutions: a collaborative approach to reducing animal losses from disasters*”. In its presentation on the inclusion of livestock in disaster risk reduction plans, the cases of Costa Rica, Mexico and India were used as examples.

- b) The hemisphere-wide forum on *Management of Animal Risks in Emergency Situations. Increasing the Resilience of the Livestock Sector*, held in November 2014. This event was organized by IICA, SENASA and World Animal Protection for countries of the Americas, to share general aspects of animal management in situations of emergency and facilitate analysis based on Costa Rica’s experience.

Fifteen countries participated in the forum, which was webcast.

- c) The *National Conference on Animal Management in Disasters*, in New Delhi, April 2013, organized by the National Disaster Management Authority of India with the support of World Animal Protection as a forum of reflection on the topic. It was aimed at government institutions and policymakers, the UN and other international organizations, academia and the media, among others. Costa Rica’s Minister of Agriculture and Livestock gave a presentation at the plenary session on the country’s advances in this area.

Participating in the conference were 213 delegates of India and five other countries, as well as 32 national and international experts.



Hemispheric virtual forum: Animal Risk Management in Emergency Situations. Increasing the Resilience of the Livestock Sector. November 2014.

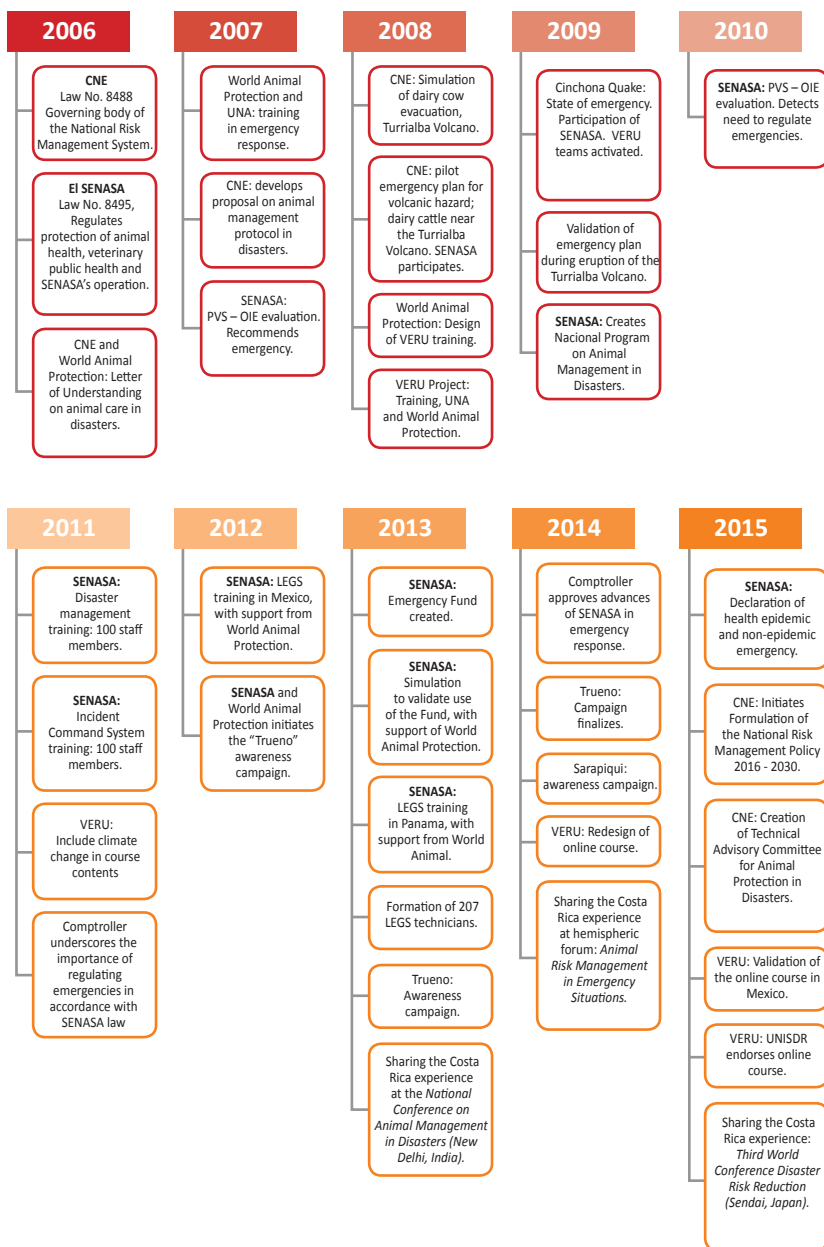
In an international context where leading organizations in disaster management and animal health increasingly recognize the importance of preserving livelihoods and good animal management in emergency situations, Costa Rica's experience holds a special place in the global aspiration of comprehensive risk management.

Including disaster risk management in the Official Veterinary Service strengthens its objective of protecting animal health, veterinary public health and animal welfare. This contributes to reducing the risks that accompany disasters and increasing the resilience of the livestock sector.

4.7. Benchmarks in the History of Costa Rican Experience in Risk Management and Animal Care in Disasters

During activities to systematize what has been done thus far (Figure 7), benchmarks in risk management and animal care during disasters in Costa Rica were identified by the actual protagonists of that history. Every one of the changes, innovations and lessons learned has been described in this publication.

Figure 7. Benchmarks in the History of Risk Management and Animal Care during Disasters in Costa Rica



Modern regulatory framework: SENASA law

Creation of National Program for Animal Care in Disasters

Creation of technical capacities (animal management in disasters, ICS, LEGS, etc.)

Promotion of a culture of prevention (awareness, community education)

Greater efficiency in management of health risks

- Disaster risk reduction
- Increased resilience of livestock sector



Workshop to systematize experience, April 2014



5. Lessons Learned and Improvement Opportunities

5.1. Lessons Learned

- a) *Institutionality for attention to disaster risk adopts a modern vision recognizing the importance of prevention and of the intersectoral work required for animal care in disasters*

In accordance with international frameworks, particularly the Sendai Framework, the National Commission on Risk Management and Emergency Response (CNE) operates under a comprehensive vision of disaster risk management. It therefore exercises a permanent supervisory function so that State agencies and entities in each sector include risk management criteria in their planning and execution of plans, programs, and projects for national development.

In addition, CNE, the Emergency Operations Center and other coordination bodies in the National Risk Management System are advised by interdisciplinary technical teams organized according to interrelated technical themes. The Technical Advisory Committee for Protection of Animals in Disasters, in which SENASA participates, was formed as part of this framework. Its main objective is to contribute to comprehensive management of disaster risk in the country, with an emphasis on animal protection and health.

b) Sustainable improvement of the Official Veterinary Service

SENASA maintains a process of continual improvement, establishes priorities and implements initiatives based on a strategic plan. For these purposes, its performance is continuously evaluated according to OIE international standards, national guidelines and internal control rules. This strengthens essential aspects of its mission as veterinary service.

Based on the improvement opportunities identified in health emergency response and disaster risk management, SENASA strengthened its form of action in emergency animal care by adopting a vision based on prevention and reduction of natural risks.

c) Modern regulatory framework to address current and future challenges and opportunities in animal health and veterinary public health

The SENASA law reflects requirements established in international standards in order to ensure good governance of veterinary services.

This law laid the foundation of general rules to address emergencies swiftly and expeditiously. In this framework, SENASA created a sinking fund for emergencies, both epidemic and non-epidemic, and has moved forward in comprehensive risk management and animal care in disasters.

d) Inclusion of disaster risk management in the Official Veterinary Service

SENASA created the National Program for Animal Management in Disasters, which is in charge of specifying and structuring animal care procedures in non-

epidemic emergencies, and interacts with CNE as part of the National Risk Management System.

The incorporation of social and environmental factors in risk management, facilitated by adopting methods such as LEGS and raising awareness in civil society through different means, strengthens veterinary public health and animal health. This also helps assure the resilience of the livestock sector and wellbeing of communities, food security and the sustainability of livelihoods.

e) Adoption of the international framework furthers institutional modernization and transformation in risk management

The rapid adoption of international guidelines on disaster management has marked the rate at which attention to this issue has evolved in the country, at the level of both CNE and SENASA. This change enables a comprehensive protection of the country's health conditions, aimed at achieving sustainable agriculture based on prevention, an attitude that will unquestionably lead to the country's development.

f) Awareness and capacity building for institutional transformation and modernization

Awareness and training are the mainstays for effecting changes in animal management during disasters in the country.

They involve inductive processes that recognize changes occurring in the international context, assess emerging issues, and take into account aspects of ownership and gradualness for the progressive development of capacities.

g) Collective action of institutions in risk management

Collective action strengthens the National Risk Management System, as its experience is complemented by the resources and technical capacities of other sectors. This is vital when implementing a national strategy, especially given the magnitude of the hazards to which the country is exposed.

The participation of the private sector and organized civil society is thus a key element in strengthening the National Risk Management System.

h) Leadership as driver for institutional transformation and modernization

The transformations that have taken place in disaster risk management and led to the inclusion of animals have been driven by the leaders of participating organizations. These individuals continue exercising leadership in their milieu and with their work teams to ensure the sustainability of what is achieved and to continue improving processes.

i) The role of international cooperation

World Animal Protection, renowned for its experience in risk management and climate change adaptation in relation to animals, accompanied institutional transformation and strengthening to make a shift in disaster risk management by including animal protection in emergencies.

This was done through cooperation and capacity building, and maintained until SENASA acquired the necessary capacities to respond to emergencies and give continuity to the formation of specialized human capital, not just in emergency response but also in preparedness and prevention phases.

5.2. Challenges and Improvement Opportunities

Costa Rican experience in risk management and animal care in disasters underscores the importance of comprehensive management of health hazards for sound disease control, no matter whether risks are epidemic or non-epidemic. This process, which has been evolving over the years, now includes animal management and promotes prevention, risk reduction, and the preservation of livelihoods, in order to strengthen the resilience of livestock sector.

Now that SENASA has a more active role in the National Risk Management System and a broader vision of health risk management, it has more possibilities for protecting animal health, public health and animal welfare as essential components of its mission, and contributing more effectively to national development.

When analyzing the experience, however, protagonists identified the following opportunities for improvement and for the sustainability and consolidation of achievements obtained thus far.

- a) Assure that the National Program for Animal Management in Disasters has technical and operational capacities to periodically update the emergency plan and disseminate it through training programs and simulations. Updating must also reflect changes in the international framework of disaster risk management.
- b) Strengthen the financing mechanism with procedures enabling more rapid use of resources. Also, assess the Fund's capacity for efficient emergency response, based on more experience in its use. Analyze the possibility of setting aside a minimal amount during annual programming, and securing resources from other sources as anticipated in the emergency decree.
- c) Continue ongoing preparation of technical and administrative staff, and constantly review and update technical and administrative emergency response procedures to ensure comprehensive risk management by SENASA. It is hoped that a broad vision will be maintained in the approach to diseases, and that animal management continues to be included in disaster risk management.
- d) Assure SENASA's active participation in the Technical Advisory Committee (CATPAD) and linkage of its actions in the national risk management framework.
- e) Strengthen work with the private sector and communities so that animals are also included in family emergency plans, thereby generating civil co-responsibility in emergency response. Likewise, promote community training by applying differentiated strategies that ensure the equitable linkage of both men and women. Disaster risk management is everyone's responsibility: communities, public sector and private sector.
- f) Maintain a database in the National Program for Animal Management in Disasters that includes information on declared emergencies, minor emergencies, damages and losses, resources invested, etcetera, so that studies can be made to assess the impact of emergencies, the benefits of the measures adopted, effectiveness in how the Fund is used, and other factors. Such information aids planning, decision making and the presentation of arguments in the policy sphere.
- g) Encourage alliances with international cooperation agencies and academia to address training needs in animal management and risk management, and assess mechanisms to take advantage of the capacities of veterinary professionals with risk management experience, such as the VERU teams.



Some Thoughts Expressed by Protagonists

Jason Quirós, AGRIGASA

“Thanks to the joint work of SENASA, World Animal Protection and producers, AGRIGASA is now interested in doing several projects with the producers. And it wants to help people be better prepared to deal with an emergency and have better capacity to recover.”

Luis Antonio Molina, Coordinator of the National Program for Animal Management in Disasters, SENASA

“While many countries have health emergency funds, Costa Rica expanded SENASA’s field of action by putting it in charge of response to both epidemic and non-epidemic emergencies [...] With the fund, SENASA can take swifter action ...”

“And by providing help to animals affected by an emergency, we help increase the resilience of the livestock sector in Costa Rica...”

Sandra Saborío, CNE

“Caring for animals when an emergency breaks out is work that poses institutional challenges, such as opening up credit to purchase inputs and feed for domestic animals and livestock [...] In addition, rations of feed for domestic animals must be included with the rations of food for people.”



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